#### Abstract no.: 41405 EXPRESSION PROFILE OF LONG NONCODING RNAS IN HUMAN OSTEOARTHRITIC CARTILAGE

Guangxin HUANG, Ming FU, Zhiqi ZHANG, Zhiyu HUANG, Baoxi YU, Hong SUN, Ziji ZHANG, Zibo YANG, Weiming LIAO

Objectives: Long noncoding RNAs (IncRNAs) have emerged as a novel class of regulatory molecules involved in various biological processes, but their role in osteoarthritis (OA) remains unknown. Therefore, we aimed to reveal IncRNAs expression profile in human osteoarthritic cartilage and explore the potential functions of IncRNAs in OA. Methods: The expression profiles of IncRNAs and mRNAs in cartilage were obtained using microarray and verified by quantitative reverse transcription polymerase chain reaction (qRT-PCR). Bioinformatics analyses including IncRNA classification and subgroup analysis, gene ontology analysis, pathway analysis, network analysis and target prediction were performed. Results: There were 3007 upregulated IncRNAs and 1707 downregulated IncRNAs in OA cartilage compared with normal samples (Fold change>2.0). In addition, 2136 mRNAs were upregulated and 2,241 mRNAs were downregulated in OA cartilage (Fold change>2.0). The gRT-PCR results of six dysregulated lncRNAs were consistent with the microarray data. 106 IncRNAs and 291 mRNAs composed the coding-non-coding gene co-expression network. In the 600 top differentially expressed IncRNAs, 48 IncRNAs were predicted to have more than five cis-regulated target genes and up to 530 IncRNAs might regulate their trans target genes through collaboration with transcriptional factor SP1. The positive correlation between IncRNA uc.343 and predicted target homeobox gene C8 (HOXC8) expression in SW1353 cells treating with interleukin-1 beta confirmed the target prediction to some extent. Conclusions: This study revealed the expression pattern of IncRNAs in OA cartilage and predicted the potential function and targets, which indicated that IncRNAs may be new biomarkers for diagnosis or novel therapeutic targets of OA.

## Abstract no.: 39141 CHONDROCYTE-SEEDED ECM DERIVED MICROCARRIERS AS BUILDING BLOCKS FOR ARTICULAR CARTILAGE REPAIR IN A RAT MODEL

Heyong YIN, Zhen SUN, Jiang PENG, Xun SUN, Shibi LU

We have developed innovative microcarriers derived from cartilage extracellular matrix (ECM). Articular cartilage slices from the porcine joint were physically shattered, filtrated by steel sieves with a sieve pore of 250µm and 125µm in diameter successively, and then decellularized using 1% SDS. After these processes, ECM derived microcarriers (CEMMs) with diameters of approximately 125 µm to 250 µm were prepared. On histology, CEMMs showed most of the ECM components after cell extraction, and scanning electron microscopy revealed a nearly-circular appearance and with pompons on the surface. Under Microgravity culture conditions in a rotary cell culture system (RCCS) bioreactor, chondrocytes can rapidly proliferate on the surface of CEMMs. Further, the CEMMsadhered culture under dynamic culture condition displayed increased levels of the differentiation marker Collagen-II, SOX-9, and ACAN and reduced levels of the dedifferentiation marker COL1A1 compared with static culture. In vivo study, building blocks of chondrocyte-seeded CEMMs were used to repair trochlear cartilage defect in a rat model (CEMMs group). Histological results at 6 and 12 weeks showed that the CEMMs group led to repair tissue that consisted of more hyaline-like cartilage tissue. While the control groups generally led to the formation of fibrocartilage repair tissue. Microcomputed tomography revealed that CEMMs group had more mineralized bone formation than that of control groups. To our knowledge, this is the first article that prepare innovative microcarrier derived from cartilage ECM and the derict use of chondrocyte-seeded CEMMs as building blocks for in vivo articular cartilage repair successfully.

# Abstract no.: 39738 LONG NONCODING RNAS EXPRESSION SIGNATURES IN CHONDROGENIC DIFFERENTIATION HUMAN BONE MARROW MESENCHYMAL STEM CELLS

Liang WANG, Yipeng WANG, Bin YU, Zhengyao LI, Ziquan LI

Long non-coding RNAs (IncRNAs) have been established to participate in various biological processes that are crucial for development and differentiation. However, the roles of IncRNAs in the mechanisms of human bone marrow mesenchymal stem cells (MSCs) differentiation are not completely understood. The purpose of the study was to investigate the expression profiles of IncRNAs during the chondrogenic differentiation of human bone marrow MSCs, with a view to studying the biological function of IncRNAs and their involvement in the mechanism of differentiation. We compared the IncRNAs expression profiles of undifferentiated and differentiated cells during chondrogenic differentiation by microarray. 3638 differentially expressed IncRNAs were identified (foldchange >2.0 or <-2.0, P<0.05), consisting of 2166 up-regulated and 1472 down-regulated. Microarray data were validated using quantitative reverse transcription-polymerase chain reaction (qRT-PCR). Bioinformatic analyses were applied for further study of these differentially expressed IncRNAs. Among these IncRNAs, ZBED3-AS1 and CTA-941F9.9 were further analyzed with co-expression network and target prediction analysis. The results showed that the two up-regulated IncRNAs are likely to play important roles in chondrogenic differentiation process. In conclusion, the expression profile of IncRNAs was significantly altered during differentiation process. It provided a new insight on complicated regulation mechanisms of human bone marrow MSCs chondrogenic differentiation.

## Abstract no.: 41851 ARE THE LEADING DRUGS TO FIGHT AGAINST STAPHYLOCOCCUS AUREUS REALLY TOXIC TO CARTILAGE?

Mehmet ISYAR, Mustafa DOGAN, Ibrahim YILMAZ, Bulent BILIR, Duygu YASAR SIRIN, Selami CAKMAK, Mahir MAHIROGULLARI

Objective: The aim of the present study was to investigate the effects of antibiotics, which are used against staphylococcus aureus, on human chondrocytes in vitro. Methods: Primary cell cultures obtained from gonarthrosis patients were divided into two main groups. One of these groups were designated as control chondrocyte culture. Other group was divided into three groups and each group was exposed to antibiotics vancomycin, teicoplanin, and linezolid respectively. Cell culture samples were characterized by immunophenotyping following incubation of three different antibiotics. Before and after administration of agents, cultures were subjected to inverted and environmental scanning electron microscopy. The number of live cells and the proliferation rate were monitored by MTT-assay. Results: It was showed that there is not a chondrotoxic effect of Vancomycin, teicoplanin, and linezolid can safely be used in orthopedic surgery, especially against to methicillin-resistant Staphylococcus aureus agents.

#### Abstract no.: 41203 THE EFFECT OF WHARTON'S JELLY ON MENISCUS FIBROCHONDROCYTES IN VITRO AND CELL-BASED SCAFFOLD FOR MENISCUS TISSUE ENGINEERING Wei NIU

Clinical treatment for meniscus injury is still a hang-up because of weak self-repairing capability of inner avascular zone. Tissue-engineered meniscus is considered as a promising substitution for meniscus injury in future. This experiment was conducted to assess feasibility of Wharton's jelly as a kind of material for meniscus tissue engineering. Collecting Wharton's jelly from kibbling umbilical cord in differential centrifugation method, and produce a polyporous bioscaffold in freeze drying and cross-linking process. Fibrochondrocytes were isolated from rabbit's meniscus by enzymatic digestion and were cultured to passage 3. Then the cells were seeded on the scaffold and six-well plate which was coated with Wharton's jelly, and perform correlation detection after culturing for 7 and 14 days. DNA testing results showed that the material could accelerate cell proliferation, Histology and molecular biology results indicated that the material could promote secretion of collagen and glycosaminoglycan in extracellular matrix, slow down cell degeneration and maintain cell phenotype. Tissue-section result for cell-based structure showed that cells have good histocompatibility with the material, and this construct performed fibrocartilaginous characteristics. Compared to acellular scaffold, cell seeding can obviously enhance mechanical property of the scaffold. The results demonstrated that Wharton's jelly may be select as a new resource for meniscus tissue engineering.

# Abstract no.: 41312 IDENTIFICATION FOR LONG NONCODING RNA ASSOCIATED WITH OSTEOARTHRITIS IN HUMAN

Dan XING, Yang CHEN, Yang CHEN

Objective: Long noncoding RNAs (IncRNAs) are an important class of genes involved in various biological functions, but knowledge of IncRNAs in osteoarthritis (OA) is limited. The present study was to identify differential IncRNAs which expression in OA cartilage. Methods: To identify IncRNAs specifically expressed in OA cartilage, we compared the expression of IncRNAs in OA cartilage with that in normal cartilage using microarray analysis. The potential differential expression of IncRNAs was validated by real time polymerase chain reaction (RT-PCR). Furthermore, the expression of several key mRNAs associated with OA, including MMP-9, MMP-13, BMP-2, COL2A1 and ADAMTS5, was investigated by RT-PCR in OA and normal cartilage. Results: We identified 121 IncRNAs which were up- or down-regulated in OA compared with normal tissue by microarray analysis. Microarray analysis revealed 73 upregulated and 48 downregulated IncRNAs in OA cartilage compared with normal cartilage. Twenty-one of above differential expressed IncRNAs expressed 2-fold up-regulated change. The expression of 6 IncRNAs, including HOTAIR, GAS5, PMS2L2, RP11-445H22.4, H19 and CTD-2574D22.4, was up-regulated in OA compared with normal tissue in validation of RT-PCR after microarray analysis. The expression of mRNA for MMP-9, MMP-13, BMP-2, and ADAMTS5 in OA was significant higher than those in normal. However, the expression of mRNA for COL2A1 in OA group was lower than that in normal group. Conclusion: The differentially expressed IncRNAs could be associated with the pathogenesis of OA. Further functional study is critical to confirm the function of IncRNAs in OA and to explore new potential targets for therapy.

## Abstract no.: 41769 FGFS/FGFR1 SIGNALINGS REGULATE BONE DEVELOPMENT AND REMODELING PARTIALLY THROUGH BMPS/BMPR1A SIGNALINGS Fubing LI, Lin CHEN, Yongqing XU

Abstract: FGFR1 has important role in bone development. FGFR1 knock out lead to embryo lethality. To elucidate FGFR1 function in differentiated osteoblast, FGFR1 floxed mice and OC-Cre transgenic mice were used. Results shown that disruption FGFR1 in differentiated osteoblast lead to decrease bone quality but increase BV/TV, especial the mechanical property, part of the mutant mice occurred tibia spontaneous fracture. This may be lead by decreased osteoclast activity and ectopic bone formation. Fgfr1oc-cko mice serum phosphate was significant increase. Interestingly, bone formation related protein BMPRIA and BMP4 expression decreased in knockout mice, while bone formation rate, osteoblast proliferation were significant increased. To rescue the low bone quality phenotype, conditional constitutive activated ALK3 transgenic mice were used. And the rescue mice showed increased mechanical property and normal phosphate level. Meanwhile rescue mice showed significant increase BV/TV at 3 and 4 months. These results strongly suggest that FGFR1 inhibit bone formation by coupling BMP signaling. At the same time, FGFR1 inhibit osteoblast apoptosis and promote osteoclast activity.

### Abstract no.: 41539 PROTEOMIC ANALYSIS REVEALS A CROSS-TALK AMONG OSTEOBLAST AND OSTEOCLAST IN THE BONE FRACTURE HEALING AFTER TRAUMATIC BRAIN INJURY Yang LIU, Fu-Guo HUANG

Introduction: Fracture healing is regulated by the nature and extent of trauma, the stability of fracture fixation and biological processes, including immunological and developmental processes associated with skeletal ontology. Traumatic brain injury (TBI) significantly accelerating bone fracture healing. To better understand these signaling networks and identify potential targets for therapy of the delay of bone fracture healing, we characterized the secrete of blood collected from patients suffered traumatic brain injury and bone fracture separately. Methods : To study signaling molecules critical to these unique early phase within 7 days, we performed cytokines array on human blood and identified 18 secrete proteins, such as CSF2, Neuron1, PRKAA5, TGFB2, CXCL1 and Optineurin, which represent both novel and previously un-published secreted proteins. Results: RT-PCR using human specific primers showed that CSF2, Neuron1, PRKAA5, and Optineurin existed in human blood after injured. TGFB2 function as both autocrine and paracrine factors on osteroblast. In contrast, CSF2 functions as a paracrine factor expressed on osteoclast. Western blot analysis also showed the same characteristics. This current study reveals a complex traumatic brain injury induced secrete with paracrine and autocrine signaling functions that mediate cross-talk among osteoblast and osteoclast.

## Abstract no.: 39478 TBX6 GENE RARE MUTATION IS AN IMPORTANT ETIOLOGY FOR CONGENITAL SCOLIOSIS

Nan WU, Zhihong WU, Jianqiu XIAO, Sen LIU, Jianqi LIU, Zhenlei LIU, Yuzhi ZUO, Feng ZHANG, Guixing QIU

Introduction: Congenital scoliosis (CS) is a common type of vertebral malformation. Genetic susceptibility has been implicated in CS. Methods: We analyzed 161 Han Chinese persons with sporadic CS, 166 Han Chinese controls, and two pedigrees, members of which harbored a 16p11.2 deletion, using comparative genomic hybridization, guantitative PCR, and DNA sequencing. We carried out tests of replication using an additional series of 76 Han Chinese patients and a multi-center series of 42 subjects with 16p11.2 deletions. Results: We identified seventeen heterozygous TBX6 null mutations (twelve 16p11.2/TBX6 deletions, one nonsense and four frameshift mutations) in 161 persons with sporadic CS; we did not observe any null mutations in TBX6 in 166 controls (P < 3.8×10-6). However, the discordant intra-familial phenotypes of 16p11.2/TBX6 deletion carriers suggest that heterozygous null TBX6 is insufficient to cause CS. We went on to identify a common TBX6 haplotype as the second risk allele in all 17 carriers of TBX6 null mutations (P < 1.1×10-6). Replication studies in additional CS patients who carried a deletion affecting TBX6 confirmed this compound inheritance model. In vitro functional assays suggest that the risk haplotype is a hypomorphic allele. Conclusions: Here we reported the largest cohort of genetic study in CS patients. The TBX6 null mutations account for approximately 11% of sporadic CS, potentially representing a significant genetic locus in CS. We also suggested the compound inheritance of rare TBX6 null mutations and their common risk haplotype in CS pathogenesis, which will facilitate molecular diagnostics of CS and other genomic disorders.

# Abstract no.: 39387 POLYMORPHISM OF RS2767485 IN LEPTIN RECEPTOR (LEPR) GENE IS ASSOCIATED WITH THE OCCURRENCE OF ADOLESCENT IDIOPATHIC SCOLIOSIS

Weiguo ZHU

Objective. To determine whether LEPR gene polymorphisms are associated with the predisposition and/or disease severity of AIS. Background. AIS patients were reported to have abnormal leptin bioavailability. However, no study has been done to investigate the relationship between genetic polymorphisms of the LEPR gene and susceptibility to AIS.Methods. 570 AIS patients aged 10 to 18 years old were enrolled, and 570 agematched healthy subjects were recruited as controls. Six SNPs (rs1137101, rs1137100, rs4655555, rs2767485, rs1751492 and rs8179183) of LEPR gene were selected. The polymorphisms were genotyped using the PCR-based Invader assay. Case-control study was performed to define the contribution of the 6 SNPs to predisposition of AIS. Results. Both the genotype and allele frequencies of SNP rs2767485 were significantly different between the AIS patient and the control groups. No significant difference of allele frequency was noted in other 5 SNPs between the AIS patients and the normal controls. Both the mean maximum Cobb angles and BMI of different genotype AIS groups were similar with each other for all the 6 SNPs (P >0.05).Conclusion. Polymorphism of rs2767485 in LEPR gene is associated with the occurrence of AIS, suggesting LEPR is a predisposition gene. Key words. Leptin receptor gene, polymorphism, occurrence, curve severity, adolescent idiopathic scoliosis.

## Abstract no.: 39277 EVOLUTION OF VERTEBRAL AND DISC WEDGING IN IMMATURE PORCINE SCOLIOSIS MODEL AND ITS SIGNIFICANCE Xu SUN, Xin ZHENG

Introduction: It is thought that both the discs and vertebrae become increasingly wedged as a result of asymmetrical loading and asymmetrical growth. However, no published study has ever longitudinally analyzed the progression of wedging deformity in animal scoliosis models. Objective: To investigate the evolution of the disc and vertebral wedging under unilateral tethering in porcine scoliosis model. Methods: Seven female pigs underwent posterior asymmetric tethering surgery. All pigs were observed with serial postero-anterior X-ray films at 4-week intervals to document progression of the deformity. The wedging angle of every disc and vertebra in the major curve was measured by Cobb's method, and the proportion to the Cobb angle was calculated (wedging percentage) respectively. The wedging of 5 vertebrae and four discs which included apex and two superior and two inferior vertebrae as well as discs between these vertebrae was also analyzed. Results: The wedging of the apical vertebra and disc was found to be larger than the adjacent area. Immediate postoperatively, the wedging of intervertebral discs made almost whole contribution to the scoliosis. However, the contribution of the vertebral wedging to the scoliosis increased over time. The wedging of the vertebrae made the major contribution (71.5%) to the scoliosis 8-week postoperatively. Conclusion: The respective contributions of vertebral and disc wedging to the Cobb angle varied over time under asymmetric tethering. To obtain a reliable scoliosis animal model, adequate tethering duration is required to get prominent vertebral wedging.

# Abstract no.: 42321 THE RELATIONSHIPS BETWEEN MUTATIONS IN COMP GENE AND THE RISKS OF ANKYLOSING SPONDYLITIS IN CHINESE POPULATION Chongru HE

Objective :To discuss the relationship between COMP and the risk of AS, and establish the correlation between mutations and its clinical findings. Method Blood DNA of 100 AS and 200 controls selected from 113 AS and 400 controls who join this plans were extracted and purified. Using the primer 6.0, the primers were designed to amplify the target fragment of DNA. Then 3730XL was used to sequence the products of PCR. Using DNA sequencing to obtain mutations of COMP, we can get the relationship between these mutations and AS. Then we found the correlation between mutations and its clinical findings. Results:In this study, we collected the blood and clinical findings of 100 AS and 200 controls to evaluate the effects of mutations in COMP on AS. COMP has significant association with ESR( X2=8.082 P=0.004)和 CRP( X2=15.297 P=0.000) in analyzing the clinical findings. This result suggests the COMP has important effect on Pyrin. Conclusion Our study discuss the relationship between point mutations in COMP and risk of AS and clinical findings. To explain the associations between COMP and ESR and CRP, a prediction model was built to analysis point mutations on Pyrin. However, this finding need to be identified in a large sample, and the mechanism of this process should be found.

## Abstract no.: 42319 DISC GENE THERAPY: DEVELOPMENT OF A NOVEL INDUCIBLE SYSTEM TO REGULATE EXPRESSION OF THE THERAPEUTIC TRANSGENE TIMP1 Weniun WANG

Introduction: We successfully developed a new gene therapy recombinant adenoassociated viral (rAAV) vector, rAAV-NFkB-hTIMP1. To test out hypothesis that rabbit annulus fibrosis cells transfected with rAAV-NFkB-hTIMP1 will not express high level of hTIMP1 unless stimulated with the pro-inflammatory cytokine IL-1b. Methods: Cultured Rabbit annulus fibrosis (rAF) cells were divided into six groups; "Control" (cell only); "rAAV-CMV-hTIMP1(cells transfected with AAV-CMV-hTIMP1 plasmid DNA)" and "rAAV-NFkBhTIMP1(cells transfected with AAV-NFkB-hTIMP1 plasmid DNA)" treated with and without IL-1b. The transfection efficiency was estimated using a CMV-GFP construct, and NF-kB activation after IL-1b stimulation was verified by NF-kB nuclear translocation. Production of hTIMP1 was determined by ELISA and RT-PCR. MMP activity assay was measured by following cleavage of a fluorogenic substrate. Results: The estimated transfection efficiency was over 50% and the NF-kB activation after IL-1b stimulation was almost 100%. RT-PCR analysis demonstrated that the level of hTIMP1 transcription from cells transfected with rAAV-NFkB-hTIMP1 construct was greater than in the IL-1b stimulated condition compared to unstimulated control. ELISA assay showed 5 fold greater hTIMP1 concentration in rAAV-NFkB-hTIMP1 group stimulated with IL-1b than unstimulated cells. Cells transfected with rAAV-CMV-hTIMP1 always produced high levels of hTIMP1 protein. the level of MMP activity was decreased compared to baseline levels or cells exposed to IL-1. Conclusion: This novel construct represents a feasible inducible system of transgene delivery and is unique in that the induction of the transgene is not dependent on exogenous treatments, but on endogenous factors that are present only in the cells requiring the gene therapy product

#### Abstract no.: 39980 COUPLED SPINAL CANAL AND VERTEBRAL BODY GROWTH; OBSERVATIONS FROM AN OSTEOLOGICAL COLLECTION Ahmad ALAA, Schwend RICHARD, Blakemore LAUREL, Akbarnia BEHROOZ, Dumas MEGAN, Schmidt JOHN

Introduction: Development and growth of the spinal canal and vertebral bodies (VBs) is fundamental to the maturing human and depends on normal induction by the notochord and neural tube. Methods: The VBs from 32 pediatric specimens, age range 1-18 years, in the Hamann-Todd Osteological Collection were utilized. Measurements of the spinal canal area, midline sagittal canal width, interpedicular canal width and mid-coronal width of the vertebral body were measured through calibrated photographs using Scandium software (Olympus SoftImage). Results: There was continuous growth of the canal area in the cervical and thoracic regions through age 12 years when the cervical canal had reached 277±27 cm2. By age 9 years the cervical canal area (220±20 mm2) was still only 83% of the area of a mature 18 year old (265±37 mm2), indicating continued growth into adolescence. Canal areas (mm2) were larger for the 10-18 year old group compared to 1-8 year old group. After age 5 years, the increase in canal area was due to the interpedicular diameter. Compared to the thoracic and lumbar spine segments, the interpedicular width of the cervical spinal canal increased more with increasing VB width indicating a larger cervical canal to vertebral body ratio than for the thoracic or lumbar regions. Conclusion: The pediatric spinal canal grows in area until adolescence, mostly through an increase in interpedicular canal width. There is coupled growth between the VBs and the spinal canal, with the cervical spine showing the most increase in canal width compared to VB width.

## Abstract no.: 41295 ASSOCIATION BETWEEN ADAMTS-4 GENE POLYMORPHISM AND LUMBAR DISC DEGENERATION IN CHINESE HAN POPULATION Sen LIU, Nan WU, Jiaqi LIU, Zhenlei LIU, Yuzhi ZUO, Weisheng CHEN, Jun CHEN, Guixing QIU, Zhihong WU

Objective: Low back pain (LBP) is a common health problem and 40% of LBP are caused by lumbar disc degeneration (LDD). ADAMTS-4 (a disintegrin and metalloprotease with thrombospondin motifs-4), also known as aggrecanse-1, play a core role in degeneration of extracellular matrix in LDD. To investigate the association between ADAMTS-4 genetic polymorphism and LDD, we phenotype SNPs in and around ADAMTS-4. Methods: We recruit 482 sporadic cases of LDD and 496 control from Chinese Han population. Five SNPs were selected and phenotyped by the Sequenom MassARRAY system. Allelic, genotypic, and haplotypic association were performed. Result: Rs4233367 (c.1877 C>T) which located in exon of ADAMTS-4 showed significant association with LDD. The C allele owner higher risk of LDD with an OR of 1.4548 and CC genotype is at nearly five-time higher risk comparing with TT genotype. Other tested SNPs didn't show significant difference between case and control group. Conclusion: The SNP rs4233367 in the exon of ADAMTS-4 gene may be associated with lumbar disc degeneration.

## Abstract no.: 40831 ASSESMENTS OF THE BIOCOMPATIBILITY BETWEEN HUMAN UMBILICAL CORD-DERIVED WHARTON'S JELLY ACELLULAR POROUS SCAFFOLDS AND THE CANINE NUCLEUS PULPOSUS CELLS Fan DING

Introduction: Progress of biological materials makes it promissing to treat the degenerative disc diseases with tissue engineering technologies. Similar to the extracellular matrix of nucleus pulposus cells (NPcs), human umbilical cord-derived Wharton's jelly (WJ) is composed of collegen, glycosaminoglycan and hyaluronic acid. This study aimed to evaluate the biocompatibility between WJ-derived acellular porous scaffolds and the canine NPcs. methods : Human umbilical cord was obtained form the puerpera after informed consent. After remove of the outer membrane and vessel, the WJ was made into three-dimensional porous scaffolds with the steps of freeze-thaw, grinding, decellularization, freeze-drying, and crosslinking. Safranin O staining, hematoxylin and eosin (HE) staining and immunohistochemical staining were performed to observe the histological morphology and biochemical components. Scanning electron microscope (SEM) was used to verify the ultrastructure of the scaffolds and the adhesion of NPcs. The leaching liquor toxicity of the scaffolds was tested with methyl thiazolyl tetrazolium (MTT). The cultured canine NPcs (Passage 1) were seeded on the scaffolds and cultured in vitro for 3 days. The cell viability was tested after CalceinAM/PI fluorescein staining and HE staining. Result: WJ can be made into disc-like scaffolds, which was acellular and porous with the aperture of 138+18.5 µm. Collagen-1 was confirmed by immunohistochemical staining. MTT test revealed the nontoxicity of the scaffolds for NPcs proliferation (p>0.05). A 95% cell viability was verified through CalceinAM/PI fluorescein staining. Conclusion: WJ-derived acellular porous scaffold has a good biocompatibility with canine NPcs, it may be a potential material for tissue engineering technologies.

#### Abstract no.: 40141 NEW ANATOMY FINDINGS ON THE PATELLAR ATTACHMENT OF MPFL: A WIDER AND DYNAMIC STRUCTURE Yunshen GE, Tomohiro KATO, Urszula ZDANOWICZ, Shiyi CHEN, Robert SMIGIELSKI

Introduction: To find out unclarified understanding on the patellar attachment of medial patellofemoral ligament which present a complicated structure according to the current knowledge. Methods: Sixteen fresh-frozen human knees were dissected by using outsidein and inside-out combined technique. The patellar side attachment was observed from the inside view. Results: The medial patellofemoral ligament was found a complex patellar attachment. From inside view, the patellar side attachment consisted of the bony and nonbony parts which present a wider insertion. The non-bony attachment was found attached on the vastus intermedius tendon (VI) with mean width 21.69±4.80 mm. The bony attachment was identified overlapped the entire bony attachment of vastus medius oblique (VMO) tendon with mean width 16.28±3.76 mm. The patellar attachment of MPFL was dissected a complicated structure with both bony and non-bony attachment, and also appeared a dynamic function.

#### Abstract no.: 40408 ACL UNSTABLE DEFORMED KNEES MANAGEMENT WHICH ONE IS THE BEST ? HTO FIRST, ACL RECONSTRUCTION FIRST OR SIMULTANEOUS SURGERY Firooz MADADI. Firoozeh MADADI

A group of Athletes with torn ACL ( insufficient knees ) suffer from bowleg or valgus knees. AT this points we don't have a general consensus in literature. This study is based on a randomized clinical trial with double blind randomization of young athletes not more than 36 years and not over than 82 kg weight. Each groups contained by 30 patient with ACL deficient knees and bowlegs with Mikolicz line on the most medical 1/3rd of medial condyle of femur on worse. with follow up of 2 to 6 years and in all three groups we tried to control the knee by KT 2000 , Tegner's score and IKDC and lysholm's scores in all patient. At final exam we had chance to meet 29 patients with simultaneous HTO ( open wedge + plate ) and ACL – R and 26 patients with HTO 1st , and 6 months later for ACL – R and only 24 patients with ACL – R 1st, 6 patients of this group and a patient of HTO 1st didn't show for rest of their procedures. Conclusion : by P value (o.o1) Simultaneous ACL – R and HTO had higher rate of success and between two other groups except osteoarthritis out come in short period of time (2 – 6 years ) HTO had better results than ACL –R 1st with P value of ( 0.05 )

## Abstract no.: 41420 TENSION BAND TECHNIQUE OF HIGH TIBIAL OSTEOTOMY FOR VARUS OSTEOARTHRITIS

Chittaranjan SAHU, Jagadesh GUDARU, Rohit BANSAL

We present the outcome of high tibial osteotomy (HTO) performed over 105 patients over a period of 12 years. These patients were followed for at least 6 years or until the procedure failed. Majority of the patients belonged to 45-60 years age group. Pre op and post op X-ray evaluation was done using Pirdie's classification. Clinical functional results were assessed using Coventry's criteria. The results were divided as good (90.4%), fair (3.83%) and poor (5.78%). 94.4% patients were satisfied when asked subjectively. There was significant improvement in pain and walking distance. The range of movement also improved. A valgus correction of 7-10 degrees was achieved in 66.4%. High tibial osteotomy delays the need for arthroplasty in osteoarthritis. Special emphasis of this study is the operative technique and the implant used. All HTOs were for varus knees and were lateral closing wedge osteotomies performed proximal to tibial tubercle with Macquet effect and under fluoroscopic control. All the HTOs were stabilized with the tension band principle using less expensive implants (one cancellous screw with washer, one cortical screw with washer and stainless steel wire). Patients were made to walk immediately after the drain tube was removed on the first post-operative day as per pain tolerance initially with walker and subsequently unaided. The cost involved in terms of money and loss of working hours was thus minimized making it an available option for the masses. Emerging orthopedic surgeons should not forget the option of HTO in uni-compartmental osteoarthritis of the knee.

## Abstract no.: 40530 COMPARATIVE STUDY BETWEEN LOCKED T-PLATE AND SHORT TOOTHED PLATE (ELASSAL PLATE) FOR MEDIAL WEDGE OPENING HIGH TIBIAL OSTEOTOMY

Hatem SAID, Ibraam ALAABD, Mohamed MORSY, Maher ELASSAL

Introduction: High tibial osteotomy is effective for managing a variety of knee conditions including gonarthrosis with varus malalignment. Methods: Prospective comparative study between locked T-plate and short toothed plate for medial wedge opening high tibial osteotomy, Our study is performed on 100 patients, all have gonarthrosis with varus malalignment of the knee, In 50 patients in our study fixation is done by short toothed plate (Elassal plate) and in the other 50 patients T-locked plate is used. The final end results have been assessed according to the knee society score .Mean age is 45.7 and 43.9 years old for T-locked and short toothed plate respectively. Mean anatomical axis is 3.3 and 3.4 degree pre-operative for T-locked and short toothed plate respectively. Results: Significant improvement in knee society score is better with T-locked plate ,Overcorrection is more common with locked plate 10 %, Undercorrection is more common with short toothed plate 21%, HTO can be done for patient more than 55 years old with significant improvement in knee society score . Complication rate is more with short toothed plate 20 % (intra-operative tibial plateau fracture 20 %, non-union 2%) compared with 8 % with T-locked plate , so it may need to be well skillfull to avoid fracture of the lateral cortex .

### Abstract no.: 39330 EFFECT OF MEDIAL OPENING WEDGE HIGH TIBIAL OSTEOTOMY ON INTRAARTICULAR KNEE AND ANKLE CONTACT PRESSURES Nael HAWI, Eduardo M. SUERO, Yaman SABBAGH, Ralf WESTPHAL, Musa CITAK, Friedrich M. WAHL, Christian KRETTEK, Emmanouil LIODAKIS

High tibial osteotomy (HTO) is a commonly used surgical technique for treating moderate osteoarthritis (OA) of the medial compartment of the knee by shifting the center of force towards the lateral compartment. Previous studies have documented the effects of HTO on the biomechanics of the knee. However, the effects of the procedure on the contact pressures within the ankle joint have not been as well described. Seven cadavers underwent an HTO procedure with sequential 5° valgus realignment of the leg up to 15° of correction. An axial force of up to 550 N was applied and the intraarticular pressure was recorded. Minor valgus realignment of the proximal tibia does not significantly alter the biomechanics of the ankle. However, moderate gtp-dhanges in proximal tibia alignment result in significantly decreased tibiotalar contact surface area and in changes in intraarticular ankle pressures. These findings are clinically relevant, as they provide a biomechanical rationale for the diagnosis and treatment of ankle symptoms in the setting of lower limb malalignment or after alignment correction procedures.

## Abstract no.: 40234 EARLY OUTCOMES OF BILATERAL SYNCHRONOUS HIGH TIBIAL OSTEOTOMY VERSUS UNILATERAL HIGH TIBIAL OSTEOTOMY. A CASE CONTROL SERIES Paul Ross MIDDLETON

Introduction: Medial opening wedge high tibial osteotomy (HTO) is a recognised operation for those who suffer medial compartment OA with varus deformity. Our unit has carried out over 150 procedures with good outcomes. Several patients have required an HTO on both knees, done at separate sittings. Bilateral synchronous HTO (operating on both knees in the one procedure) has been reported in the literature. The aim of this study was to compare the post-operative recovery and procedure tolerability of those undergoing bilateral synchronous HTO against a patient undergoing unilateral HTO. Methods: 10 patients were included in this study. 5 patients underwent bilateral synchronous HTO. 5 patients underwent unilateral HTO. Pre-operative knee scores including OKS, KOOS and OKSAPQ were completed by every patient pre-operatively. The operations were all performed by one surgeon using the same surgical technique. All patients were followed up with a "pain diary" at weekly intervals. Results: Outcomes showed that none of the 5 Bilateral HTO patients suffered any early complications. Mean pain scores at 6 weeks (2.25 vs 2.0) and 12 weeks (1.8 vs 1.8) were comparable. OKSAPQ scores sowed a similar improvement with time in both groups. Average length of stay was also comparable (1.6 vs 1.4 days). Discussion: The early results of this group suggest patient reported outcomes in blateral HTO are similar to unilateral procedures. Bilateral HTO appears to be safe with no adverse outcomes. Benefits versus sequential surgery in those requiring bilateral procedures include shorter overall hospital stay and less time off employment.

## Abstract no.: 39338 3D CONCEPT IN UNDERSTANDING OF PATELLFEMORAL MALALIGMENT AND A GUIDELINE FOR TREATMENT PLANNING Sherif ABDELGAID, Belal AMER, Mahmoud ELZOGHBY

Patellofemoral malaligment disorders represents one of the most common and challenging knee problem. The eventual outcome of many cases of chronic patellofemoral malaligment is patellofemoral arthrosis, which interferes with the daily living activities. For this reason, surgery is undertaken in cases that do not respond to conservative treatment. Many surgical techniques to correct patellar malaligment have been described. In addition, surgical techniques prior to the development of patellofemoral arthrosis differ from techniques done after its development. In general most surgeons use one or more of three basic surgical procedures include: 1) patellar tendon transfer (distal realignment), 2) release of the tight lateral restraining structures (lateral release), and 3) tightening of lax medial restraints (medial reefing). The determination of which surgical procedures to use and when to perform must take into account sound understanding of the complexities of the extensor mechanism, the biomechanics of the patellofemoral joint, and the underlying etiology to avoid suboptimal postoperative results. The key to success lies not in applying a single technique to all patients, but in selecting the proper combination for a given individual. This article discuss a three directional (3D) concept in understanding of patellfemoral malaligment. It depends on clinical and radiological diagnosis of errors in patellar position in different directions. The aim of 3D concept is to provide guidelines for treatment planning for each case of patellofemoral malalignment based on accurate diagnosis of uni- or multidirectional patellar maltracking and proper selection of the realignment technique.

#### Abstract no.: 41553 MEDIAL PATELLO FEMORAL LIGAMENT RECONSTRUCTION FOR TREATMENT OF PATELLOFEMORAL INSTABILITY Walid AWADALLAH, Moharram ASHRAF, Hany EL SAYED

The purpose of this study was to evaluate the clinical and radiological outcomes following medial patellofemoral ligament (MPFL) reconstruction using semitendinosis graft for recurrent patellar instability. Methods: twenty patients (17 knees) were enrolled in this study. The mean age at surgery was 27 years and the mean follow up was 34.5 months. Reconstruction was performed using a semitendinosis tendon autograft. No patient had undergone additional medial tibial tuberosity transfer. Clinical scores (IKDC and Lysholm) and apprehension test were completed preoperatively and at follow up. Preoperative and follow up radiological assessments of the congruence angle and the medial patellofemoral angle. Results: the preoperative Lysholm score was 43.41±12.13 and at the last follow up visit was 84.86±9.16. The apprehension test was positive in all patients preoperatively and all patients had negative apprehension test at follow up. All radiological assessments improved significantly post operatively. Conclusion: MPFL reconstruction using a semitendinosis tendon autograft is an effective method for treatment for recurrent patellar instability.

#### Abstract no.: 39625 IMPACTION BONE GRAFTING FOR THE RECONSTRUCTION OF LARGE BONE DEFECTS IN REVISION KNEE ARTHROPLASTY Maximilian RUDERT, Maik HOBERG, Uli NOETH, Boris HOLZAPFEL

Introduction: Given the increasing rates of total knee revision, it is not unusual that patients present with a history of multiple revisions. Thus the treatment of infections, arthrofibrosis, soft tissue defects and bone loss has become routine in specialized departments. Large bone defects could be either treated by metal augments, cones or cement. Bone impaction grafting, however, might be an alternative therapeutic strategy to minimize further bone loss and additionally restore endogenous bone stock. Methods: 28 patients were treated between 2010 and 2012 with the impaction grafting technique in our department. Aim was the regeneration of bone stock and formation of a stable implant bed by impaction of morselized bone allograft. Results: Between 2010 and 2012, 28 patients with large bone defects [Anderson Orthopaedic Research Institute (AORI) grade: 21x F3, 3x F2, 13x T3, 8x T2] underwent total knee revision with impaction bone grafting. The mean follow-up was 27.7 months (range 21-47 months). On average, patients had undergone 2.5 previous revisions. Implant survival was 82.0% (95% CI=62.5%- 92.1%) for any reason of revision as the end- point and 93.1% (95% CI=74.5-98.4%) for aseptic revision as the endpoint. The mean postoperative Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score was 35.4 (range 3.3-101.6, SD±26.2). The mean KSS was 70.6 (range 20–100, SD±26.8). Conclusion: Impaction bone grafting in revision knee arthroplasty is an appealing technique enlarging the armamentarium of the surgeon to treat very large bone defects in an adaptable manner.

# Abstract no.: 40048 MODIFIED WEAVER DUNN VERSUS RECONSTRUCTION USING SEMITENDINOSUS FOR CHRONIC ACROMIOCLAVICULAR DISLOCATION: A COMPARATIVE STUDY

Amr RASHWAN, Alaa Eldin SOLIMAN, Hisham MISBAH, Mohamed ELGEBALLY

Patients suffering from chronic acromioclavicular dislocation are subjected to osteoarthritis and loss of ligamentous suspension of the scapula to the shoulder girdle resulting in a marked shoulder impairment. Various methods had been suggested for the reconstruction including the modified weaver Dunn with the transfer of the coracoacromial ligament into the lateral end of the clavicle or the reconstruction of the coracoclavicular ligament using the semitendinosus graft. A prospective comparative study including 48 patients with painful chronic Rockwood type III through V acromioclavicular dislocation divided into two groups. Group A for whom Modified Weaver Dunn reconstruction was done while for group B reconstruction using the semitendinosus tendon was performed. Clinical evaluation was performed using constant score after a mean follow up of 24 months. Preoperative and postoperative radiographs were compared. The constant score improved from 55.3 preoperatively to 86.6 postoperatively in the modified Weaver Dunn group and from 60.15 preoperatively in the semitendinosus group to 89.2 postoperatively. The radiological measurements showed a mean coracoclavicular distance of 18.75mm preoperatively improving to 9.2mm postoperatively in the modified Weaver Dunn compared to a mean of 17.15 mm preoperatively improving to 8.6 mm postoperatively in the semitendinosus Semitendinosus tendon group. Conclusion: graft for coracoclavicular ligament reconstruction resulted in superior clinical and radiologic outcomes compared to the modified Weaver-Dunn procedure.

## Abstract no.: 39964 A BIOMECHANICAL STUDY OF CORONOID PROCESS WITH MEDIAL COLLATERAL LIGAMENT INJURY AS POSTEROLATERAL ROTATORY INSTABILITY OF THE ELBOW Fuguo HUANG

Objective: To discuss the role of the type-I and type-II coronoid process fracture together with anterior bundle of medial collateral ligament injury as posterolateral rotatory instability of the elbow. Methods: Ten fresh-frozen upper extremities specimens were transected through the upper midhumeral and carpal levels to get the bone-ligament specimens. With the forearm kept maximum supination, an axial load of 100-newton compressing the elbow joint was applied in the sagittal plane. Each elbow was tested at 3 positions of elbow flexion (90°, 60° and 45°) in 4 injury levels: (1) in tart etid wro 2 after type (3) after onlyinde process fracture with AMCL deficient; Allafter type fracture: coronoid process fractures with AMCL deficient. The experimental data were analyzed with the ANOVA analysis. Results: At 90° of elbow flexion, the posterolateral rotatory stability of various "injury level" were: (1)2.17±0. elbowst: 2.2.00 ± 00.141 pn to Cesses ténaio tu desplacement (3)2.31 ±0.34mm posterior displacement after typeI coronoid process fracture with AMCL (4) 2co5odo38 mocessteracture placement deficient; with AMCL deficient. After type-II coronoid process fractures with AMCL deficient, the (1)90° of e posterolateral rotatory stability of various "flexion angle":

with 60° of elbow flexion, which was no significant difference; (2)45° flexioncompared with 90° and 60° of elbow flexion respectively, which showed a significant difference. Conclusion: An isolated type-I coronoid process fracture would not cause posterolateral rotatory instability of elbow, so did the type-I coronoid process fracture with AMCL deficient. The type-II coronoid process fractures with AMCL deficient can cause posterolateral rotatory instability of elbow.

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## Abstract no.: 39415 THE COMPARISON BETWEEN MIPPO AND MIPTENO IN ADULT MIDSHAFT CLAVICULAR FRACTURE

Long CHEN, Hui CHEN, Majid NISAR, Hua CHEN, Jun PAN, Yongzeng FENG, Lei PENG, Qingyu CHEN, Jianjun HONG

Objective: To compare the efficacy of minimally invasive percutaneous plate osteosynthesis (MIPPO) with minimally invasive percutaneous titanium elastic nail osteosynthesis (MIPTENO) in adult midshaft clavicular fracture. Methods: We collected the data of 42 midshaft clavicular fracture patients (from January 2011 to June 2012) treated with MIPPO (12 patients) and MIPTENO (30 patients), calculated the union time and assessed the complications. Constant shoulder scores and DASH scores were used to analyze the functional outcome. Results: Bone union was achieved in all cases at an average of 12.2 weeks in the MIPPO group and 13.1 weeks in the MIPTENO group, indicating significant inter-groups difference (P=0.049), especially in wedge type and comminuted fracture. Clinical assessment showed there was no significant difference in Constant shoulder scores or DASH scores (P > 0.05) between the two groups. As for the complications, there were two patients with dysesthesia and two patients with painful local irritation in the MIPPO group. Whereas in the MIPTENO group there were three patients with telescoping and four patients with painful local irritation. At one year post injury, both groups were satisfied with the appearance and outcome of the shoulder. Conclusion: The MIPPO technique has comparatively more advantages and shows a lower trend in complications than MIPTENO especially in wedge type and comminuted fracture. However, MIPTENO technique has more cosmetic advantage.

## Abstract no.: 41336 TRANSTENDON DOUBLE-ROW SUTURE BRIDGE TECHNIQUE FOR REPAIR OF THE GRADE III PARTIAL ARTICULAR SUPRASPINATUS TENDON AVULSION

Zimin WANG, Xuan HUANG, Zhe LU

Introduction: The standard technique for repairing partial-thickness tears of the rotator cuff includes completion of the lesion to a full-thickness tear. Grade III partial articular supraspinatus tendon avulsion (PASTA) form a subgroup deserving special consideration. We present a transtendon suture bridge technique for this subgroup of pts. Methods: Thirty-six patients with isolated PASTA lesions treated by transtendon suture bridge repair were included and retrospectively reviewed. One or two medial row anchors were put though supraspinatus tendon. The retracted tendon was reduced with a tissue grasper or a traction suture. The trans-tendon repair technique was used. The sutures of medial row anchors were tied and then fixed to the greater tubercle with double-row suture bridge technique. All patients were evaluated preoperatively and at a mean of 21.2 months (±9.7 months) postoperatively using standardized clinical evaluation (physical exam, American Shoulder and Elbow Surgeons, and Simple Shoulder Test). All patients underwent postoperative imaging with a MRI arthrogram. Results: There was a significant improvement in American Shoulder and Elbow Surgeons (42.7±17.5 to 86.9±25.2) and Simple Shoulder Test (4.6±3.2 to 10.1±3.8) scores from pre- to postoperative, respectively. At 3 months from surgery, radiographic healing of the tendon was noted and integrity of the supraspinatus tendon insertion to the footprint was confirmed by arthromagnetic resonance imaging, with full recovery of daily activities and complete active range of motion confirmed at 6 and 12 months. Conclusion: For grade III PASTA lesion, transtendon double-row fixation exhibited superior biomechanical properties and satisfied clinical outcomes.

# Abstract no.: 39699 THE TIME POINT IN SURGICAL EXCISION OF HETEROTOPIC OSSIFICATION OF POST-TRAUMATIC STIFF ELBOW: RECOMMENDATION FOR EARLY EXCISION FOLLOWED BY EARLY EXERCISE

Shuai CHEN

Background: Post-traumatic heterotopic ossification (HO) around the elbow may severely impair joint function. Although surgical excision is effective to restore range of motion, traditional surgical treatment was postponed for at least a year to prevent recurrence, which leads to second contracture of elbow. As the optimal timing of resection is controversial, our study was performed to compare recurrence and elbow function between early and late excision in our patients to determine the necessity for the delay. Methods: We retrospectively reviewed 164 such patients during a 4-year period. In the control group (112 patients), HO was excised at an averaging 22.98 months after initial injury (range from 3 to 8 months); in early excision group (52 patients), resection was performed at an averaging 6.13 months, ranging from 3 to 8 months. HO recurrence was assessed by Hastings classification system. Final range of motion (ROM) and Mayo Elbow Performance Score (MEPS) were also evaluated. Results: Recurrent HO was observed in 30 of 112 patients (26.79%) in the control group and 15 of 52 (28.85%) in early excision group. No significant difference (P>0.05) was found in HO recurrence between two groups. Moreover, there is no notable difference regarding ROM, MEPS and complications, postoperatively (P>0.05). Conclusions: Early excision associated with early exercise is effective for the treatment of HO aiming at low recurrence rate and satisfying function. Conventional surgical delay of more than a year may be shortened.

## Abstract no.: 39698 IS ROUTINE ULNAR NERVE TRANSPOSITION NECESSARY IN OPEN RELEASE OF STIFF ELBOWS? OUR EXPERIENCE AND A LITERATURE REVIEW Shuai CHEN

Introduction: Prophylactic release of the ulnar nerve to reduce the incidence of postoperative nerve symptoms in stiff elbows has been recommended. However, the necessity for routine anterior transposition remains unclear. In this study, we aim to gain an insight into the value of routine transposition in open release of stiff elbows. Methods: We retrospectively reviewed 94 patients suffering from elbow stiffness with no preoperative ulnar nerve symptoms. Simple decompression (with in situ decompression or epicondylectomy) and subcutaneous anterior transposition were chronologically performed in 53 and 37 patients, respectively. Another four patients were treated by a single lateral approach with no intervention of the ulnar nerve. Pre- and postoperative range of motion and incidence of ulnar nerve symptoms were recorded. The function of ulnar nerve was measured by Amadio rating scale. Results: The incidence of ulnar nerve dysfuction was 18.9% (ten of 53) and 8.1% (three of 37) in the simple decompression and transposition groups, respectively. The mean Amadio scores were 7.62 and 8.22, respectively. All these data showed a statistically significant difference (P < 0.05). In the lateral approach group, 50 % (two of four) of patients developed nerve symptoms with a mean Amadio score of 6.50. Conclusions: The transposition group exhibited a superior nervous outcomes compared with the simple decompression group. No comparison was conducted between the transposition and lateral approach groups because of too few patients in the latter. According to related literature and our experience, we conclude that routine transposition is necessary to prevent postoperative nerve symptoms.

## Abstract no.: 39683 ANATOMIC STUDY AND APPLICATION OF MODIFIED-MEDIAL APPROACH OF ELBOW JOINT IN TREATING CORONOID PROCESS FRACTURES

Yunhui ZHANG, Yuqi DONG, Chao ZHANG, Tao HE, Gen LI, Gen LI, Chao ZHANG, Tao HE, Chao ZHANG

Objective: The purpose of the study is to provide an anatomical basis for treating coronoid fractures with a modified-medial approach of elbow joint, and evaluate its clinical effects. Methods: The course characteristics of main nerve associated with the modified-medial approach of elbow joint were observed on 40 adult upper limb specimens. On the basis of anatomical study, four patients were applied in clinical practice. Fixation of the coronoid process and repair of a medial collateral ligament were preformed through the modifiedmedial approach. At the last follow-up visit, the function of the elbows was evaluated according to Mayo Elbow Performance Scores (MEPS). Results: The main branch of median nerve ran between the lateral and the medial humeral epicondyle, which had a distance of 27.34 ± 3.08 mm to the medial humeral epicondyle. Its distance ratio to the distance between the lateral and the medial humeral epicondyle was  $(0.50 \pm 0.03)^{*100\%}$ ; and there was no significant difference between male and female(P>0.05). The distance between the original point of muscular branches of the flexor carpi radialis and coronoid process tip was 30.89 ± 6.95 mm. The distance between the entrance point of muscular branches of the flexor carpi radialis and the medial humeral epicondyle was 65.18 ± 5.55mm. Treatment was performed on six patients. At the last follow-up the mean flexionextension arc of the elbow was 132.5°, the mean rotation was 146.7°, and the mean MEPS was 98.3points. Conclusion: The modified-medial approach for ulna coronoid fractures is simple, safe and effective.

#### Abstract no.: 41637 POSTERIOR INTEROSSEOUS NERVE LOCALIZATION IN THE PROXIMAL FOREARM - A PATIENT NORMALIZED PARAMETER Srinath KAMINENI, Christopher HAYES, Crystal NORGREN, Andrew AMIS, Andrew DEANE

Background: Accurately localizing the posterior interosseous nerve in the proximal forearm has diagnostic, therapeutic, and safety implications. We provide a non-invasive, "patientnormalized" localizing parameter of the posterior interosseous nerve in the proximal forearm. Methods: Sixty-three cadaveric upper extremities were studied, with minimally disruptive dissection techniques. We measured the transepicondylar distance (TED), posterior interosseous nerve distance in forearm neutral rotation, pronation, and supination, and the nerve width. Two individuals performed the measurements using a digital caliper on two separate occasions, with inter-observer and inter-occasion blinding. The results were analyzed with Wilcoxon-Mann-Whitney test for paired samples. Results: In pronation, the posterior interosseous nerve was within two confidence intervals of 1 TED in 95% of cases (range 0.7-1.3 TED); in neutral, within two confidence intervals of 0.84 TED in 95% of cases (range 0.5-1.1 TED); and in supination, within two confidence intervals of 0.72 TED in 95% of cases (range 0.5-0.9 TED). Significant differences existed between TEDs comparing left to right side of the same person, p-value 0.03. Conclusions: The mean posterior interosseous nerve distance from the lateral epicondyle was 100% of the transepicondylar distance (TED) in a pronated forearm, 84% in neutral, and 72% in supination. Predictive accuracy was highest when the arm was in a supinated position, and in all cases the majority of specimens (90.47% - 95.23%) are within 2 cm of the forearm position-specific percentage of TED. Clinical Relevance: This parameter will aid in diagnosis, injections, surgical approaches, and understanding neurological symptoms in the forearm.

Date: 2015-09-17 Session: Free Papers Osteoporosis Time: 10:30 - 12:00 Room: Jieyang Hall

#### Abstract no.: 41192 IMPACT OF THE OSTEOPOROSIS PREVENTION AND SELF-MANAGEMENT COURSE ON KNOWLEDGE AND HEALTH BEHAVIORS AGAINST OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN: A COHORT STUDY IN SHENYANG, CHINA Bing XIE

Bing XIE

Objective: The purpose of this study was to evaluate the effectiveness of the osteoporosis prevention and self-management course (OPSMC) in heightening the awareness and knowledge and improving the health behaviors against osteoporosis (OP) in postmenopausal women. Study design: A total of 267 postmenopausal women were enrolled and randomized to OPSMC group (n=133) and control group (n=134) who received health education unrelated to OP. Main outcome measures: All forms of the Osteoporosis Knowledge Test (OKT), Osteoporosis Self-Efficacy Scale (OSES) and Self-Designed Osteoporosis Health Behavior Questionnaire (SD-OHBQ) before course and 3 months after course were analyzed using repeated measurement ANOVA. Results: There were significant differences in OKT and OSES scores before course and 3 months after course (P<0.001), and between the two groups (P<0.001). A time interaction with group division was noticed (P<0.001). The results obtained at 3 months after course showed that, compared with the control group, more women in OPSMC group began taking calcium supplements (19.5% vs 1.8%, P<0.01), vitamin D supplements (14.4% vs 0.9%, P<0.01) and foods rich in calcium (15.3% vs 2.7%, P<0.01), and more women spent more time on exercise (9.3% vs 0.9%, P<0.01) and preferred more vigorous exercise (27.9% vs 8.8%, P<0.01). Conclusions: The results of our population-based study suggest that the OPSMC is an effective intervention for improving the understanding about the prevention and treatment of OP and the health behaviors at least on a short-term basis.

Date: 2015-09-17 Session: Free Papers Osteoporosis Time: 10:30 - 12:00 Room: Jieyang Hall

## Abstract no.: 41514 DEVELOPMENT OF A NOVEL BONE-TARGETING DELIVERY SYSTEM CARRYING OSTEOPROMOTIVE PHYTOMOLECULE(S) FOR PREVENTION OF ESTROGEN DEPLETION INDUCED OSTEOPOROSIS Le HUANG

This study aims to evaluate the efficacy of Epimedium-derived flavonoid, Icaritin, with targeting liposome delivery system on prevention of osteoporosis in vivo by analyzing the bone quality and microarchitecture by micro-Computerized Tomography(uCT) and Xenogen IVIS spectrum. 90 four-month-old C57/BL6 female mice were divided into 9 groups which are Baseline (BL), Sham surgery(SH), Ovariectomized only(OVX), Estradiol for oral administration(O-E2), Icaritin for oral administration(O-ICT), low dose targeting liposome delivery system with Icaritin injected via caudal vein(IV-LIP+ICT+DSS6-L), high dose targeting liposome delivery system with Icaritin injected via caudal vein(IV-LIP+ICT+DSS6-H), low dose liposome delivery system with Icaritin injected via caudal vein(IV-LIP+ICT-L) and high dose liposome delivery system with Icaritin injected via caudal vein(IV-LIP+ICT-H)). Treatments was applied from the day right after the surgery and lasted for 6 weeks. Lumbar spine and the lower limbs were harvest for bone quality analysis. The 5th vertebra body of lumbar region was scanned by uCT. The parameters including Bone Mineral Density (BMD), trabecular bone number (Tb.N), trabecular bone thickness (Tb.Th) and trabecular bone separation (Tb.Sp) etc. were analyzed for evaluation of bone quality and microarchitecture. For the efficacy of the targeting delivery system, we use Xenogen IVIS spectrum to semi-gualify the distribution of signals in vivo by injecting labelled targeting delivery system into four-month-old C57/BL6 normal female mice. The novel bone-targeting delivery system carrying osteopromotive phytomolecule(s) Icaritin can help to prevent the estrogen depletion induced osteoporosis more specifically and effectively.

Date: 2015-09-17 Session: Free Papers Osteoporosis Time: 10:30 - 12:00 Room: Jieyang Hall

## Abstract no.: 41111 FACTORS AFFECTING THE ACUTE PHASE RESPONSE OF ZOLEDRONIC ACID

Li Peng YU, Jian CHEN, Ning ZHANG, Guo Yong YIN

Objective: Compare the differences of the acute phase response after the use of zoledronic cid in osteoporosis patients in orthopedic department with the endocrinology department in our hospital. Methods: A retrospective analysis of the osteoporotic patients in the orthopedics and endocrinology department in our hospital. After the first use of 5mg zoledronic acid (450 cases), Saridon were used to prevent acute phase response (APR). 222 endocrinology patients(EP) and 228 orthopedics patients(OP) with osteoporosis were concomitted. OP were divided into open surgery group (OS, 93 cases) and minimally invasive surgery group (MIS,135 cases), exploring the potential factors that affect APR occurrence. Results: The CRP, ESR, TNF-α value before treatment in each group were OS> MIS> EP (P <0.05), APR / fever response rates of OS group and MIS group were 71.0 % / 69.9% and 59.3% / 57.8%, significantly higher than the EP group (27.5% / 26.1%); Average duration of APR is longer in the OS group than the EP group (P < 0.05). The serum 25-OH VitD3, CRP, ESR, TNF- $\alpha$ , the proportion of those who underwent surgery and surgical sizes were significantly different between the APR (+) and APR (-) groups (P <0.05). Conclusions: zoledronic acid was effective in the treatment of osteoporosis, but the APR of postoperative orthopedic patients were significantly higher than internal medical patients, and the incidence was positively correlated with the surgical wound size and the inflammation level of the body.
### Abstract no.: 41676 OSTEOCYTES ALTERATIONS AFFECT BONE MICROSTRUCTURE IN A SHEEP MODEL OF OSTEOPOROSIS

Markus ENGELHARDT, Thaqif EL KHASSAWNA, Wolfgang BOECKER, David WEISWEILER, Katrin LIPS, Christian HEIß

Osteoporosis leads into increased fracture risk. Previous studies documented dysregulated osteoblast and osteoclast activity, leading to a high-turnover phenotype, reduced bone mass and low bone mineral content. However, the correlation between osteoporotic bone status and osteocytes localization, activity and networks might provide a potential target for biomaterial development to aid healing in osteoporotic fractures. Therefore, 32 female Merino sheep (average 5.5 years) were utilized to investigate the development of postmenopausal osteoporosis. Animals were divided into four groups: non-operated control group (C, n=8), ovariectomized group (O, n=7); and to experimental groups ovariectomized and multi-deficient diet (OD, n=8), (iv) ovariectomized + multideficient diet + steroid treatment (ODS, n=8). Biopsies were taken from iliac crest at 0M, 3M and 8M (M= Month). Left femoral head and a lumbar vertebral body were collected. Bone microstructure was evaluated using µCT analysis. Further, Osteocytes morphology and localization were detected using silver staining, while rhodamine staining by means of Laser confocal microscopy evaluated osteocytes arrangement and networks. Descriptively, trabecular network was lowest in the ODS group at 3M and 8M. Furthermore, osteocytes number correlated linearly with bone structural integrity. Osteocytes morphology, count and viability of osteocytes were severely affected in the ODS group. The current study emphasizes the effect of malnutrition and glucocorticoid administration along with estrogen deficiency are reflecting on osteocytes properties indicating the importance in therapeutically targeting osteocytes to regulate bone metabolism in osteoporotic bone especially in developing novel biomaterials to enhance bone healing. This study is supported by DFG (SFB/TRR 79).

## Abstract no.: 41056 RISK FACTORS OF NEW SYMPTOMATIC VERTEBRAL COMPRESSION FRACTURES IN OSTEOPOROTIC PATIENTS UNDERGONE PERCUTANEOUS VERTEBROPLASTY

Hai-Long REN, Jian-Ming JIANG, Jian-Ting CHEN, Ji-Xing WANG

Introduction: This study evaluated the risk factors of new vertebral compression fractures (VCFs) following PVP.Methods: From June 2005 to January 2011, patients with osteoporotic VCFs (OVCFs) who were treated with PVP and met this study's inclusion criteria were retrospectively reviewed. Observed parameters were age, sex, BMD, BMI, amount of bone cement, cement leakage into the disk, preoperative kyphosis, preoperative degree of anterior vertebral compression, preoperative degree of middle vertebral compression, kyphosis correction, anterior vertebral height restoration, middle vertebral height restoration, and number of initial symptomatic fractures (levels treated). The data were analyzed by univariate and multivariate analysis for the emergence of new fractures after PVP to determine related risk factors.Results: A total of 182 patients met the inclusion criteria. There were 155 female and 27 male patients with a mean age of 69.7 years (range, 49-91 years). The follow-up period was 24-50 months (average, 26.4 months). A total of 294 VCFs among 182 patients were observed, twenty-eight new VCFs occurred in 21 patients (21/182, 11.5%) during the follow-up period. Statistical analysis indicated that higher BMI (P = 0.004) and a greater number of initial symptomatic fractures(P = 0.017) were significantly associated with new VCFs after PVP. It is the most obvious that the risk of new fractures increased 2.518-fold (95% CI, 1.176-5.395), when the number of initial VCFs increased by one level. Conclusions: The incidence of new symptomatic VCFs after PVP was higher in osteoporotic patients with initial multiple-level fractures.

## Abstract no.: 41488 INFLUENCE OF VERTEBRAL DEFORMATION ON THE VERTEBRAL PAIN SYNDROME

Vladyslav POVOROZNYUK, Tetiana ORLYK

The aim of our study is to investigate the relation between the intensity of pain in the thoracic and lumbar spine and morphometric parameters of vertebrae in postmenopausal women. Object. We have examined 250 postmenopausal women aged 50-79 years divided into two groups:171 women without vertebral deformations and 79 women with confirmed vertebral fractures. The duration of pain syndrome after fracture was over 6 months. Methods. The presence and intensity of pain syndrome were assessed using a visual analog scale. Morphometric analysis of the vertebral parameters was carried out using the VFA software of the dual-energy X-ray densitometer «Prodigy» (GE Medical systems, Lunar, model 8743,2005). Results. The intensity of pain syndrome in the lumbar spine significantly correlates with L1 vertebral indices: A/P(r=-0.37,p=0.01) and M/P(r=-0.29,p=0.03) in women with normal BMD. The intensity of pain in the thoracic region correlates with Th10 vertebral indices: A/P(r=-0.45,p=0.0004) and M/P(r=-0.35,p=0.01) in women with osteopenia. In 11% patients with confirmed wedge and compression vertebral fractures chronic pain syndrome is absent, and the presence of other fractures does not increase the frequency of back pain syndrome (14%). The presence of vertebral fractures significantly increases the risk of pain in the thoracic spine (RR=1.32; 95%CI:1.09-1.60,p=0.004). In patients with vertebral fractures the intensity of pain in the thoracic spine significantly correlates with indices of Th11-Th12vertebrae, and relates to the number and localization of vertebral fractures. Conclusion. In postmenopausal women without osteoporosis and vertebral fractures level of pain may be associated with initial vertebral deformation, limiting the spine transition zone.

# Abstract no.: 41482 GENDER FEATURES OF VERTEBRAL PAIN SYNDROME DEPENDING ON BONE MINERAL DENSITY

Vladyslav POVOROZNYUK, Tetiana ORLYK

The aim is to study the frequency of vertebral pain syndrome in men and women of older age groups depending on the bone mineral density (BMD). Materials and methods. We have examined 1934 people aged 50-89 years, among them 1697 women and 237 men. The frequency of back pain syndrome was studied depending on the BMD (osteoporosis, osteopenia, and norm). BMD at all sites was measured by DXA using a Prodigy densitometer (GE). Results. The frequency of pain syndrome among older age groups is significantly higher in women compared with men (88.3% (1499/1697) vs 84.8% (201/237), accordingly, p=0.01). In women of 50-89 years, with osteoporosis and no fractures in their anamnesis, pain syndrome in the thoracic and lumbar spine is significantly higher in comparison with women who have osteopenia (p=0.01) and normal BMD (p=0.02) and compared to men with a similar BMD state (osteoporosis; (91.8% (337/367) vs 76.2% (16/21), accordingly, p=0.01)). The frequency of pain syndrome in the thoracic and the lumbar spine in women is associated with BMD. The presence of osteoporosis increases the risk of pain syndrome in the thoracic spine (RR=1.27, 95% CI: 1.12-1 44, p=0.0001). In older women, the presence of low-energy fractures significantly impacts the increasing frequency of pain in the thoracic region regardless of the BMD state. Conclusion. The frequency of pain among older age groups is significantly higher in women compared with men.

## Abstract no.: 41870 TREATMENT FOR AGED PATIENTS WITH ACUTE OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURES: CONSERVATIVE TREATMENT OR PERCUTANEOUS VERTEBROPLASTY? Xiaofeng LIAN

As the geriatric population size increases, osteoporotic vertebral compression fractures (OVCF) are an increasing source of pain and dysfunction, and become a significant cause of morbidity and mortality, particularly in the developed countries. However, the optimal treatment strategy for OVCFs remains controversial. Therefore, in this study we aimed to compare the efficacy of vertebroplasty (VP) and conservative therapy (CV) for the patients aged 70 years or older with acute OVCF. We conducted this prospective randomized controlled study in our hospital between January 2009 and December 2011. A total of 107 patients with acute OVCF resulted in minor trauma randomly allocated to VP group (n=51) and CV group (n=56). All patients were followed up for more than one year. At baseline there were no significant differences between two groups according to age, sex, levels involved, bone mineral density, body mass index (BMI), collapse rates. Within 6 months, six patients in CV group accepted VP treatment because of persistent pain. Two patients in CV group were performed opening decompression and stabilization because of kyphotic deformity and spinal cord compression of the fractured body. Therefore, 48 patients in CV group completed one-year follow-up. Pain relief and functional outcomes, depicting as visual analogue scale (VAS), Oswestry Disability Index (ODI), and short-form 36 items (SF-36), were significantly better in VP group than in CV group at 1 day, 1 week, 1 month, 3 months, 6 months and 1 year. So, in elderly patients with acute OVCF, VP showed better clinical outcomes, with less complication.

## Abstract no.: 41456 MODIFIED STOPPA APPROACH IN TREATMENT OF PELVIC FRACTURES

Alyaksandr MURZICH, Alexander BELETSKY, Andrey VORONOVICH

Introduction: The modified extraperitoneal Stoppa approach is the minimally invasive approach used in the pelvis and acetabulum surgery. Methods: Stoppa approach has been used in 14 patients with unstable pelvic fractures, specifically eight type B and six type C injuries according to AO. Four patients had fractures of the anterior wall of the acetabulum. During the operation suprapubic skin incision was performed, fascia dissected longitudinally, rectus abdominis parted in the midline with both pubic bone visualized. Curved retractor was placed in supraacetabular area under the neurovascular bundle. With the further allocation along the linea terminalis bared the inner surface of the pelvis to the sacroiliac joint. External rotation of the pelvic bones is removed by C-clamp attached to the iliac wing. Anterior pelvic ring was fixed by plates on the front surface of the pubic bones and upper surface with screws fixing in both supraacetabular areas. Posterior pelvic ring was fixed by front plates or ilio-iliac fixation. Results: Mean follow-up was 2.5 years. Consolidation of the pelvic ring fractures noted in 12 cases. Asymptomatic nonunion of the lateral sacrum masses noted in 2 cases. One case of marginal damage of the femoral vein, one case of deep wound infection. Conclusion: Stoppa approach gives a good visualization of all parts of the anterior pelvic ring, anterior and medial wall of the acetabulum, the sacroiliac joint. There is a risk of damage to the bladder, iliac vessels, femoral nerve, the corona mortis. Supraacetabular plate fixation provides rigid osteosynthesis of unstable pelvis fractures.

#### Abstract no.: 39148 TREATMENT OF UNSTABLE PELVIC FRACTURES WITH POSTERIOR PLATING AND ANTERIOR EXTERNAL FIXATOR Dariush SAVADKOOHI, Babak SIAVASHI, Ehsan PENDAR, Dariush SAVADKOOHI

Introduction: Unstable pelvic fracture is on of high energy traumas in human beings which in the past, was treated with skeletal traction and bed rest for long time, but today, with operation and rigid fixation of pelvic ring we can ambulate the patient sooner. There are many methods for operation on pelvis, we evaluate the results of one type of them. Materials and methods: 34 consecutive patients with unstable pelvic fractures in both vertical and rotational directions were studied. For their posterior pelvic fractures, after open reduction through anterior approach, fixation with plate and screw were done and for their anterior pelvic fractures, external fixator without open reduction were used. Results: There were no malunion or nonunion in the posterior part of pelvic ring, but all of anterior pelvic ring fractures were united as malunions. There was no leg length discrepancy. After six months of followup, 3 patients experienced sever limping and pain and use cane but all of them return to their previous jobs. Discussion: It seems because of simple approach, no need to special instruments or devices, anatomic reduction and rigid fixation of posterior part of pelvic ring fractures we can achieve good functional results with low complications.

# Abstract no.: 40316 PARARECTUS APPROACH FOR TREATMENT OF ACETABULAR BOTH-COLUMN FRACTURE COMBINED WITH TRANSLOCATION OF QUADRILATERAL SURFACE

Shicai FAN, Guang XIA, Xiaodong YANG

Objective To explore the clinical effect of pararectus approach for the internal fixation of acetabular both-column fractures with concurrent displaced quadrilateral plate fractures. Methods From January 2012 to December 2013, 15 patients with acetabular both-column fractures and displaced quadrilateral plate fractures were surgically managed through the pararectus approach. They were 11 males and 4 females, with an average age of 40 years(from 19 to 61 years). All these fractures were treated through the pararectus approach. The pre-bended plate was placed in interior pelvic ring to fix the anterior wall, anterior column and quadrilateral plate in direct sight. Then, the posterior column was fixed with antegrade lag screw. Results All the 15 cases underwent the operation successfully. Postoperative X-ray and CT exams showed excellent and good reduction of the fractures. with none surgical complication occurred. According to the Matta radiological evaluation postoperatively, reduction of acetabular fracture was rated as excellent in 9 cases, good in 3 cases and fair in 3 cases. The rate of excellent and good was 80.0%. After 8 to 18 months' follow-up, all the patients gained bone union. According to the modified Merle d'Aubigne and Postel scoring system, 9 cases were excellent, 4 good, and 2 fair. The rate of excellent and good was 86.7%. Conclusions Surgical management of acetabular fractures through the pararectus approach can provides adequate exposure of reducing and fixing both-column acetabular fractures with concurrent displaced quadrilateral plate fractures, which has a good effect in clinical application.

## Abstract no.: 41085 PROSPECTIVE STUDY OF DOUBLE PERPENDICULAR PLATES FIXATION IN ANTERO-POSTERIOR COMPRESSION INJURY WITH SYMPHISIAL DIASTASIS

Waleed AMRHASSAEN, Mohammad Salah ABDELAAL

Introduction: Diastasis of the pubic symphyseal joint has been reported to occur in 13 -16% of pelvic ring injuries and it typically follows a very high velocity force with predominant external rotatory vector trying to split open one or both the hemipelvis. Objectives: To assess functional outcome of surgically treated patient using double perpendicular plates in symphisial diastasis injury. Methods: This a prospective study included a total of 19 patients with pubic diastases managed from May 2006 to December 2008. Type II APC injuries (13 patients) were treated surgically with symphyseal plating using double perpendicularly placed plates. Type III injuries (6 patients) in addition underwent posterior fixation using percutaneous sacro-iliac screws. The outcome was assessed clinically (Majeed score) and radiologically. Results: The mean follow-up was for 2.9 years (6 months to 4.5 years). Among the 13 patients with APC II injuries, the clinical scores were excellent in two, good in 6, fair in 4, and poor in 1. Radiological scores were excellent in 2 ,good in 8 ,fair in 2 and poor in one patient, Among the 5 patients with APC III injuries, there were 3 patients each with good and 2 fair. Complications included postoperative superficial infection in 2 patients resolved with culture and antibiotics, deep venous thrombosis in one patient. Conclusions: double perpendicular plates fixation in antero-posterior compression injury with symphisial diastasis is a very good way of management with high functional outcome with low complication rate in APC II pelvic iniuries.

#### Abstract no.: 40270 COMPARISON OF CURATIVE EFFECTS OF PARARECTUS APPROACH AND MODIFIED STOPPA APPROACH IN THE TREATMENT OF ACETABULAR FRACTURES Xiaodong YANG, Shicai FAN

Objectives: To compare the surgical techniques and clinical outcomes of pararectus approach and modified Stoppa approach in the treatment of acetabular fractures. Methods: The clinical data of 35 patients treated with pararectus approach (Group 1) and patients treated with modified Stoppa approach (Group 2) was analyzed 17 retrospectively. The operation times, intra-operative techniques, exposure procedures, intra-operative blood loss, reductions of fractures, and surgical approach related complications were compared between the 2 groups. Results: Surgeries of the 52 cases were all completed smoothly. Group 1 shows less blood loss during the exposure ( P < 0.05). However, there were no significant differences between the two groups regarding exposure time, complications and matta score. 1 patient in Group 1 present symptom of sciatic nerve injury, which was considered as intra-operative nerve traction through the posterior approach, and fully recovered 6 weeks after the surgery. 1 patient in Group1 present incision fat liquefaction of the abdominal wall, which was healed after dressing changing. Conclusions: Both the pararectus and modified Stoppa approaches were ideal approaches in the treatment of anterior acetabular fractures, especially involving the quadrilateral surface, which can achieve fully exposure of the anterior column and quadrilateral surface, and reduction and fixation under direct vision, with simple exposure procedure, minimal injury, and few complications. Advantages of the Pararectus approach compared to modified Stoppa approach is on the treatment of high anterior column fracture of acetabulum. compared to Pararectus approach, The modified Stoppa approach is more benefit for the management of bilateral acetabulum fractures.

### Abstract no.: 40711 SURGICAL TREATMENT OF POSTERIOR WALL FRACTURE COMBINED WITH FEMORAL HEAD FRACTURE -EFFECTIVENESS OF SURGICAL DISLOCATION FOR FEMORAL HEAD FRACTURE-

Yoshihiro NAKAMURA, Etsuo CHOSA, Takero SAKAMOTO, Shinji WATANABE, Hiroshi IKEJIRI, Taro FUNAMOTO, Masaru HIYOSHI, Keisuke KAWANO

Introduction The purpose of surgical treatment of posterior wall fractures is to restore the joint congruency of acetabulum and femoral head by anatomic reduction of the articular surface. Fractures of the posterior wall are the most common, however posterior wall fracture combined with femoral head is very rare. The keys to surgical success include exact reduction of the posterior fragments and the femoral head itself, using Kocher-Langenbech approach combined with surgical dislocation (Combined technique). Materials and Methods Between 2010 and 2012, 11cases were approached through Kocher-Langenbech approach with or without Ganz's Surgical dislocation. There were 8 males and 3 females. The averaged age was 52.2 years. Posterior fracture patterns were; Type I/II/III 2/7/2cases, femoral head fracture patterns were; Ciron I-B/II-B/III-B 2/4/5cases. Ganz's Surgical dislocation was needed for 9cases, other were resected the femoral bone fragments. Clinical and radiographic results, complication were evaluated. Results Clinical results were; excellent: 5, good: 3, poor 3cases. Poor cases (all of the cases were femoral fragments resected) needed total hip arthroplasty. Conclusion Removal of femoral head fragments leads to incongruency of the hip joint, resulting in the poor results. Proactively using Ganz's Surgical dislocation for femoral head fractures, and should aim to improve the joint congruency.

## Abstract no.: 41127 RANDOMIZED CONTROLLED TRIAL OF A MODIFIED STOPPA APPROACH VERSUS AN ILIOINGUINAL APPROACH FOR THE TREATMENT OF ACETABULAR FRACTURES Yue FANG

Objectives: To compare the results between modified stoppa approach and ilioinguinal appproach for the treatment of acetabular fractures and to evaluate which surgical approach is more favorable in treatment of acetabular fractures. Materials-methods: This is a randomized trial of 60 consecutive patients with an acetabular fracture treated with either modified stoppa approach or ilioinguinal appproach. The parameters that we assessed pre-operatively, in addition to their demographics, included fracture pattern, associated injuries, time to surgery and Injury Severity Score. Intra-operatively we calculated the blood loss and operative time for each procedure. Postoperatively we evaluated the wound drainage, blood transfusion, perioperative complications, quality of reduction, radiological results and clinical outcomes. Results: The study showed no significant differences in all measured preoperative variables between two groups(all p > 0.05). Using modified Stoppa approach obviously reduce the blood loss, wound drainage, blood transfusion and shorten operative time compared with the ilioinguinal approach (all p < 0.05). However, the two groups had no significant difference in the guality of reduction, radiological results and clinical outcomes (all p > 0.05). Conclusion: The use of the modified Stoppa approach for treatment of acetabular fractures have advantages of shorter operative time, lower blood loss, lower wound drainage and less blood transfusion.

## Abstract no.: 40747 THE APPLICATION OF 3D PRINTING AND THE TECHNOLOGY OF VIRTUAL SURGERY IN THE SURGICAL TREATMENT OF ACETABULAR FRACTURES

Cangjun ZENG, Zhanglin WU, Jing XU, Yang YANG, Bin YAN, Huajun HUANG

Objective: To explore the application value of 3D printing combined virtual surgical design to acetabular fractures. Methods: A total of 10 patients with acetabular fractures were observed in this study (01/2014-02/2015). Data of pelvis lamellar scanning were obtained for 3D reconstruction and virtual surgical design. 3D printed models were applied to surgery simulation and plate preflex. The clinical surgeries were in accordance with the virtual design. A second pelvis lamellar scanning was taken a week after operation to compare with the location and number of plate and screw in virtual design. CT data of postoperation showed highly consistency with the virtual design in location and number of plate and screw. Conclusion: 3D printing combined virtual surgical design could promote the accuracy and safety of surgical treatment of acetabular fractures, with a good curative effect and application value.

#### Abstract no.: 40973 HETEROTOPIC OSSIFICATION AFTER ACETABULAR FIXATION: Ady ABDELHAG, Yahya ELHASSAN

National Pelvic and acetabular unit, Adealaide and Meath Hospital, Tallaght, Dublin, Ireland Abstract The aim of this study was to determine the incidence of heterotopic ossification which varies considerably in the literature and to examine the associated risk factors following open reduction and internal fixation of acetabular fracture. Our study cohort comprised a consecutive series of 369 acetabular fractures admitted to a single institution between January 2002 and December 2012. The observed rate of heterotopic ossification was noticed in to be 65 patients (17.62%), of these 39 (60.0 %) were Class I, 16 (24.6%) were Class II, 8 (12.3%) were Class III, 2 (3.1%) were Class IV according to Brooker Classification. Furthermore, the median time from operation till diagnosis was found to be 261 days. The association between heterotopic ossification and these factors was explored by univariate and multivariate logistic regression. Significant risk factors included admission to ICU (p-value = 0.04), chest injury p-value = 0.01, multiple fractures p=0.005, the time lapse between injury and operation p value=0.03, and some significance with surgical approach p-value = 0.05, Open fractures p-value = 0.048. Surprisingly, there was no significant association found between with NSAIDs use, head injury and abdominal injury. We concluded that the risk for HO is multifactorial, and that severity of injury including local and systemic injuries has a direct effect on the development of HO. Chest injury, ICU admission, multiple fractures and surgical approach is prognostic factors for HO.

# Abstract no.: 42388 MINIMALLY INVASIVE PLATE OSTEOSYNTHESIS FOR UNSTABLE FRACTURE OF ANTERIOR PELVICRING INJURIES: A RETROSPECTIVE STUDY

Zhongxiang YU

Background: To evaluate merits of anterior minimally invasive plate osteosynthesis (MIPO) in patients with unstable anterior pelvic ring injuries. Methods: Forty patients with type B fractures based on AO-ASIF classification, treated from 2008 to January 2012. Patients were divided into two groups: group A (15 male and 5 female) and group B (16 male and 4 female). Conventional open reduction was applied in group A, while MIPO via ilioinguinal approach was performed in group B. Results: Group B achieved less operation time (41.5±9.19 vs.77.75±21.3), blood loss (79.5±31.03ml vs. 517.5±135.99), wound healing duration (7 vs. 17.55±6.03 days) compared to group A. Less patients were allowed analgesic administration in group B (n=3) than in group A (n=18). The radiological outcome and Majeed scoring between group A and B were no significantly difference Conclusion: MIPO may be an optimal surgical option for pelvic ring fractures compared to conventional open reduction.

### Abstract no.: 39877 OCCIPITAL CONDYLE FRACTURES IN ADOLESCENTS Ryszard TOMASZEWSKI, Wiktor LUKASZ

Background: The occipital condyle fracture is rare injury of the cranio-cervical junction, which is more commonly diagnosed in adult persons. The best method for diagnosing the occipital condyle fracture is CT-scan evaluation of the craniocervical junction. Defining morphology and stability of the fracture in CT/MRI evaluation, but not assigned type of fracture is crucial in selection of a suitable treatment method. Material & method: We present retrospective study involving a group of 3 patients (mean age 16.3) with a occipital condylar fracture treated in our Department. We evaluated the type of fracture, accompanying damage, classification systems, method of treatment, outcomes and complications. Results: The median follow-up was 16 months (10 - 22). All patients obtained good clinical effect, which we assessed using a NDI scale. One patient in the control MRI evaluation revealed the presence of clinically silent meningeal spinal cysts located at the ventral side of the spinal cord in the cervical segment of the spine. Conclusions: "Halo-vest" is a good method of treatment of unstable occipital condylar fractures. Presented cases proves that diagnostics of the occipital condyle fracture should be extended with MRI of the head and the cervical segment of the spine not only to evaluate damages of the ligamentous structures at the level of C0-C1-C2, but also in order to monitor healing process and detection of potential complications.

#### Abstract no.: 41900 ANTERIOR CERVICAL DECOMPRESSION, FUSION AND STABILIZATION BY CERVICAL PLATE & SCREW FOR TRAUMATIC LOWER CERVICAL SPINAL INJURY - A SERIES OF 62 PATIENTS Jonayed SHARIF AHMED, Alam MD. SHAH, Karim MD. REZAUL, Md. Munir HASAN KHALID, Chakraborty SHUBHENDU, Alam TASHFIQUE

Introduction: Acute cervical spinal injury one of the most common causes of severe disability and death.Anterior cervical surgery has still a better outcome.Methodology:A prospective study was done in NITOR and other private clinics at Dhaka from July 2009 -September 2014. Discectomy or corpectomy was done for decompression, tricortical bone graft or cage with bone graft was used for fusion. Cervical plate was used in all. Total case was 62(M-46,F-16). Age ranging from 14 – 52 years. Total follow up time was 3 Months to 48 Months. Quantification of deficit and neurological outcome was rated by ASIA impairment scale.Results:The results shows that peak incidence was in 3rd decade. Falling due to slip while carrying heavy load on head was the most common cause. The commonest skeletal level was C5/C6.Among 62, in pre operative period 6 patients had ASIA impairment scale A,25 patients had ASIA impairment scale B, 28 patients had ASIA impairment scale C & 3 patient had ASIA impairment scale D. At follow up, 22 of ASIA B changed to ASIA D,3 of ASIA B changed to ASIA E, 18 of ASIA C changed to ASIA D, 10 of ASIA C changed to ASIA E, 3 of ASIA D changed to ASIA E & 6 of ASIA A remain unchanged. None had worsening of neurodeficit due to surgery. Conclusion: For better outcome, proper selection of case is very important. As because, no neurological recovery occurs in complete lesion but for early mobilization and prevention of further complication surgery may be considered.

### Abstract no.: 39103 SHORT SEGMENT PEDICLE SCREW FIXATION FOR THORACOLUMBAR SPINE FRACTURES WITH INTER TRANSVERSE FUSION Varun GUPTA, Swapnil GADGE, Pradeep K SINGH

Introduction: Spine fractures have been studied extensively in the literature for their inherent biomechanical characteristics. They commonly occur at the thoracolumbar spine junction out of which >50% of these fractures are located between T11 and L2. For patients sustaining a spinal column injury, the treatment focus is protecting uninjured neural tissues, maximizing recovery of injured neural tissues and optimizing conditions for the musculoskeletal portions of the spinal column to heal in a satisfactory position. The classification system (Magerl 1994), further modified by the AO, classifies burst fractures within the severe end of the spectrum of injuries. Aim: To evaluate the results of short segment pedicle screw fixation for thoracolumbar spine fractures with inter transverse fusion. Study Design: Prospective study was conducted .All patients with single level acute thoracolumbar fracture were included in the study. The fracture pattern was classified using Magerl classification system whereas Frankel grading system was used to evaluate the neurologic status of the patients at different stages of follow-up. Antero-posterior and lateral radiographs were taken preoperatively to ascertain the status of the posterior elements, pedicles, and the retropulsion of bony fragments into the spinal canal. MRI was done to evaluate spinal cord injury. CT scan was considered as optional radiological tool to classify the fracture. Results: Results were assessed by Frankel grading system and rapid neurological recovery and mobilization was observed in patients who were treated within 24 hours of injury. Conclusion: Short segment fixation is an option for stable type of thoraco-lumbar injury with fusion. Fusion should always be done in order to augment fixation.

# Abstract no.: 42355 TREATMENT OF THORACOLUMBAR BURST FRACTURES WITH NEUROLOGICAL DEFICIT: A MODIFIED SUBTOTAL CORPECTOMY FOR SINGLE-SEGMENT TITANIUM MESH FUSION AND INTERNAL FIXATION THROUGH POSTERIOR APPROACH

Aiqiang XU

Purpose: We designed a modified surgical treatment for thoracolumbar burst fractures with neurological deficit: subtotal corpectomy via foramen-pedicle for single-segment titanium mesh fusion and internal fixation through posterior approach. The purpose of this study was to verify the clinical effect of our surgical technique. Methods: Forty-five patients were treated in this study. The measurements of sagittal cobb angle, percentage loss of the vertebral body height and percentage of the spinal canal compromise before and after surgery were compared for observation. The outcome assessment were evaluated with Frankel grade and Asia motor score (AMS). Results: All patients were followed-up for at least 12 months. The loss rates of vertebral body heights, cobb angles and the spinal canal obstruction were restored significantly at postoperative period. The heights and angles had been well maintained for at least 12 months. The mean cobb angle was (5.71±2.04)° and the mean percentage of the spinal canal obstruction was (10.80±3.63)% in the latest follow-up and the mean AMS before and after the operation was 39.8, 79.4, which all showed obvious significance(p<0.05). Just one case of nerve injury has not been significantly restored according to the Frankel rating, observing the CT and MRI found the serious canal compression and severe spinal cord injury, but the other patients had obvious recovery. No implant sinkage, breaking or loosening of screw occurred in the latest follow-up. Conclusions: This surgical technique is an ideal and reliable treatment for thoracolumbar burst fracture with the intact inferior endplate.

### Abstract no.: 40523 PROSPECTIVE RANDOMIZED CONTROLLED TRIAL COMPARING THE OUTCOMES OF PEDICLE SCREW FIXATION WITH OR WITHOUT BONE GRAFT IN THE MANAGEMENT OF THORACOLUMBAR BURST FRACTURES

Aaradhana Jivendra JHA, Abhijeet KUNWAR, Bikram Prasad SHRESTHA, Pashupati CHAUDHARY, Rajiv MAHARJAN

Background: Posterior fixation using pedicle screws is an accepted standard method of treatment of thoracolumbar vertebral fractures. Bone graft adjunct is supposed to improve outcomes of pedicle screw fixation. Nevertheless, bone graft supplement is controversial due to conflicting results. Purpose: We conducted prospective randomised clinical trial on 60 patients with thoracolumbar vertebral fractures to ascertain role of bone graft. Methods: Sixty patients aged 18-60 years presenting with thoracolumbar vertebral fractures were randomly allocated to treatment with pedicle screw fixation with or without bone graft. Thirty were assigned Group A(with bone graft) and Group B (without bone graft). Clinical and radiological parameters were studied in both groups pre- and post-operatively. These patients were followed up at 2, 6, 12 and 24 weeks. ASIA score, Modified Frankel grade, Visual Analogue Score, Cobb's angle, Anterior Vertebral Height were employed to study the clinical and radiological parameters to compare the outcomes in the two groups. Results :The clinical and radiologic outcomes did not vary significantly between the two groups in terms of post-operative back-pain, complications, hospital stay, neurologic improvement (ASIA scores and Modified Frankel grade), loss of correction of kyphotic angle and anterior vertebral height. The fusion group had additional operative time, blood loss, graft site morbidity and cost. Conclusion : There is no significant difference in outcomes of pedicle screw fixation with or without bone graft in the management of thoracolumbar vertebral fractures, moreover grafting has its own drawbacks. However, long term studies are required to further validate this.

#### Abstract no.: 41072 NEGLECTED THORACO LUMBAR TRAUMATIC SPINE INJURIES: A RETROSPECTIVE STUDY OF FORTY PATIENTS AT JPNATC, AIIMS, NEW DELHI A LEVEL ONE TRAUMA CENTER Kamran FAROOQUE, Vijay SHARMA, Babita GUPTA

Forty patients with neglected traumatic thoraco lumbar spine injuries were included in this retrospective study from Jan 2008 to March 2014. This study was conducted at JPNATC, AIIMS, New Delhi a level one trauma center in India. Only patients with more than three weeks of traumatic thoraco lumber spine fractures were included in the study, and classified as neglected spine trauma. A total of forty patients fulfilled the inclusion criteria and were recruited in this study. There were 20 cases of Burst fractures, 17 cases were fracture Dislocation and one case each of soft tissues chance fracture, traumatic spondylptosis and traumatic spondylolisthesis. An anterior surgery was done in 09 cases (Burst Fractures). A posterior surgery was done in 26 cases. A combined posterior and anterior surgery was done in 05 cases. Inadequate treatment at the primary treatment center (45%) was the leading cause followed by late presentation (38%) and missed injury (17%) for the delay in proper management of these neglected spine fractures. A neurologic improvement of at least one ASIA grade was seen in 48% (19 pts). The average SCIM score at final follow up was 73. The most common complication was pressure sores which were present in 35 % (14 cases). Other complications were urinary tract infection & respiratory tract infection. Conclusion: Neglected spine trauma is common in developing country like India. A variety of surgical stratagies are required to manage such cases, however with adequate treatment an acceptable outcome can be acheived.

## Abstract no.: 40655 LATE DECOMPRESSION OF TRAUMATIC CAUDA EQUINE SYNDROME: IS IT EFFECTIVE?

Mohammad ZAREI, Babak MIRZASHAHI, Sm Javad MORTAZAVI

The prevalence of traumatic spinal cord injury worldwide is approximately 750 per million with an annual incidence that appear to be raising. Blunt spinal trauma complicated by injury to conus medullaris and cauda equine is a devasting event on a personal and family level, as well as a tremendous financial burden to society because of its attendant morbidity, expense, and prolong treatment requirement. Cauda equine is a medical emergency. it is believed that for a good clinical outcome, surgical decompression must be down as soon as possible within 24 hours. Late decompression is believed to be associated with poor outcome. The purpose of this study is to find the clinical outcome of decompression of traumatic cauda equina presenting late in the course of disease. In this study we present 12 patients, 10 male and 2 female with average age 28 years, ranging from 19 to 52 years. Time interval between trauma and surgery varied from 12 to 29 days. The average follow-up was 27 months, ranging from 14 to 38 months. The result of surgical decompression and fixation in these patients is dramatic. Neurological improvement reach a plateau one year after surgical decompression and fixation. Presence of anal wink is good predicting factor for bowel and bladder recovery. Our patients do show that late decompression in traumatic cauda equine syndrome is a worthwhile procedure.

#### Abstract no.: 40946 SURGICAL TREATMENT OF TRAUMATIC SACRAL FRACTURE Babak MIRZASHAHI, Mohamad ZAREI, S.M. Javad MORTAZAVI

Sacral fractures are rare and potentially have high complication rate. Injury to sacrum may lead to neurologic deficit, pain and disability. All patients with sacral fractures who had undergone surgical treatment were evaluated retrospectively and data was collected . All patients followed minimum one year postoperatively. Fracture type, preoperative and postoperative neurologic examination according to the ASIA score and Gibbons classification, VAS, postoperatively complication infection, deep venous thrombosis (DVT) were evaluated. 27 patients with sacral fracture were treated surgically. 15 (55.4%) patients were female and 12 (44.6%) were male. They divided in two groups. 14 (51.8) patients underwent percutaneous iliosacral screw fixation (iliosacral fixation group) and 13 (48.1%) patients underwent spinopelvic fixation (spinopelvic fixation group). 3 (11.1%) patients had neurologic deficit, ASIA score B,C,D and Gibbons grade 3 and 4 (sphincter dysfunction) for them neurologic decompression was done. Two of them recovered completely (with preoperative gibbon, s grade 2.3) and one of them with gibbons grade 4 (incontinence) improved incompletely in motor power but still remained incontinence. Non of them developed post op infection, DVT, rod breakage or screw lossening or breakage whereas only one patient in spinopelvic fixation group developed asymptomatic rod dislodgment from distal (iliac) fixation. In all patients VAS score changed from mean 8 preoperatively to mean 1 postoperatively. One patient complained of low back pain in spinopelvic fixation group. Surgical treatment of sacral fractures is trending treatment of sacral fractures and provide reasonable results.

#### Abstract no.: 40409 EFFECT OF GANGLIOSIDE (GM1) ADMINISTRATION IN SPINAL CORD INJURY

Tarcisio BARROS, Ciro SILVA, Reginaldo OLIVEIRA, Alexandre CRISTANTE, Raphael MARCON

There are several publications that support the effectiveness of gangliosides in animal models with spinal cord injury caused by neurotoxic. traumatic or ischemic events. Based on these findings, clinical studies were carried out with GM1 in patients suffering from acute and chronic spinal cord injuries, showing improvement of functions in the group of patients treated with GM1. In order to evaluate the efficacy of GM1 ganglioside in acute spinal cord injury a prospective, randomized, double blind clinical trial was performed at our unit. There were evaluated 30 consecutive patients with closed acute spinal cord injury admitted between 8 and 72 hours after the trauma, with age ranging from 14 to 70 years. Patients were randomized to two groups: the GM1 group consisted of patients treated with GM1 bolus (200mg IV) at the admission and 100 mg IV per day during 30 days and the placebo group. The patients were evaluated according the ASIA/IMSOP neurologic standards at 6 weeks, 6 months, 1 year and 2 years pos-tinjury. The difference between the GM1 group and the placebo group in terms of neurologic recovery was statistically significant (p<0,05) at 6 weeks and 6 months and 2 years. These results indicate a therapeutic benefit of GM1 in the initial phases of neurologic recovery in patients with acute spinal cord injury.

## Abstract no.: 40302 OUTCOMES OF POSTERIOR ONLY KYPHOSIS CORRECTION IN ACUTE TUBERCULAR SPONDYLODISCITIS

Bhaskara Kanakeshwar RAJA, S RAJASEKARAN, Shetty AJOY

It was considered that posterior only deformity correction is a safe and feasible technique in acute tubercular kyphosis. 67 consecutive patients with thoracic kyphosis due to acute tuberculosis were treated by a posterior only kyphosis correction and stabilisation. Indications for surgery were persistent pain (n=12), neurological deficit (n=27) and kyphosis (n=28). Following transforaminal/transpedicular debridement 30 patients had posterior column shortening and 37 had reconstruction with anterior cage as per our previously decided criteria. The mean follow-up was  $36.4 \pm 12.1$  months. The mean VAS improved from  $7.2\pm1.2$  to  $1.6\pm0.9$ . The mean kyphotic angle improved from  $26.4\pm4.6^{\circ}$  to  $12.4\pm2.4^{\circ}$  There was significant kyphosis correction which was maintained at the final follow-up. With minimal peri-operative morbidity, the technique provided good clinical outcomes and disease healing.

### Abstract no.: 40480 OUTCOME ANALYSIS OF MANAGEMENT OF TUBERCULAR SPINE TREATED WITH ANTERIOR DECOMPRESSION WITH VARIOUS AUTOLOGOUS BONE GRAFT WITHOUT INSTRUMENTATION Hemant BANSAL, Saurabh SINGH, Samrat Smrutiranjan SAHOO, Kumar PRITESH

Background: Our study is to analyse the outcome of anterior decompression of cord, debridement and stabilisation with various autologous bone grafts used in combination without instrumentation in tubercular spine. Material and Method: Twenty patients of tubercular spine (GATA type 2or3) with paraplegia were operated with anterior (transthoracic & trans-diaphragmatic) decompression of cord, debridement and stabilisation with various autologous bone graft in combination. Further they were grouped(10 in each) into GROUP-A: which includes patients treated with autologous fibula strut, rib and tricortical iliac crest graft, GROUP-B: includes patients treated with only autologous rib and tricortical iliac crest graft. Results were analysed on the basis of neurological improvement (Frankel Grade), union time (graft uptake), correction and progression of kyphosis and graft subsidence. Results: Patients in both, Group A and B shows similar neurological recovery from Frankel Grade A to E. Group-A patients shows mean correction of 7.2°(3°-22°) in kyphosis with no loss of correction on 2 year of follow up. Whereas patients in Group-B shows increase in kyphosis in immediate post-operative period without further progression on follow up. Graft uptake was good in 19 cases and graft subsidence was seen in 1 patient of Group A. Conclusions: Anterior decompression, debridement and stabilisation with autologous bone graft without instrumentation has shown complete neurological recovery with bone block formation. Our study justifies that use of fibula strut graft along with cancellous bone graft is essential to correct the kyphosis and to prevent its further progression.

#### Abstract no.: 40460 OUTCOME ANALYSIS OF TREATMENT OF JUNCTIONAL AREA TUBERCULOSIS

Hemant BANSAL, Saurabh SINGH, Samrat Smrutiranjan SAHOO, Kumar PRITESH, Vivek SRIVASTAVA

BACKGROUND: Tubercular spondylitis of junctional area (cervico-dorsal or dorso- lumbar) are difficult to diagnose due to anatomical location and unilateral symptoms or altogether lack of symptoms. Anterior decompression of cord and complete debridement in junctional tuberculosis is surgically demanding procedure. The aim of the study is to analyse outcome of anterior decompression of cord, debridement and stabilisation with bone graft in junctional area tuberculosis. METHOD: Eleven patients with GATA Type 2 & 3 tubercular paraplegia were chosen between the age of 20 to 70 years. Six patients of dorso-lumbar and five of cervico-dorsal region tuberculosis were operated with anterior decompression of cord, debridement and stabilisation with autogenous bone graft. Results were analysed on the basis of neurological improvement (Frankel Grade), union time (uptake of graft) and deformity correction. RESULTS: 9 out of 11 patients show recovery from Frankel grade A to Frankel grade E, 2 patients of cervico-dorsal tuberculosis improved from grade A to D in 2 year follow-up. Graft uptake was good and union occurred in all the cases. There was no incidence of graft subsidence or recurrence of disease. CONCLUSIONS: Anterior decompression of cord and bone grafting is the best approach for tubercular spondylitis of junctional area tuberculosis. The approach is difficult and requires surgical expertise but provides good visualisation and in-turn complete debridement of the diseased region, drainage of abscess and decompression of the cord. This leads to good clinical outcome in terms of neurological recovery and graft uptake.

## Abstract no.: 41183 COMPARISON OF OUTCOMES OF 9 MONTHS ANTI TUBERCULAR CHEMOTHERAPY REGIMEN WITH 12 MONTHS ANTI TUBERCULAR CHEMOTHERAPY REGIMEN IN UNCOMPLICATED POTTS SPINE Himanshu VIJAY, M L BANSAL, Bibhudendu MOHAPATRA

Introduction: anti tuberculosis drugs have made the management of uncomplicated potts spine predominantly medical subsequent to many studies the first line drugs are now standardized but the problem lies in deciding upon the appropriate duration of chemotherapy in spinal tuberculosis. Method: a prospective study of 59 patients was done in a tertiary care spine centre.the outcome measures were noted immediately after the completion of the treatment, at 6months, 12 months and 18 months. Outcome measures included clinical, hematological and radiological criteria. A mixed model anova was used to compare group-a (9 month) & group-b (12 month) across different times of assessment for each variable.the differences from baseline at 6 and 12 months were compared across groups & as the data was not normally distributed, mann whitneyU test was used. Result:on comparison group b was found to have reduced pain scores than group a during 6 month follow up (odi: group-A 19.2 & group-B 17.3) but in the 12 month follow up showed no statistical difference in pain score (odi: group-A 13.9 & group-B 12.6).there was no neurological deterioration in both groups. crp, esr, hb improved in both the groups.deterioration of kyphotic angle was statistically significant in group a(0.6\*) than group b(0.2\*) but it was clinically irrelevant. Conclusion: after 18 months follow up of patients who had completed their anti tubercular treatment, the study concluded that there was no additional benefit of prescribing anti tubercular therapy for 12 months over 9 months in patients of uncomplicated potts Spine (1 or 2 Level). Level of evidence - II

# Abstract no.: 41926 FUNCTIONAL OUTCOME OF CAGE FIXATION IN SPINAL TUBERCULOSIS PATIENTS

Irfan MEHBOOB, Muhammad Abdul BASIT, Zubair KARIM

Objective: To evaluate functional outcome with cage stabilization in spinal tuberculosis. Methods: Between January 2012 and august 2013, thirty patients with a diagnosis of vertebral tuberculosis underwent surgery by anterior approach, with follow-up of 18 months. The procedure consisted of wide debridement of the affected body, followed by instrumentation with cage stabilization and autograft. The indication for surgery was instability of vertebrae and kyphosis of the segment. Previously, patients received ATT treatment for three weeks. Imaging studies before and after surgery, as antero-posterior and lateral radiographs, evaluated the kyphosis. Fusion was assessed by postoperative simple radiographs. Magnetic resonance imaging was performed preoperatively. Besides imaging, the following tests were made: complete blood count, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), T-spot and microbiological examination of urine and sputum smear, sputum or urine culture. Results: Thirty patients were operated by anterior approach, 12 males with a mean age of 35.5 years and 18 females with mean age of 49.5 years. All patients had segmental kyphosis. One female patient developed complication. Conclusion: The anterior instrumentation is an effective method to treat spinal tuberculosis, while avoiding the progression of kyphosis or promotes kyphosis correction. Keywords: Spinal tuberculosis; Cage fixation; Kyphosis; ATT

#### Abstract no.: 41306 FACTORS AFFECTING THE QUALITY OF LIFE OF POTT'S PATIENTS Jewel SADIANG-ABAY

Introduction: In the Philippines, Vianzon reported 1 379 390 cases of tuberculosis (2003 to 2011). Of these, extra-pulmonary tuberculosis comprise 1.1%. Among the forms of extrapulmonary tuberculosis, Pott's poses a threat of spinal cord compression. WHO defines Quality of Life as an individual's perception of their position in life in the context of the culture and value systems in which they live. This study aimed to identify the factors that define the Quality of Life of patients with Pott's disease. Methods: This was a cross sectional study of patients who consulted at Philippine Orthopedic Center. Twenty-eight patients answered the WHO BREF QOL. Factors that were investigated include age, gender, spinal level of disease, level of education, marital status, hospital admission, length of admission, time interval from onset of symptoms to initial consult, months of anti-Kochs medication. Results: Mean age of patients was 38 years old; 14 males and 12 females. Level of affectation ranged from C4 to L5. 46% of patients involved T10-T12. The average hospital stay was 3 months. The average time interval from onset of symptoms to initial consult was 6.65 months. Higher level of education, less than three months hospital stay, less than six months interval of onset of symptoms to initial consult, intact bowel and bladder continence were positively associated with good quality of life. Higher level of spine affected, prolonged hospital admission and less than 12 months of anti-Kochs treatment were correlated with poor quality of life.

#### Abstract no.: 41623 IMPLANT INFECTIONS: COMPARISON BETWEEN THE USE OF STAINLESS STEEL AND TITANIUM SPINAL IMPLANTS Fred Matthew Toboso OTSYENO, Peter Gichuru MWANGI

Instrumentation in spinal surgery is well established. Late postoperative infection following use of implants in spinal surgery is a recognized entity. We analyzed, infection as a late complication in two groups of patients who had undergone spinal stabilization instrumentation with pedicle screws and rods over a five year period between January 2008 and December 2012. The first group of patients were treated with posterior stainless steel spinal pedicle screws and rods, they were 67 in number, at two years post operatively eight patients had presented with wound infections. Six of the patients were successfully treated by debridement and removal of implants, one had to undergo further stabilization with titanium implants and since over eighteen months not developed infection, one was lost to follow up. At surgical debridement in all situations there was implant loosening. The second group involved 37 patients who were treated with posterior titanium spinal pedicle screws and rods instrumentation system. Only one of the patients had presented with infection at two years follow up. The patient was noted to be HIV positive, at debridement there was no loosening of the implants but their removal appeared to have controlled the spinal infection, the patient died from intra-abdominal sepsis 5 months later after the removal of the spine implants. We conclude that spinal instrumentation with titanium systems compared to stainless steel systems appear to have smaller incidence of late postoperative infections, We advocate for long follow up of large series to reaffirm this.

# Abstract no.: 40529 HEMATOCRIT MAY BE AN INDICATOR OF SURGICAL SITE INFECTION RISK IN CHILDREN WITH CEREBRAL PALSY

Joshua HYMAN, Eric BARANEK, Hiroko MATSUMOTO, Benjamin ROYE, David ROYE, Michael VITALE

Background: Only grade C evidence exists linking malnutrition to surgical site infection (SSI) risk in pediatric patients following scoliosis surgery. Low Hct is a nutritionally related risk factor for SSI in patients with myelomeningocele; however, there is no evidence that low Hct is a risk factor for SSI in cerebral palsy (CP) patients. Methods: We performed a case-control study comparing nutritional indicators of CP patients who did and did not develop SSI following posterior spinal instrumentation and fusion (PSIF). Data on age, height, weight, BMI, pre-operative Hct, and occurrence of SSI (defined as a deep wound infection within 1 year of PSIF) was collected retrospectively. Odds ratios, 95% confidence intervals (CI) and Fischer's exact test were performed to determine the causal inference of nutritional indicators and SSI. Results: 25 patients were included. Average age was 14.3 ± 2.6 years, height 135.2 ± 16.4 cm, weight 35.9 ± 13.7 kg, BMI 20.1 ± 8.9 kg/m<sup>2</sup>, preoperative Hct 42.3 ± 3.6%. 5/25 (20%) patients developed SSI within one year. Of the patients who developed SSI 3/5 (60%) had pre-operative Hct ≤40%. Of the patients who did not develop an SSI 3/20 (15%) had pre-operative Hct ≤40%. Pre-operative Hct ≤40% (OR = 8.50, 95% CI: 1 - 74, p = 0.0351) was a risk factor for SSI. Height, weight, and BMI were not significantly correlated with SSI. Conclusion: CP patients with Hct ≤40% were 8.5 times more likely to develop an SSI within one year of PSIF.

# Abstract no.: 40295 ONE-STAGE DEBRIDEMENT, AUTOGRAFT AN INTERNAL FIXATION COMBINED WITH LONG COURSES OF ANTIBIOTICS FOR GRAM-NEGATIVE BACTERIAL SPONDYLITIS OF THE THORACIC AND LUMBAR VERTEBRAE

Xiang-Yang LIU

Objective: To discuss the surgical treatment method and effectiveness of gram-negative bacterial (GNB) spondylitis of the vertebrae. Method: From June 2004 to March 2013, 26 inpatients suffering from GNB thoracic/lumbar spondylitis were reviewed retrospectively. All the patients received one-stage debridement and autograft from posterior or posterior combined anterior approach, and posterior pedicle internal fixation. All of patients were followed up regularly after operation. Result: The mean follow-up was 24.7 months (24~72 months). 1 case experienced clinical recurrence which was confirmed by blood culture. After bed rest, systemic antibiotics and other conservative treatments, that patient recovered healthy. The VAS scores were significantly improved at 3 month (2.4±0.9), 6 months( $1.0\pm0.4$ ), and 12 months ( $0.5\pm0.6$ ) when compared with preoperative score  $(8.2\pm1.6)$  (P < 0.05). The nerve function ASIA classification after operation was significantly improved when compared with preoperative (P < 0.05). Macnab evaluation: as time went on, the Macnab scores gradually improved, and the good rate achieved 92.31% at 12 months after operation. Imaging evaluation: imaging scores were significantly improved at 3 month( $3.91 \pm 0.19$ ), 6 months ( $4.58 \pm 0.34$ ), and months ( $4.82 \pm 0.18$ ) when compared with the preoperative score(1.32±0.23)(P<0.05).Conclusions: One-stage debridement, autograft and posterior pedicle internal fixation combined with postoperative irrigation and drainage is a effective and feasible surgical method for GNB spondylitis. Select antibiotics based on the result of drug sensitivity test, and ensure the course more than 8 weeks, also are the key points for treatment.

Date: 2015-09-17 Session: Free Papers Osteoarticular Infection Time: 16:30 - 18:00 Room: Qingyuan Hall

#### Abstract no.: 40376 IMPROVED DIAGNOSTIC POTENTIAL OF PCR BY AMPLIFICATION OF MULTIPLE GENE TARGETS IN OSTEOARTICULAR TB Balaji SAIBABA, Gopinath PALANISAMY, Sameer AGGARWAL, Mandeep Singh DHILLON, Kusum SHARMA

Aim: Heterogenous primers have been routinely employed in the Polymerase Chain Reaction (PCR) assays for the diagnosis of tuberculosis, but most investigators have evaluated their utility using only one primer specific for Mycobacterium tuberculosis. The purpose of our study was to evaluate the efficacy of PCR tests using two different DNA sequences - insertion sequence 6110 (IS6110) and protein antigen b (Pab) in the same set of clinical samples from osteoarticular tuberculosis cases and to evaluate if the sensitivity of the assay is improved. Methodology: Twenty clinical samples obtained from osteoarticular TB cases were subjected to PCR assays targeting 123bp sequence coding for IS6110 and 419bp sequence coding for Pab. Ten clinical samples from cases of proven septic arthritis were studied as controls. Results: The sensitivity of IS6110 PCR and Pab PCR were found to be 75% and 80% respectively and the specificity of both IS6110 PCR and Pab PCR were 100%. No significant difference was found between two PCR assays (p >0.05). However, there were 2 cases which were negative by IS6110 PCR but were positive by Pab PCR. There was 1 case which was positive by IS6110, but was negative by Pab PCR. Conclusion: The diagnostic yield of PCR can be improved simultaneous amplification (Multiplex PCR) of two or more gene targets. Keywords Osteoarticular tuberculosis, polymerase chain reaction.

Date: 2015-09-17 Session: Free Papers Osteoarticular Infection Time: 16:30 - 18:00 Room: Qingyuan Hall

### Abstract no.: 39539 GLYCATED HEMOGLOBIN AS A PREDICTOR OF ARTERIAL OCCLUSION SEVERITY IN DIABETIC FOOT INFECTIONS MANAGED WITH MAJOR AMPUTATION

Juan Agustin Iv CORUÑA, Teodorico PACALDO, Ma. Luz Vicenta GUANZON, Jose Maria CORUÑA, Mary PEREZ, Therese Anne SUÑE

Introduction: In this retrospective cohort study, we compared HbA1c levels of all diabetic patients with foot infections, and between those treated with major amputation (belowknee and above-knee) or conservatively. Methods: After ethics review board approval, a systematized chart review was performed. Three-hundred two feet from 264 consecutive patient referrals were enrolled in the study from January 1 to December 31, 2014. HbA1c result upon admission and routine histopathology of amputated limb posterior tibial artery were collected and inputted to a spreadsheet, together with demographic and clinical data. Results: Majority of the patients were males (58.94%). The mean HbA1c of study participants was 9.81% (SD: 2.89%). Majority (78.15%) had uncontrolled blood sugar (HbA1c >7.0%). Forty-five percent underwent major amputation. The mean HbA1c of patients who did not undergo surgery was 7.89% (SD: 2.41%) while patients with major surgery had 11.20% (SD: 2.68%). The mean percentage for posterior tibial artery occlusion among amputated limbs was 31.46% n=135 (95% CI: 27.01% to 35.91%). On univariate analysis using linear regression analysis, Hba1c correlates with percentage occlusion in posterior tibial artery (F value- 57.17, R square- 0.1601, p value- 0.000). Based on the linear regression analysis equation, the lowest HbA1c level that could predict a 90% occlusion of the posterior tibial artery is 14.11%. Conclusion: Patients with poor glucose control have higher incidence of undergoing major amputation. Among amputees, poor glucose control is associated with increased occlusion in the posterior tibial artery.

Date: 2015-09-17 Session: Free Papers Osteoarticular Infection Time: 16:30 - 18:00 Room: Qingyuan Hall

# Abstract no.: 41563 POST ANTI.T.B. TREATMENT INDUCED OSTEOMALACIA REMAINS UNDIAGNOSED IN 100 %

Vijay Kumar KHARIWAL, Sadhna GARG

This is a study done on 250 cases who had treatment for tuberculosis of any region of body by modern drugs like rifampicin, isoniazid. Patients usually after 6 month of treatment start getting severe body aches & pains. This pain does not respond to analgesics. In 40 patients it was thought patient not taking medicine properly, either dose was increased or medicine changed. In 35 it was thought to be drug resistant T.B. In few it was thought wrong diagnosis, spurious medicine, in few as recurrence of disease& in these alkaline phosphtase may be raised & on DEXA bone scan many people had osteopenia. osteomalacia. Vit D, serum calcium, phosphorus& alkaline phosphtase helped. These cases remained undiagnosed varying from few months to many years & spent huge amount on investigation unrelated, this requires strong clinical suspicion to diagnose ,as this responds very dramatically to Vit D & calcium. One must think that many anti .t.b. Drugs are hepato toxic & vit. D metabolism is disturbed, but not to the extent to give clinical symptoms in every case , though in the literature it is claimed that anti. T.B drugs do not affect Vit D& calcium metabolism but in some patients it does affect. In these few, problem too much& may be because of genetic factor or individual response. By prolonging anti t.b drugs we are increasing agony of patient by promoting vicious cycle& even psychological symptoms. A simple problem is rather made complicated by doctors.
#### Abstract no.: 40897 OZONETHERAPY EFFECTIVENESS IN CHRONIC OSTEOMYELITIS TREATMENT, A RANDOMIZED CLINICAL TRIAL STUDY Mohammad Reza GOLBAKHSH, Ahmadreza MIRBOLOOK, Bahram NADERI NABI, Hossein ETTEHAD, Mohammad HAGHIGHI, Reza

GHORBANI AMJAD, Mohammadsadegh MOUSAVI

Introduction: It seems that ozone has a positive effect in the treatment of infections, especially abscesses, and specifically those areas that Antibiotics have no chance of penetrating the affected area. Objectives: Evaluate ozonetherapy effectiveness in chronic osteomyelitis treatment Methods: The present study is a Randomized Clinical Trial which has been performed on 66 patients with chronic post-operative osteomyelitis who were referred to Poursina Hospital during the year 2012. In this study all patients were evaluated through clinical examination for a one year period. These patients were observed in the first, third, sixth, ninth and twelfth months. Patients were studied in terms of recovery time relative to the administration of frequent radiology treatments. Results: Altogether, 30 patients recovered through receiving treatment. 22 of these patients were in the group treated by ozone and 8 patients were in the group treated by antibiotics. The statistical difference between these two groups was significant. The rate of final ESR was 49.66+41.14, recorded as 67.90+39.88 in the antibiotics group and 30.79+33.69 in the group treated by ozone(p=0.0001) Conclusions: The results of our study show that in patients treated by ozone, statistically and clinically increased likelihood of survival from the risk of amputation of the involved site even if initially non-responsive.

#### Abstract no.: 39075

# THE MANAGEMENT OF HIP AND KNEE PROSTHETIC JOINT INFECTIONS IN A DISTRICT GENERAL HOSPITAL. HOW SUCCESSFUL IS THE DEBRIDEMENT, ANTIBIOTIC AND IMPLANT RETENTION (DAIR) STRATEGY?

Stephen NG MAN SUN, Ruth CORRIGAN, Mansoor RAZA, Oliver PEARCE

INTRODUCTION: Prosthetic joint infection (PJI) is a serious complication of joint arthroplasty with an incidence of 0.6%-2%. Eradication of infection whilst maintaining joint function remains the primary goal and this may be achieved through DAIR, or single / two stage revision. The combination of early aggressive debridement combined with prolonged antibiotics may successfully lead to implant retention and forms the basis of DAIR. This study describes our experience of DAIR in a district general hospital setting. METHODS: Patients were identified from the Outpatient Parenteral Antibiotics Therapy (OPAT) database during a 30-month period (Oct. 2011 - March 2014). Notes were reviewed retrospectively. RESULTS: 35 cases with PJI were identified. 26/35 (74%) were managed with DAIR (16 TKR and 10 THR) with prolonged courses of intravenous followed by oral antibiotics (6 months in TKR and 3 months in THR). 12 males and 14 females with mean age was 64 years and BMI 33. Of the 26 managed with DAIR, 14 presented early (<3months), 4 delayed (3-12months) and 8 late (>12months) after their primary surgery. Implants were retained successfully in 19/26 (73%). The remaining 7 patients remained symptomatic and required revision. CONCLUSIONS: The outcome of management of joint infections in our district general hospital is excellent with minimal need for tertiary centre referral. In particular, the strategy of DAIR was successful in 73% cases. OPAT facilitates early discharge of these patients. DAIR was largely unsuccessful in those presenting >12 months and in this group, early revision surgery would have been the better option.

# Abstract no.: 40038CUSTOM-MADEANTIBIOTIC-IMPREGNATEDCEMENTEDINTRAMEDULLARYNAILSININFECTEDNON-UNIONOFLOWEREXTREMITYPavel VOLOTOVSKI, Alexandre SITNIK, Oleg BONDAREV, AlexanderBELETSKY

Introduction: Problems of infected non-unions include not only infection and impossibility of weight-bearing, but also restricted ROM and compromised soft-tissues as result of trauma and previous surgeries. In such cases, treatment is long and difficult both for patient and treating surgeon. Purpose: Evaluation of antibiotic-impregnated cement nails efficacy for management of infected non-unions. Materials and methods: The study included 28 patients with infected non-unions of femur (18) and tibia (10) treated from 01.2009 to 11.2013. Mean time from the injury to AB-cemented nailing was 16.5(9-27) months. 4/18 femoral and 5/10 tibial fractures were initially open. Other fractures were closed and infected non-union developed as complication of previous surgeries: IM-nailing, ORIF or Ilizarov external fixation. Fistulas were revealed in all patients, but have closed by the time of AB-cemented nailing in 18 cases. Pre- and intraoperative cultures revealed S.aureus in 18, S.epidermidis in 5, no grows in 5 cases. Solid stainless-steel nails (SIGN) were coated with AB-cement (Gentafix mixed with Vancomycin) intraoperatively. Full weight-bearing was usualy allowed 3 months after surgery. Follow-up was performed in 6, 12, 24 and 52 weeks. Results: One year after surgery, X-ray revealed bone union in 25 (89.3%) patients and all 28 (100%) patients were full weight-bearing. In 3 (10.7%) cases, X-ray has revealed persistent non-union. Open fistulas were found in 4(14.3%) patients and required hardware removal and debridement. Discussion: AB-cemented nailing allowed to eliminate infection and achieve fracture healing in the majority of patients. This method can be considered as effective and requires further studies.

# Abstract no.: 40865 FREE VASCULARIZED FIBULAR GRAFT BRIDGED VASCULAR PEDICLE BY VEIN TRANSPLANTATION FOR INFECTIVE BONE DEFECT RECONSTRUCTION IN THE LOWER EXTREMITY Gao-Hong REN

Objective To study the effect of free vascularized fibular graft bridged vascular pedicle by vein transplantation for infective bone defect with or without soft tissue defect reconstruction in the lower extremity. Methods 15 patients with infective bone defect (7 cases also with soft tissue defect) in the lower extremity were treated in our department. After debridement and treated with vacuum sealing drainage (VSD) for 2 to 3 weeks, free vascularized fibular (skin) flap were designed and harvested. After fixation of fibula flap to bridge the bone defect site, artery and veins close to the health site were dissected, and bridged vascular pedicle of free vascularized fibular flap by autologous vein transplantation with end to end anastomosis. Results After debrided and treated by VSD, the granulation in the infective bone defect area survived well, 15 cases of fibular flap were all successful. Follow-up averaged two and a half years. Bone defect healed in 13 cases, and one end of the fibula graft unhealed in 2 cases, but healed again after a second operation. Fibula stress fractures occurred in 1 case. Infected bone defect healing time from 3.6 to 9.8 months, averaged 6.9 months. According to the Enneking score, lower extremity functional recovery rate was 88.1%. Conclusions Free vascularized fibular (skin) graft with vein bridged vascular pedicle is an effective treatment of infective bone defects in the lower extremity, it can maximize the recovery of limb function.

# Abstract no.: 40388 MANAGEMENT OF FOOT BONE OSTEOMYELITIS AND ASSOCIATED EQUINOVARUS WITH THE ILIZAROV COMPRESSION DISTRACTION METHOD

Anatoly SUDNITSYN, Nikolay KLYUSHIN

Our study investigated the outcomes of managing foot bone osteomyelitis and associated equinovarus that was aimed at infection arrest and limb segment weight-bearing recovery. The materials were 15 patients aged from 20 to 64 years that had equinovarus deformity in the foot, purulent trophic ulcers and chronic osteomyelitis in the foot bones. Foot trophic ulcers persisted from nine to 40 years. Each of the patients had undergone several operations at other hospitals that failed. Equinovarus had developed due to spine trauma in four patients, sequelae of spina bifida in eight, congenital club foot in one, and two had complications of peripheral nerve injuries. Ulcers and osteomyelitis were caused by the change in the foot support points and neurotrophic disorders. Local manifestations were foot equinovarus and purulent trophic wounds that sized from 1 to 6 cm2. The radiographic views revealed necrotic damage to the 5th metatarsals in 7 patients and to the calcaneal bones in 8 alongside with foot deformities. Management was staged. First phase was radical sequestrnecrectomy and fixation in the Ilizarov apparatus in a favorable foot position for wound healing; antibiotics were administered for two weeks. Second phase was correction of the biomechanical limb axis with the Ilizarov method and subsequent stabilization operation on the foot joints. The treatment resulted in purulent process arrest and weight-bearing recovery in all the patients. The follow-ups were short-term (one month) and long-term (from one to 6 years) after the apparatus dismounting.

# Abstract no.: 42360 OPTIMIZED MAGNETIC RESONANCE IMAGING OF JOINT ARTHROPLASTY : CLINICAL VALUE FOR DIAGNOSIS OF PERIPROSTHETIC INFECTION Chuan HE

Introduction: The clinical and imaging diagnosis of peripros-thetic infection, especially lowgrad infection is frequently challenging. The purpose of our study was to evaluate clinical value of optimized Magnetic Resonance Imaging for the assessment of patients who are clinically suspected to have peripros-thetic infection. Methods: From Jan 2012 to June 2014, thirty-five painful hips following primary hip arhroplasty (HA) and eleven painful knees following primary total knee arthroplasty (TKA) were assessed using optimized MRI. CT, standardized radiographs, triphasic bone scan and blood test. The diagnosis of MRI were correlated with intraoperative findings as well as with microbiological and histological examinations (when available). The sensitivity and the specificity of MRI diagnosis were determined according to final diagnosis. Results: Magnetic resonance imaging demonstrated the bone-implant interface and the surrounding soft-tissue envelope in all hips and knees. Periprosthetic infection was pre-operatively diagnosed on MRI in 14 hips and 3 knees, 16 of which were confirmed by intraoperative findings as well as with microbiological and histological examinations. In addition, one false-negative hip and two false-positive cases (one hip and one knee) were found. The MR imaging features of infection include layering of a thickened hyperintense synovium, extracapsular soft-tissue and bone edema, local lymphadenopathy, and extracapsular collections increase the positive predictive value. Conclusion: Optimized MRI was effective for the assessment of the periprosthetic infection. The use of modified magnetic resonance imaging parameters provided a useful adjunct to conventional examinations for the evaluation of patients with painful hip and knee arthroplasty.

#### Abstract no.: 41662 EXTRASKELETAL CHONDROMA CAUSING ULNAR NEUROPATHY Aparna VISWANATH, Jonathan JONES

Soft tissue chondromata usually occur as isolated, well-encapsulated tumours that are largely benign. We report a case of ulnar nerve compression in Guyon's canal caused by an extra-skeletal chondroma. To our knowledge, this is the only reported case of ulnar neuropathy caused by such a lesion. A 39-year-old previously fit and well right hand dominant painter/decorator presented to the orthopaedic outpatient clinic 18 months following minor trauma to the palmar aspect of his left hand. After thorough investigation, the patient underwent excision of the lesion. Operative findings consisted of a large extraskeletal chondroma, about the size of a carpal bone, within the hypothenar eminence causing upward compression of branches of the ulnar nerve. The ulnar neurovascular bundle was stretched over the mass. In order to excise the mass in its entirety safely, it was divided in two segments and a branch of the ulnar artery was cauterised. Previous rare causes of ulnar nerve compression at this level have been reported as being caused by intra-neural ganglia, pseudoaneurysms of the ulnar artery, lipoma, and vascular leiomyomata. To our knowledge this is the only case described where an extra-skeletal chondroma has caused a distal ulnar neuropathy. Although such a lesion is rare, it is a diagnosis that should be considered particularly in those patients presenting with a palpable mass and nerve deficit.

## Abstract no.: 40503 REPAIR OF CHRONIC MALLET FINGER USING TRANSOSSEOUS TENDON GRAFT: A NEW TECHNIQUE Ahmad ADDOSOOKI, Elsayed SAID

The most frequently reported surgical technique for chronic mallet finger involves the conversion of the chronic injury into an acute one and the extensor tendon is reattached with minor variations. Distal interphalangeal joint (DIP) is usually fixed in hyperextension position for about 6 weeks postoperative. This fixation results in DIP stiffness which needs long time physiotherapy to recover. In this study, we introduce a new technique which needs only two weeks of immobilisation. Starting from 2012, 20 fingers in 18 patients with chronic soft tissue mallet finger underwent surgical treatment. Palmaris tendon was harvested using tendon stripper. Palmaris tendon graft was passed transversely in the base of the distal phalanx through 2.5mm drill holes. Two other small dorso-lateral incisions at the middle phalanx were done. The two ends of the tendon grafts were crossed at the dorsum of the DIP and retrieved at the two proximal woods. Tendon ends were sutured to the two lateral bands. Removal aluminium splint was worn day and night for two weeks and at night only for another two weeks. The mean follow-up period was 8 months. All patients obtained more than 90% of contralateral finger range of motion. An excellent result in 18 patients fingers and a good result in 2 fingers were obtained, according to Crawford's evaluation criteria. All patients returned to full activity within 6 weeks. This method seems to be a new good alternative that offers early and excellent recovery in the treatment of chronic mallet finger.

# Abstract no.: 39876 WRIST AND HAND SECONDARY SURGERY FOLLOWING HIGH-VOLTAGE ELECTRIC BURNS

Islam TOLBA, Karim LARDJANE, Abdelfattah GUERGUADJ, Ahmed Fawzi NEDJAHI

INTRODUCTION: The high voltage electric burns sequelae are severe. Unlike the "thermal" burns that give superficial skin flanges, electrical burns are deep and multitissue. Secondary surgery is "Upon request ", whose objective is to restore hand function. METHODS: 8 secondary surgeries of wrist and hand were performed between 2007 and 2014. We have reanimated the long fingers in 7 hands (6 flexion and 1 extension); 6 thumbs whose 3 oppositions (using brachioradialis 2 times, EPI 1 time), 6 flexion (using FCR 1 time, ECRL 1 time, FDS 4 times) and 2 extension. Fascia lata was used for tendon grafting in all cases.8 nerve surgeries were performed whose 7 grafts (5 median,2 ulnar) and 1 direct suture. We used for the cutaneous reconstruction inquinal flaps3 times, rotation flaps in 2 times and radial flap in one time. RESULTS: At 13 months follow-up, the Kapandji was improved in 3 of 4 patients (from 0 to 1,2 and 3) the pulp-palm distance was improved in 4 of 5 patients in active and passive (respective gain of 92 and 53%).CONCLUSION :At the sight of our preliminary results, we recommend resensitization of the hand, resuscitation flexion of the thumb and long fingers with skin reconstruction in all cases. We see then that the functional improvement is certain for patients.

# Abstract no.: 40979 TANGENTIAL VIEW AND INTRAOPERATIVE 3D-FLUOROSCOPY FOR THE DETECTION OF SCREW-MISPLACEMENTS IN VOLAR PLATING OF DISTAL RADIUS FRACTURES

Isabel GRAUL, Ivan MARINTSCHEV, Hofmann GUNTER, Sascha RAUSCH, Mark Florian GRAS

Volar locking plate fixation becomes the gold standard in treatment of unstable distal radius fractures. Juxta-articular screws should to be placed as close as possible to the subchondral zone in an optimized length to buttress the articulare surface and address the contralateral cortical bone. Whereas intra-articular screw misplacements will promote osteoarthritis, penetration of the contralateral bone surface may result in tendon irritations and ruptures. The intraoperative control of fracture reduction and implant positioning is limited in the common 2D fluoroscopic views. Therefore additional 2D-fluoroscopic views intraoperative 3D-fluoroscopy were recently reported. To determine the usefulness of these additional flouroskopic methods 48 patients ( $36x \ Q, 13x \ Z$ ) with 49 unstable distal radius fractures were treated with a 2.4 mm variable angle LCP Two-Column volar distal radius plate (Synthes GmbH, Oberdorf, Switzerland) in a period of 10 months. After final fixation an additional tangential-view and intraoperative 3D-fluoroscopic scan was performed to control the anatomic fracture reduction and screw placements. screw misplacements (intra-articular or overlength) were evaluated. In the standard 2Dfluoroscopic views 22 screw misplacements of 232 inserted screws were not detected. Based on the additional tangential view, 12 screws were exchanged, followed by further 10 screws after peforming the 3D-fluoroscopic scan. The most lateral screw position had the highest risk for screw misplacement (account for 45.5% of all exchanged screws). The use of intraoperative 3D-fluoroscopy did not become accepted in our clinical routine due to the technical demanding and time consuming procedure with a limited image quality so far.

# Abstract no.: 41932 RESULTS OF TREATMENT OF THUMB CARPO-METACARPAL OA BY OCCUPATIONAL HAND THERAPY

Mansoor JAFRI, Bashir JUWAIED, Simon THOMAS

We aim to analyse the treatment of 1st carpo-metacarpal joint arthritis by Occupational Hand Therapists. Introduction: 110 cases were retrospectively and prospectively reviewed. Age range was 22 to 86 years, with median distribution of 55-75 years. Male: Female ratio of 24: 86. Referrals from Orthopaedics were 26, General Practitioners 31, and Rheumatology 53. Right Thumb involvement noted in 99 (85%) patients. 23 (20.9%) had single thumb symptoms and 11 (15%) were left handed. 40 (36.36%) patients complained of pain only, 31 (28.2%) with swelling and tenderness and rest complained of pain and decreased range of motions. Method: Daily tasks restrictions were documented in detail. Only 51 (46.36%) patients had pain scores documented on first visit, however after author's suggestion, pain scores were recorded for every patient. Treatment comprised of protective gloves splints and exercises (abduction, adduction, opponens). Stretching, active and resisted exercises advised. Review at 4 weeks and afterwards depending upon the patients' progression, ranged from 4 weeks to 4 months. Those with less severe symptoms were reviewed over the telephone. Results: 99 (90%) patients showed significant improvement towards daily tasks performance at first follow-up. 11 (10%) reported as no improvement at first follow up, (4 were then referred for steroid injections, 6 had more sessions and 1 awaited trigger thumb release). Those 6 requiring more sessions; 3 improved at 4 months, 3 awaited reviews. The trigger thumb awaited review after surgery. No patient had Trapeziectomy. Conclusion: The results show that 92.7% patients improved with occupational hand therapy only.

# Abstract no.: 41681 RADIAL NERVE PALSY TENDON TRANSFER USING SINGLE FOREARM INCISION.

Mohamed ABDELHAMED

20 patients(20-44 y) suffered from a radial nerve palsy (6-30 m injry) are underwent atendon transfer using a 10 cm dorsal single inision using Pronator teres on extensor carpi radialis brevis , palmaris longus to extensor pollicis longus and flexor carpi radialis to extensor digitorum tendon transfer . Over 2 years of follow up we find an excellent results regarding operative time ,postoperative adhesions, functional results and patient satisfaction compared to conventional multiple incisions with different types of transfers .

#### Abstract no.: 40553

# A LONG-TERM FUNCTIONAL OUTCOME AND QUALITY-OF-LIFE SCORES OF ONETIME QUAD-NERVE TRANSFER TO RESTORE SHOULDER AND ELBOW FUNCTION IN PATIENTS WITH UPPER BRACHIAL PLEXUS INJURY: A REPORT OF FIVE CASES

Shusen CUI, Chunyu LI, Le QI, Hongin SUN, Weizhong ZHANG, Yueshu WANG, Guangzhi WU

Patients & Methods: Five patients were under surgery by using this technique. The average pre-operative delay time was 5.2 months. The average follow-up period after nerve transfer was 71.8 months. All patients had at least M4 of the triceps muscle before surgery. During the operation, spinal accessory nerve was transferred to suprascapular nerve with the motor branch of long head of triceps to the axillary nerve to restore shoulder abduction and external rotation through a posterior approach. Followed by double nerve transfer for shoulder, Oberlin procedure and median nerve fascicular transferring to the brachialis motor branch were operated for elbow flexion. Results: On final evaluation, all five patients recovered full elbow flexion; all scored M5 with a mean ROM of 128.2°. Abduction range of motion recovery averaged 126.2°, and external rotation, which was measured from forearm neutral position, averaged 41°. Shoulder abduction strength was scored M5 in 4 patients and M2 in the remaining 1 patient. Shoulder external rotation strength was graded M5 in 3 patients and M3 in 2 patients. The weight lifting with the shoulder abduction and elbow flexion in 90° ranged 1.15 kg and 6.2 kg, respectively. The DASH score improved from a mean of 53.7 points to 9.8 points. The mean score of postoperative SF-36 PCS and SF-36 MCS were 50 and 55.4, respectively. Conclusion: After a long time follow-up, the onetime quad nerve transfer procedure is a safe and reliable procedure for the treatment of upper brachial plexus injury.

# Abstract no.: 40114 INTERCOSTAL NERVE TRANSFER TO SUPRASCAPULAR NERVE AFTER BRACHIAL PLEXUS ROOTS AVULSION Shaonan HU

This investigation was to perform anatomic study on the intercostal nerve transfer to the suprascapular nerve and clinical application. 30 thoracic walls of human cadavers were used to investigate the anatomical possibility for the repairment of the suprascapular nerve by using Intercostal Nerves. The dissections of the intercostal nerves from the thoracic walls were done to measure the length of the intercostal nerves from the midclavicular line to the midaxillary line(L) and the distance from the relevant intercostal space to the middle of the clavicle(D). The results showed that the differences between L and D of intercostal nerves were calculated. The results showed that the intercostal nerve III and IV could be transferred to the suprascapular nerve without nerve graft. Since the Suprascapular nerve could be dissociated and stretched about 2 centimeters under the clavicle, the intercostal nerve V could also be transferred to the suprascapular nerve directly. The intercostal nerve ‡Y could be neurotized to the suprascapular nerve with nerve graft or increasing the dissection length of the intercostal nerve. Based on this study,6 cases of brachial plexus injury which had C5-7 roots avulsion, the accessory nerve was also injured. We transferred intercoastal nerve III and IV to superscapular nerve and intercostals nerve V-VIII to musculocutaneous nerve, or Oberlin's procudure. after 32 months postoperative, the patients got 30 degrees of shoulder abduction and 45 degrees of external rotation, he had 90 degrees of elbow flexion.

## Abstract no.: 41518 DOES NAVIGATION PREDICT RANGE OF MOTION? Victor HERNANDEZ, Fabio OROZCO, Zachary POST, Alvin ONG

Introduction: After a Total Knee Replacement (TKA), 1% to 6% of patients will develop arthrofibrosis and decreased ROM. Stiffness is a worrisome complication of TKA. Our objective was to examine if the ROM obtained with computer navigation during surgery is able to predict ROM or the need for manipulation. Material and methods: 131 TKA that underwent manipulation under anesthesia (MUA), at our institution under the care of one surgeon were analyzed. Demographics, range of motion before, intra-operative data (computer Navigation) and postoperative data were recorded as well as at the latest follow up ROM. Results: 131 patients underwent MUA, average age was 58.6 y/o, and the BMI was 31.1. The average increase in ROM was 39 Degrees after the manipulation and at the last follow up it was maintained at 24 degrees. Navigation was unable to predict the range of motion, the only predictors of motion in this group was preoperative ROM conclusion: The only predictor of ROM in our study was the preoperative ROM as has been demonstrated before, computer navigation has no role in predicting ROM or the risk of manipulation after TKA.

#### Abstract no.: 41899 CONVENTIONAL INSTRUMENTATION IN TKA EASY TO CAUSE FEMORAL COMPONENT CORONAL ALIGNMENT DEVIATION Peihui WU, Zhiqi ZHANG, Ziji ZHANG, Zibo YANG, Weiming LIAO, Ming FU

object: This study assessed the accuracy and the percentage of alignment outliers in TKA by conventional instrumentation. method: We retrospectively reviewed 250 post-operative full-length hip-to-ankle radiographic pictures to identify outliers for postoperative hip-kneeankle(HKA) axis, femoral and tibial component coronal alignment and determined which component alignment easy to deviation. result: The incidence of outliers (outside the acceptable +/- 3 degrees range) for postoperative lower-limb mechanical axis, femoral component alignment, and tibial component alignment was 50.5%, 37.6%, and 18.3%, respectively, with 85.5% of limbs placed in excessive varus and 14.5% in excessive valgus. There is significant correlation between of the position of femoral component and lower-limb alignment (Pearson R: 0.7038, P<0.001).conclusion: Conventional instrumentation in TKA easy to cause femoral component coronal alignment deviation.

# Abstract no.: 40088 DIGITAL VIRTUAL TECHNIQUE IN DETERMINING THE OPTIMAL SACROILIAC SCREW CHANNEL

Peiyong TAN, Zhou XIANG

Objectives: To explore digital virtual technique(DVT) to determine the optimal sacroiliac screw channel(OSSC), and to provide a method for instrumentation under navigation. Methods: The pelvic CT scan data of 8 healthy adults were processed into Mimics 10.01 for 3D reconstruction. DVT was used to establish the model of sacral cavity die, which was used to determine the OSSC, and the associated parameters were measured by using computer aided design and Space Analytical Geometry's method. Results: The OSSC of 16 S1 pedicles in 8 cases was determined by this way. The radius of the OSSC was greater than 7.3mm in both side of all the cases, which the radius of the OSSC was 8.75±0.72mm for male, and 8.38± 0.67mm for female. The depth was 78.44±3.43mm for male, and 74.07±6.04mm for female. The introversion angle in sagittal plane was 72.62°±5.01° for male, and 79.65°±7.59° for female. The angle in cross-sectional plane was 13.28°±6.33° for male, and 9.60°±4.17° for female. The angle in coronal plane was 9.99°±7.67° for male, and 2.01°±1.58° for female. The angle in upper face of S1 vertebral was 14.91°±6.48° for male, and 7.62°±5.88° for female. The end-point of OSSC was also 2 aßthe axis wire of S1 vertebra and 3 -: 5 at the r

posterior direction. Conclusions: DVT is guided to measure and determine the OSSC. The bilateral OSSC of S1 is symmetrical, and can hold 2 sacroiliac screws.

## Abstract no.: 41436 PRELIMINARY APPLICATION OF PERCUTANEOUS GUIDE TEMPLATE IN DRILLING DECOMPRESSION OF OSTEONECROSIS OF THE FEMORAL HEAD Kun LIU, Qiang ZHANG

Objective: To evaluate the effects of 3D printing percutaneous guide template in drilling decompression of ONFH and compare the clinical results of drilling decompression under the guidance of template with those under traditional C-arm fluoroscopy. Methods: A total of 20 patients (27 hips) in the early stage of osteonecrosis of the femoral head were studied. In the template group (10 patients, 13 hips), a hip CT scan was performed, and the percutaneous guide template with a surface that is the inverse of the skin surface of hip, was designed with MIMICS 10.01 and Geomagic Stidio 7, and created using 3D printing technology. Then, 13 hips were performed drilling decompression in the template group while 14 hips were performed under C-arm fluoroscopy as control. The evaluation parameters included operation time, radiation time, the times of drilling correction and Harris hip score.Results: In control group, one pin penetrated the femoral head cartilage. In template group, no operative complications occurred including damage of femoral cartilage, fracture, infection and hematoma. The mean operation time, radiation time and the times of drilling correction in template group were significantly reduced compared with control group (p<0.05), 27.8 to 43.7, 11.2 to 34.4, 1.2 to 3.4, respectively. However, at three months followup, the mean Harris hip score was 85.2 compared to 82.4, with no significant difference. Conclusion: This percutaneous template guide technique is a promising and well-planned, solution to safely perform drilling decompression with clear reduction of intraoperative radiation exposure time, operation time and times of drilling correction.

# Abstract no.: 41051 BELIEFS AND ATTITUDES ABOUT THE USE OF 3D PRINTING TECHNOLOGY IN ORTHOPAEDICS AMONG 198 SURGEONS IN CHINA Nanfang XU, Dongning HUANG, Hong CAI, Feng WEI, Yingxia WU, Zhongjun LIU

Introduction: Three-dimensional (3D) printing, aka additive manufacturing, refers to a process where a 3D object is created from a digital model through successive layering of material under computer control. In this study we aim to formally survey a large group of Chinese orthopaedic surgeons on their beliefs and attitudes to 3D printing in the context of orthopaedic surgery. Methods: 198 orthopedic surgeons were approached during a national conference in Beijing on December 13, 2014 and were invited to participate using a self-report questionnaire. The survey instrument was created through an iterative process of expert-panel discussion informed by interview of pilot-testing volunteers. Responses of surgeons with different years of experience were statistically compared. Results: 110 surgeons who completed the survey had >10 years of experience and they held a more positive prospect for 3D printing than those who were still in residency (83.8% vs. 62.5%, p=0.03). Similarly, they were more likely to believe adult reconstruction as the most promising field, whereas residents tended to consider spine as having the greatest potential (46.2% vs. 26.0%, p=0.04). Additionally, sports medicine was considered more promising among residents than older surgeons (12.5% vs. 1.8%, p<0.01). These differences were not dependent on the subspecialty of each respondent (p=0.41). Regardless of their years in practice, industry was the most common (77.8%) source of information regarding 3D printing for all surgeons. Conclusions: Surgeons generally agreed that 3D printing held great potential in the field of orthopaedics. Variation in responses existed among surgeons with different years in practice.

#### Abstract no.: 40954 ROBOTIC ORTHOPAEDICS, SCIENCE FICTION OR REALITY? Christopher O'DOWD-BOOTH, Mohammed AL-TALIB

The role of robotics within surgery is ever increasing, with the da Vinci robot being used with increasing frequency and no longer the sole property of specialist centres. Is orthopaedics ready for robotic surgery or is there more to prove? The use of robotics within orthopaedics is at an early stage. The first iteration being the development of assisted planning in total hip replacement in the early 1990's. The tendency is towards a robotic assisted system, rather than the publics conception of a totally automated system. Robotic systems have been shown to provide higher accuracy of prosthesis alignment in minimally invasive total knee arthroplasty (MIS-TKA). Further studies have begun to investigate the potential of the established da Vinci system being implemented in arthroscopic surgery, potentially improving cost-effectiveness and resource management, currently a major factor in implementation. There are a number of potential benefits to the implementation of robotics, including for the surgeon - reduced operative radiation exposure being one. However there are still a number of difficulties still facing widespread implementation of robotic surgery. There is still uncertainty regarding the safety of such systems, and the true potential cost-benefit ratio. Further studies are required to evaluate these areas, however with the ongoing demands on health care world wide, there is a role for the precision and reproducibility of robotic assisted surgery. The evidence from other specialities suggests that, whether ready or not, robotics is going to play a growing role in the future of orthopaedics.

# Abstract no.: 41240 AN INNOVATIVE EMERGENCY RESPONSE SYSTEM : SME'S ( "CTRL ALT E" FOR EMERGENCY) AND "PRE-YELL " A SAFETY ANDROID APPLICATION.

Sandeep SHRIVASTAVA, Manish INGLE

This paper discusses our copyrighted (Indian -A.No.L-L56299/2013) Model for emergency response system. In developing world hospitals a huge challenge exits to provide adequate care, in emergency situations. Due to want of adequate and low cost solutions they lack such significant facilities. Our sMES model has "electronic button" on the computer, when activated (also by pressing Ctrl Alt E), through quick selection options (which are colour coded), identifies the threat and generates a response to the emergency situation and sends automatically text massage to targeted & trained persons. The responder team is able to identify the need, place and person immediately. enabling responders target the threat comprehensively and respond quickly to the site. This works through the hospital information system, routing through local network, and supported by the mobile phone text facility. It is installed in our Territory care hospital of 1300beds, in each computer and being used as pilot project. A broader public usage version as safety application is launched on our website as "pre-Yell" safety app. which the user can download it on their android mobiles. This model for emergency response system is widely accessible, affordable, and precisely effective, specially for developing country hospitals, which are very low on resources.

# Abstract no.: 40380 COMPARISON ON IMAGE MORPHOLOGY OF POSTERIOR PILON FRACTURE FRAGMENT AND POSTERIOR ANKLE FRACTURE FRAGMENTS

Dan JIN, Shijuan XIE

To compare the CT morphological differences and to provide help for diagnosis and treatment of posterior Pilon fracture fragment and posterior ankle fracture fragment. A total of 76 cases of posterior Pilon fracture and 47 cases of posterior ankle fracture from 2000 to 2004. CT plane with the largest measuring area of each fracture fragment was selected. The following indexes were measured: 1. Angle  $\alpha$ , 2. Angle  $\beta$ , 3. FAR1, 4. FAR2. According to the transverse images, Pilon fractures were divided into 3 types: post-lateral oblique type(46)/ medial-extended single bone type (11)/medial-extended double bones type(19); posterior ankle fracture were divided into 2 types: post-lateral oblique type(35) and small pieces of avulsion type (12); 51.3%(39/76) of posterior Pilon fractures occurred posterior astragalus subluxation, while only 8.5% (4/47) in posterior ankle fracture; angle  $\alpha$ of two groups were varied without statistical difference (P=0.18), while angle  $\beta$  of posterior Pilon fractures were larger than that of posterior ankle fracture (P=0.04) ,namely close to 80°; FAR1 in 48.0% (36/75) and FAR2 in 55.9% (38/68) of posterior Pilon fracture segments were ≥25%. For all posterior ankle fracture segments, both FAR1 and FAR2 were <25%. FAR1 and FAR2 of posterior Pilon fracture was statistically significantly higher than that of posterior ankle fracture (P=0.00, P=0.01). Fracture line of sagittal plane was basically vertical to the ground. Posterior Pilon fracture has higher risk to occur ankle joint subluxation than posterior ankle fracture. Posterior Pilon fracture has significantly larger transverse and sagittal plane area ratios than posterior ankle fracture.

# Abstract no.: 40054 THE MODIFIED CLASSIFICATION FOR PILON FRACTURE BASED ON INJURY MECHANISM

Shijun WEI, Xianhua CAI

Objective: To establish an advanced classification method for tibia Pilon fracture based on injury mechanism. Methods: 151 patients with Pilon fracture from Aug. 2008 to Aug. 2011 were analyzed. These patients were divided into 5 groups according to the location of injured ankle or initial displacement of fracture: Varus, Valgus, Dorsalflexion, Plantarflexion, and Neutral. Surgical incision and fixation were selected according to initial displacement of fracture. 121 patients were followed up for 22.1 months in average. Outcome and complition was evaluated. Teeny and Wiss's scale was used to evaluate reduction quality of the fracture. The functional evaluations were conducted by the AOFAS ankle-hindfoot scale. Results: All cases were followed up for 12-36 months (average 22.1 months), where 119 cases were healed after operation, 2 cases appeared healing delay and finally cured by bone grafting. The complications were mainly centered at Vaglus group and Neutral group. According to Teeny and Wiss's scale, 109 cases (90%) achieved goal reduction (including anatomical reduction and adequate reduction). At last follow-up after operation, AOFAS score achieved 86.3 points. Even in the Neutral group, the injury of which was relatively more serious, reduction rate also reached 72.7%, and mean AOFAS score was up to 78.7 points. Failure of internal fixation was not observed at last follow-up. Conclusion: The modified classification for Pilon fracture based on injury mechanism and corresponding surgery strategy may have potential advantages: including increasing accuracy of fracture reduction and stability as well as reducing complications of soft tissue.

#### Abstract no.: 41925 ANTEROLATERAL PLATING: DISTAL TIBIA FRACTURES Gaurav SANJAY, Thomas MATHEW

Introduction: Distal tibia fractures are notorious for non union due to their anatomical peculiarities. Plating them has long been known to cause limitations in it becoming a popular method of treatment due to limited soft tissue and precarious blood supply. Anterolateral plating has certain advantages over the conventional medial plating due to the lack of soft tissues over the distal medial third of tibia. Methods: We assessed the bone union rate, ankle range of motion, return to pre injury activities, infection, and complication rate in 14 selected patients who underwent ORIF distal tibia fractures with an LP via anterolateral approach .Results: The minimum follow up was 2 years (average, 2.8 years; range, 2–4 years). Union was achieved in all but one patient by the 24th postoperative week. Five patients had ankle range of motion less than 25° compared with the contralateral side. Three patients developed a intra operative difficulty in closure of wound. We judge the LP a reasonable device for treating distal tibia fractures. The union rates are good in most patients .Patient selection criteria is a very important part in determining it as a modality for treatment.

# Abstract no.: 39612 MODIFIED POSTEROMEDIAL APPROACH TO POSTERIOR PILON FRACTURES : A TECHNIQUE FOR MINIMIZING INTRAOPERATIVE COMPLICATIONS

Jian Wei WANG, Yukai WANG

Introduction: Posterior pilon fracture is a recently described variant between trimalleolar and pilon fracture, of which the commonly used posterolateral approach may encounter intraoperative complications both in terms of anatomy and position. The aim of this study was to report an alternative technique using modified posteromedial approach to minimize complications, facilitate exposure and stable fixation of the posterior tibial plafond. Technique Description: Posteromedial and posterolateral fragments of tibial plafond as well as medial malleoli fragment could be manipulated via the single posteromedial incision through three different planes in supine position. Either screw fixation or buttress plate can be applied to the posterior tibial plafond based on the proximal extension. Methods: Between January 2009 and June 2012, a retrospective review was made of all posterior pilon fractures performed with modified posteromedial approach. Radiological images were checked for evaluation of alignment and articular surface directly after the operation. Cases of complications were noted. Results: 16 cases of posterior pilon fracture fixation with modified posteromedial approach were identified. All fractures healed within a mean period of 15.2 weeks without malalignment or articular step-off. Regarding complications, all except one patient developed local wound necrosis, which healed after debridement and closure. All patients achieved good or excellent ankle function. Conclusion: The modified posteromedial approach is an effective way of visualization and stable fixation of posterior tibial plafond. It provides an alternative way to the surgical treatment of posterior pilon fracture in minimizing intraoperative complications, especially for those who have premorbidities.

# Abstract no.: 40068 COMPARISON OF ETN NAILING AND PLATING IN TREATMENT OF DISTAL METADIAPHYSEAL TIBIAL FRACTURES: A RETROSPECTIVE STUDY OF MATCHED PAIRS OF PATIENTS Lei LIU

Objective: The aim of this study was to compare the results of closed or open reduction and ETN(Expert Tibial Nail) nailing(group A) with closed reduction and minimally invasive plating (group B). Methods: 34 matched cases has been divided into two groups (group A and group B) with regard to age, soft tissue condition, and the AO classification of the fracture and had been treated with either method. Then these patients were followed up and the results were retrospectively analyzed. Results: The group A was follow up for a mean of 24 months versus group B for a mean of 26 months. Three patients in group A versus one patients in group B had a malalignment (>5°). Patients in group A had a short operating time, hospital stay and early full weight-bearing (FWB). There was no difference with regard to time to union or non-union, limb shortening, hardware failure, functional score and infections between two groups. Conclusion: Both treatment methods achieved satisfactory functional outcomes in patients with distal metadiaphyseal tibial fractures. ETN showed advantages in term of operation time, hospital stay and early full weight-bearing; however, closed reduction and minimally invasive plating often resulted in better alignment. ETN are recommended for fractures associated with open injury that had a poor soft-tissue condition.

# Abstract no.: 41822 COMBINED ANTERIOR AND POSTERIOR APPROACH FOR THE TREATMENT OF THREE COLUMN PILON FRACTURES Liangyu ZHAO, Depeng MENG, Huihao CHEN, Di SHEN

Pilon fractures involving medial, middle and lateral columns are difficult in treatment. From 2012 to 2014, twelve cases of three column pilon fracture cases were treated by open reduction and internal fixation through both anterior and posterior approaches. The patient was put in a floating position. A lateral posterior approach was first made. The lateral column, which is the fibular was first reduced and fixed by plate. Then the posterior part of middle column was reduced and fixed. Then the patient was put in a supine position. Both medial and middle columns were reduced and fixed through the same anterior approach. Postoperatively, the patients were followed up for at least 6 months. AOFAS score system was used for functional evaluation. The mean union time was 4.2 months. 83.3% percent of the patients obtained good or excellent result. Complications include superficial infection in one case, symptomatic implant protrusion in one case, and osteoarthritis in one case. The two-incision combined anterior and posterior approach is an effective treatment for three column pilon fractures.

# Abstract no.: 41145 DIGITAL DESIGN FOR FIXATION IMPLANT BY CT IMAGE IN POSTERIOR PART OF THE DISTAL TIBIA Ming XIE

Introduction: To investigate the procedures of digital design for fixation implant in posterior part of the distal tibia by Mimics and UG software. Methods: Digital internal fixation according to 3D reconstruction of CT images and UG machining method. Results: CT scans, three-dimensional reconstruction, theoretical reduction of the fracture have been carried out smoothly in 30 cases and 4 cases of posterior ankle fracture. And the measurement of length or angle in 3-D mold was done in accordance with the design and internal fixation was achieved by 3D measurement data. Digital plate model was carried out in the operation The consequence analysis shows anatomical reduction and excellent internal fixation. Conclusion: The design of digital implantation fixation can be carried out by using CT data, Mimics and UG. Software. Provided relevant evidence for orthopedic instruments development.

#### Abstract no.: 41298 RETROSPECTIVE COMPARATIVE ANALYSIS OF SURGICAL MANAGEMENT OF TIBIAL PILON FRACTURES Naresh PANIGRAHI, Dibya S DAS, Satya S PATRA

Introduction: High energy Pilon fractures are among the most challenging injuries known to orthopaedic surgeons. These fractures are associated with severe damage to the surrounding soft tissues. Open reduction and internal fixation techniques popularised by Ruedi and Allgower have been used for years with good success rates. But these open reduction methods are plaqued with various degrees of soft tissue complications like superficial and deep infections, wound breakdown, osteomyelitis and exposed implants. These complications significantly increase morbidity and secondary surgical produces in patients of Pilon fractures. Patients and methods: All the Pilon fractures treated surgically during September 2010 to October 2014 by either open reduction and internal fixation (including Two-stage surgeries and Minimal invasive plating) (n=12) or by Ilizarov External-fixation method (n=16) were retrospectively studied. Old cases, malunion, nonunion, previously operated cases were excluded. Extra-articular fractures of distal tibia were also excluded. Discussion: There is hardly any significant difference in the functional outcome scores measured by the AOFAS scoring system, between the internal fixation (77.8) and the Ilizarov group (76.06) after one year to four years follow-up. But wound complications are significantly higher in open reduction group. It seems prudent to choose the surgical method which is less likely to cause serious peri-operative complications. Ilizarov technique is a safer method for high-energy pilon fractures and internal fixation methods should be preferred only in low-energy injuries with minimum soft tissue damage.

# Abstract no.: 41543 MINIMIZING COMPLICATIONS IN HIGH-ENERGY PILON FRACTURES-AN EVIDENCE BASED TREATMENT ALGORITHM Satya Ranjan PATRA

Introduction: Tibial Pilon fractures caused by high-energy traumatic events are notorious to have serious associated soft-tissue injury which is often underestimated and can range from local edema to skin contusions, fracture blisters and open wounds. Severity of soft tissue trauma has a significant effect on the final outcome of these fractures. Attempts towards open reduction of pilon fractures can further jeopardize the soft-tissues and result in devastating complications such as skin breakdown, wound dehiscence, exposed implants and osteomyelitis. Various researchers in the past have suggested a number of management protocols to deal with these problems. But the confusion still persists. Methods: A literature review was done to gather the recent and old evidences on the incidence, cause and outcome of the various complications of pilon fractures. Recommendations were analysed and the presented data was compared with our series of 38 cases of pilon fractures treated with both internal and external fixation methods and followed up for one to seven years duration. Result: The evidence in the series seems to suggests that long term outcome of pilon fractures often depends on the severity of the primary trauma, impact on the articular surface and surrounding soft tissue envelope and a judicious treatment plan. A treatment algorithm is devised for dealing with both the bone and soft-tissue components of the injury.

# Abstract no.: 39069 COMPARISOIN BETWEEN POLYTRUMA AND ISOLATED FRACTURE OF SHAFT OF LONG BONE Boujaylah AQWUYIDIR

23 men and 3 women presented with tibia fracture and other injuries. Stay in hospital 3 to 68 days, its mean 13 days 8 patients readmitted 9 times (34%). Hospital stay in second admission mean is 10 days. Duration between two admission range from one week to 4 months, its mean one and half month. 9 females and 55 males presented with isolated tibial shaft fracture, stay in hospital for 1-36 days, its mean 6 days, 10 patients readmitted 13 times(20%) Duration between two admission is 2 weeks to 7 months, its mean 3.5 months, Hospital stay in second admission is 1 to 30 days, its mean 7 days. 26 males and 1 female presented with poly trauma involving femoral shaft stay in hospital for 7 to 68 days, its mean is 17 days. 15 patients readmitted 21 times.(77%) Duration between 2 admission 1 to 7 months, mean 3 months. Hospital stay in second admission 1 to 40 days, its mean 10 days 40 men and 8 women presented with isolated femoral shaft fracture, stay in hospital 3 to 69 days, its mean 12 days, follow up is 3 to 12 months, its mean 7 months. 9 patients admitted 10 times(20%), Duration between two admission is one week to 8 months, its mean is 2 months hospital stay in second admission is 1 to 8 days, its mean is 2 days. Complication occurance is higher in polytraumatized patients than patients who presented with isolated fracture.

# Abstract no.: 41638 COMPARATIVE ANALYSIS OF PAEDIATRIC ORTHOPAEDICS WEEKEND TRAUMA IN NIGERIA

Olayinka Oladiran ADEGBEHINGBE, Adeolu Ikechukwu ADEYEYE, Rereloluwa Nicodemus BABALOLA, Michael Bimbola FAWALE, Toluwani Ebun BABALOLA, Joseph Olorunsogo MEJABI

Introduction: Trauma is of enormous public health concern as a leading cause of death which is largely preventable. We compare the pattern and outcome of paediatric orthopaedic trauma patients (POWT) with adults (AOWT) presenting at the Accident and Emergency during the weekend days. Methods: A prospective cross sectional study of 285 patients presenting to the Accident and Emergency in Wesley Guilds Hospital. Ilesa between January 2013 and December 2013. Ethical committee approved the study protocol. The biodata, clinical information on mechanism of injury, injury sustained, time interval between injury and hospital presentation and early outcome were documented. Results: 117 paediatric orthopaedic trauma patients presented over the period of study compared with 168 adults. Paediatrics patients diagnosed more with low velocity injury compared with adults (OR=2.6, 95%CI: 1.9-3.5, p<0.001), Late presentation beyond 6hrs post injury was seen largely among children than adults (OR=0.5, 95%CI: 0.4-0.7, p<0.0001). The Saturday was weekend day with peak presentation for POWT and AOWT (p=0.277). Paediatrics open fractures 11(9.4%) was uncommon compared with adults (p=0.008). Fifteen POWT (12.8%) presented with posttraumatic osteomyelitis (p<0.0001). Upper limb injuries (52.9%) was predominant in POWT contrary to the lower limb injuries (63.7%) in the AOWT (p=0.012). The hospital prevalence of paediatric orthopaedic weekend neurotrauma was 1.0% and 2.4% mortality in AOWT. Conclusion: Low velocity injury, infection and late presentation were more predominant in weekend paediatric orthopaedic trauma as compared with high-velocity injury and mortality in adults. Preventive measures could be directed at source of paediatric trauma in the weekend.

#### Abstract no.: 40855

# THE NEW FEMORAL NECK SYSTEM FOR FEMORAL NECK FRACTURE FIXATION. BIOMECHANICAL PERFORMANCE IN COMPARISON TO DIVERSE STANDARD IMPLANTS FOR OSTEOSYNTHESIS

Boyko GUEORGUIEV, Karl STOFFEL, Ivan ZDERIC, Christoph SOMMER, Ursula EBERLI, David MUELLER, Martin OSWALD

Three Cannulated Screws (3CS), Dynamic Hip Screw (DHS) with antirotation screw (DHS-Screw) or with Blade (DHS-Blade) are gold standards for fixation of unstable femoral neck fractures. Compared to 3CS, both DHS systems require a larger skin incision with more extensive soft tissue dissection while providing the benefit of superior stability. The newly designed Femoral Neck System (FNS) combines the advantages of angular stability and less invasive surgical technique. The aim of this study is to evaluate the biomechanical performance of FNS in comparison to established methods for fixation of the femoral neck. Twenty pairs fresh-frozen human femora were instrumented with either DHS-Screw, DHS-Blade, 3CS or FNS. Reduced unstable femoral neck fracture 70° Pauwels-III, AO/OTA 31-B2.3 was simulated with 30° distal and 15° posterior wedges. Cyclic axial loading was applied with 16° adduction, starting at 500 N with cycle-by-cycle progressive load increase until failure. Interfragmentary movements were evaluated with optical motion tracking. Highest axial stiffness was observed for FNS (748.9±66.8 N/mm), followed by DHS-Screw (688.8±44.2 N/mm), DHS-Blade (629.1±31.4 N/mm) and 3CS (584.1±47.2 N/mm) with no statistical significances. Cycles until 15 mm leg shortening were comparable for DHS-Screw (20'542±2488), DHS-Blade (19'161±1264) and FNS (17'372±947), and significantly higher than for 3CS (7'293±850), p<0.001. From a biomechanical point of view, the Femoral Neck System is a valid alternative to treat unstable femoral neck fractures, representing the advantages of a minimal invasive implant with comparable stability to the two DHS systems and superior to 3CS.

# Abstract no.: 39080 INNOVATIVE SOLUTION TO COLD-WELDING PROBLEMS WITH LOCKING OSTEOSYNTHESIS PLATES: A STUDY OF 140 PATIENTS Reinhard SCHNETTLER

Introduction: The removal of titanium locking screws as a result of cold welding, crossthreading and stripping of screw heads is a well-known problem in orthopedic surgery. The use of carbide drills to remove the cold-welded screws generates particular metal debris accumulation in soft tissues, which could lead to inflammation and fibrous tissue formation. It is also a time-consuming process, which extends the surgery time and cost. Objectives: The objective of this study was to prospectively evaluate a new locking plating system LOQTEQ® with a unique conical screw head as a solution for cold-welding problems with conventional locking head screws. Other factors included in the evaluation included followup of bone healing and non-union rates, complications such as infections and general implant-related problems. Methods: Prospective, comparative, multicentre post-market clinical study of 140 patients with 12-months follow-up. Conclusions: There were no observed cases of cold-welding at the time of implant removal. The new locking screws LOQTEQ® with conical head design could provide an innovative solution to the coldwelding problems with conventional fully threaded locking screws.

## Abstract no.: 41737 MANAGEMENT OF PERITROCHANTERIC FEMORAL FRACTURES USING PROXIMAL FEMORAL NAIL VERSUS TROCHANTERIC LOCKED PLATE IN ELDERLY PATIENTS Alaa EL TAHAN, Atef MORSY, Emad EL BANA

The peritrochanteric fracture is one of the most serious causes of mortality and morbidity in the elderly. A number of treatment alternatives exist, each with its own subset of complications. However, the main treatment choices of femoral subtrochanteric fractures can be divided into two groups, the cepholomeduallary hip nails (PFN) and the lateral plate-screw systems. Materials and method: In the period between January 2009 and January 2015, a prospective study was conducted involving 108 cases in Beni Sueif university hospital and in El-Helal hospital in Cairo who complained from peritrochanteric fracture. They divided into 2 groups, group I is fixed using PFN and group II is fixed using trochanteric locked plate. The follow up of patients ranged from 18 to 72 months with a mean period of 42 months. All hips were assessed clinically and radiologically at 6 weeks, 3 months, 6 months and 1 year then every six months. Results: In group 48 fractures are fully united after mean time of 4.09 months, 3 need revision, 2 patients are lost during follow up and1 is died before union. In group II 33 fractures are fully united after mean time of 6.23 months, 3 need revision, 2 patients are lost during follow up and1 is died before union. Conclusions: From the current study we can conclude that the use of PFN shows better results than the use of trochanteric locked plate, shorter operative time and less complications.

# Abstract no.: 41617 FIXATION FAILURE IN INTRAMEDULLARY NAILING OF THE INTERTROCHANTERIC FRACTURES.

Aleh KORZUN, Alexandre BELETSKY, Alexandre SITNIK, Alexandre LINOV

Background. Intramedullary nailing is the widespread procedure in the treatment of the intertrochanteric fractures. But till nowadays cut out and periimplant fractures remain substantial problem. We hypothesized that mechanical failure of the nailing was associated with technical errors and unstable fracture pattern. Methods. Prospective study, including 93 patients underwent nailing of the A1 (10), A2 (60) and A3 (23) femur fractures using one-head-screw nail (Medgal, Poland; Osteosynthesis, Russia) in our center since Dec 2012 till Sept 2014. The mean age was 75±10,7 years (52-95). Results. Mechanical failure had happened in 5 cases: cut out in 3\93 patients (3,2%), periimplant fractures in 2\93 patients (2,1%). Two of three cut out failures had A3 fracture type, one A2. One periimplant fracture occured during distal screw insertion and displaced two days later and another after falling in 4 weeks after surgery and also were attributed to technical problems with distal screw. All 5 patients were reoperated. In one cut out case reosteosynthesis had been performed, in two - total hip replacement. Two periimplant fractures were revised with long nails. There were no cut outs in 3 patients who had tip apex distance more then 35 mm and in 2 patients with diaphysis medialization. Conclusion. In our opinion the main causes of the fixation failure in intramedullary nailing of the intertrochanteric fractures are technical errors during nail insertion and unstable fracture pattern.
## Abstract no.: 41489 RECONSTRUCTION OF POST TRAUMATIC LONG SEGMENT BONE DEFECTS OF THE LOWER END OF FEMUR BY FREE VASCULARIZED FIBULA COMBINED WITH ALLOGRAFT (MODIFIED CAPANNA'S TECHNIQUE)

Bhaskara Kanakeshwar RAJA, Agraharam DEVENDRA, S RAJASEKARAN

Purpose: Salvage of long segment bone loss in the limbs particularly near the joints continues to be a challenge to the trauma surgeon. None of the techniques available are universally successful and all share the disadvantages of multi staged procedures. A reliable single stage technique would be ideal to reduce the treatment time and the cost of care. We are presenting here our experience of successfully using modified Capanna Technique of combining allograft and free vascularised fibular graft in treating large bone defects in the distal third of femur. Methods: Between January 2013 to October 2014, six patients with post traumatic long segment bone loss in the distal femur had reconstruction of bone defect by the Capanna technique. Average age was 33years (range of 18 to 49 years). Bone defect ranged from 10 to 20 cm (average 15 cm). Five patients had primary reconstruction while one was done after allograft failure. Bone union time and occurrence of any complications were noted. Follow up ranged from 7 to 24 months (average 15 months). Results: All grafts went on to union. No patient required secondary procedure to achieve union. Average time to union was 6 months. One patient had deep infection and delayed union of distal end of fibula, Conclusion: Free vascularised fibular graft combined with allograft increases initial stability, allows guicker weight bearing and has higher chances of union and is a good single stage technique of reconstruction of distal third femur defects.

### Abstract no.: 40201 EVALUATION OF ACCURACY OF PATIENT SPECIFIC PRE-CONTOURED PLATES IN ACETABULUM FRACTURE FIXATION Amit SHARMA, Lalit MAINI, Sunil JHA

Introduction: Due to complex anatomy of acetabulum, achieving anatomical contouring intra-operatively is a difficult task. A 3D real model can facilitate us in contouring plate preoperatively. Patient specific pre-contoured plate in acetabular fracture has been studied by few researchers but a randomized case-control study was lacking. Hence, we conducted a case-control study to evaluate the accuracy of patient specific pre-contoured plate using 3D model. Patients and Methods: Prospective randomized case-control study. 21 patients were included. 10 patients were in "case" group and remaining 11 in "control" group. Inclusion criteria: Displaced acetabulum fractures with displacement of >= 3 mm in adults who reported within 3 weeks of injury. Exclusion criteria: 1) Open fractures of acetabulum. 2) Associated Moral-lavallee lesion. In case group, patient specific real 3D model of fractured acetabulum was generated using rapid prototyping technology and the plates were contoured pre-operatively using this model. Control group was treated using intraoperative contoured plates. Both the groups were compared on following parameters: Total blood loss, Surgery time, Post-operative reduction on x-ray, post surgical residual displacement and reduction achieved as evaluated by CT scan. Results: Reduced blood loss and surgical time and better post-operative reduction was observed in case than control but was statistically insignificant (p value >.05). Reduction achieved as evaluated by CT was more in "case" group with statistically significant outcomes (p-value <0.05). Conclusion: Patient specific pre-contoured plate made by using 3D model is a better implant than intra-operatively contoured plate. Though, a study comparing similar fracture pattern will be required.

# Abstract no.: 41273 NEGLECTED PILON FRACTURE WITH CONCOMITANT IPSILATERAL COMMINUTED FRACTURE OF TALUS

Dibya Singha DAS, Naresh PANIGRAHI, Satya R PATRA

Introduction: Fracture of the tibial pilon with concomitant occurrence of a fracture of ipsilateral talus is an uncommon injury. The early anatomical reduction and fixation of these injuries are important to prevent post traumatic ankle deformities and arthritis. The association of tibial pilon fractures with concomitant fracture of body of talus is a challenging situation to manage. Case report: We describe a 30/male patient came with a neglected fracture of the tibial pilon along with comminuted fracture of the ipsilateral talar body. Patient did not receive any orthopaedic help for the injuries and was in bed for last one month. Radiographic evaluations showed comminuted fracture of talus with comminuted fracture distal end of tibia without disruption of the distal tibio-fibular syndesmosis. The patient was treated with arthrodesis of the ankle as well as the subtalar joints using a retrograde intramedullary interlocking nail with bone grafting. Partial followed by full weight bearing was allowed after evidence of bony fusion on radiographs. At the end of one year follow-up the patient was free from pain in the affected ankle and was continuing his job as a auto-rickshaw driver. Conclusion: As post-traumatic complications of painful joint arthrosis are almost inevitable in such complex and neglected fractures, primary arthrodesis was chosen for this particular patient. The result was satisfactory in the end and the patient had a painless limb, which enable him to go back to his previous profession in quick time. For such complex ankle fractures primary arthrodesis using a retrograde interlocking nail is a good treatment option.

## Abstract no.: 42368 COMPUTER ASSISTED ORTHOPAEDIC SURGERY GUIDED BY DAMAGE CONTROL FOR PELVIC FRACTURES IN POLYTRAUMA PATIENTS: PRELIMINARY RESULTS OF 39 PATIENTS. Xin HUANG, Chunpeng ZHAO, Yonggang SU, Tianmiao WANG, Manyi WANG

Objective: The aim of this study was to evaluate the safety and efficiency of computer assisted orthopaedic surgery guided by damage control orthopaedics in polytraumatised patients with pelvic injuries. Methods: A 23-month retrospective review of the pelvic fracture database. Consecutive high-energy trauma patients was suitable for computer assisted percutaneous screw fixation were included. Inclusion criteria: New Injury Severity Score (NISS) > 17, >2 major fractures and >1 organ/soft tissue injury. Demographics, times to operating room (TOR), time from acute stabilization to late definitive internal fixation(TAL), time of bone union, length of stay (LOS). To evaluate the outcome according to Matta . Results: From August 2006 to December 2012,39 patients met inclusion criteria. Mean age was 40.5+1.6 years, and mean Injury Severity Score (ISS) was 25.6+1.3. Optoelectronic navigation aided or robot navigated percutaneous screwing included sacroiliac screws, superior ramus medullary screws, pubic symphysis screws, and both column screws . Accuracy of screw placement was verified by CT scan.TOR:2.7+0.3 times. TAL: 5.9 + 1.2days. The mean time of bone healing Was 79+ 3.6 days. Hospital LOS:27 +3.2 days. The intensive care unit(ICU) LOS: 3.7 + 1.6 days .ICU admission rate: 15%.All patients had no complications and severe disability due to pelvic fracture.To evaluate the outcome according to Matta, the excellent and good rate was 87.1% (35 /39).Conclusion: We found that CAOS guided by DCO in patients with multiple injuries seems to be effective, time Saving, and safe.

## Abstract no.: 42367 EXPLORATIONS TO THE EARLY MANAGING STRATEGIES OF MULTIPLE INJURIES

Jincheng HUANG, Hongkai LIAN

Introduction: To explore the early managing strategies of multiple injuries. Methods: In a retrospective study, we studied 406 patients presented with multiple injuries. They were divided into two groups according to the time they entered into our hospital.189 patients who entered into our hospital between January 2010 to April 2012 was defined Group A,the others was defined Group B.Record time between reception and entering SICU or operating room, mortality rate 3 days after injuries between patients from the two group. Results: Time between reception and entering SICU or operating room was  $108.23\pm6.72$ min and  $45.67\pm7.96$ min in group A and B respectively,difference are significant(P=0.001 < 0.05).Conclusions: Shortening the time between injury and treatment

and reasonable utilization of intracranial pressure monitoring, limited fluid resuscitation, damage control theory can reduce the early mortality rate in multiple injury patients.

### Abstract no.: 39205 POSTOPERATIVE INFECTION IN PATIENTS UNDERGOING INSPECTION OF ORTHOPEDIC DAMAGE DUE TO EXTERNAL FIXATION Noel FONI, Felipe BAPTISTA, Luís ROSSATO, José Octávio HUNGRIA, Marcelo MERCADANTE, Ralph CHRISTIAN

Introduction: To conduct a retrospective analysis on cases undergoing inspection of orthope- dic damage, at an orthopedic emergency service in a teaching hospital, with the aim of evaluating patients with postoperative infection after conversion to internal osteosynthesis. Methods: This was a retrospective analysis covering the period from June 2012 to June 2013, on patients who underwent inspection of orthopedic damage due to external fixation and subsequently were converted to definitive osteosynthesis using a nail or plate. Results: We found an infection rate of 13.3% in our sample and, furthermore, found that there had been technical errors in setting up the fixator in 60.4% of the cases. Conclusion: We found an infection rate that we considered high, along with inadequacies in constructing the external fixator. We emphasize that this procedure is not risk-free and that training for physicians who perform this procedure should be mandatory.

#### Abstract no.: 40235 USE OF CIRCULAR&TUBULAR EXTERNAL FIXATION FOR TREATMENT OF OPEN HUMERAL FRACTURE Mohamed ELDEEB

introduction: the results of treatment of closed humeral shaft fracture are excellent using a variety of techniques including bracing, hanging cast, plate fixation and intamedullary nailling, open shaft humeral fracture due to high energy forces is challenge for orthopedic surgeons. Methods: purpose of this study was to determine the outome of open humeral shaft fractures treated by different modalities of external fixators.17 cases of open humeral fracture treated in national Jeddah hospital,ksa from 2005-2011 . 13 tubular external fixators were used 3 AO.6Hoffman.4orthofix.and 4 cases treated by ILIZAROV external fixators, depridement, wound irrigation and primary fixation were emergency surgery. flouroscopic control is required for fracture reduction and pins insertion. 4 cases were associated with radial nerve palsy, three of them improved gradually by physiotherapy and one case treated by neurosurgeon with nerve grafting Results: the numbers of Hospital days range fro 5 21 day, Average time of radiographic healing were from 8-30 weeks . 2cases had pin tract infection wich treated by irrigation and antibiotics. four cases were treated by Ilizarov external fixators wich had infection non union, two cases were treated primary by tublar external fixators and the other two were associated with implant failure one cases we use bone lengheneing of shaft humerus using Ilizarov external fixator. discussion&conclusion:external fixator which used for treatment of open fracture humerus have many advantages, easy applied, provides rigid fixation, earlyweight bearing, Hight tolerably and high rate of bone healing, Ilizarov external fixators can treat infected non union problems.

### Abstract no.: 39434 MINIMALLY INVASIVE HYBRID FIXATION FOR BOTH-BONE FOREARM FRACTURES

Jianshun WANG, Leyi CAI, Hua CHEN

Introduction: Surgery for fractures of both radius and ulna shaft is necessary, dual plating fixation as a main choice cost a lot and the damage to soft tissue seems huge. For some specific cases We use a hybrid fixation with plating and elastic intramedullary nailing as a minimally invasive method. Methods: For the cases of which the radius shaft fracture is AO type A, we proposed ORIF with plating of the ulna and CRIF with elastic intramedullary nailing of the radius. A long upper limb cast is necessary to help the stabilization for 2-3 weeks and start rehabitation after the cast was removed. To Compare the Dual plating and our new method, we focus on the clinical outcomes and cost. Result: The hybrid fixation group had 26 cases and the dual plating is 32. Groups were similar for sex, age and fracture location. Duration and the incision of surgery and tourniquet use were significantly shorter in the hybrid group. The average medical cost was significantly much lower in the hybrid group. There was no significant difference in either time to union or Price scores for function evaluation between two groups. Complication rates were also similar. Conclusion: For specific cases, the Hybrid fixation, ORIF with plating for the ulna and closed reduction and elastic intramedullary fixation for the radius, is an acceptable minimally invasive method for treating both radius and ulna shaft fractures. The new minimally invasive method cost less but a similar outcome with dual plating.

### Abstract no.: 40783 MULTIPLE JOINT RECONSTRUCTIONS IN ONE PATIENT USING MIS TECHNIQUES WITH BILATERAL SIMULTANEOUS PROCEDURES Mahmoud HAFEZ, Emara AHMED

Background: We present a case of juvenile idiopathic arthropathy (JIA) that required 6 arthroplasty procedures. Case presentation: A 32-year-old male presented with fused joints and deformities in both hips and both knees (30 to 40° flexion deformities). He had unsound fusion of right ankle and subtalar joints with severe valgus. At time of presentation, he was non walker for 4 months and he was declared non fit for surgery because of expected difficulties with intubation and spinal anesthesia due to spinal deformities. After multidisciplinary consultation, a decision was made to do bilateral simultaneous procedures on 3 sessions. Bilateral THA were done in one admission by using preoperative digital templating. Bilateral simultaneous TKA was done one year later, using custom-made cutting guides. After another year, the deformities of right ankle and hind foot were corrected by pantalar arthrodesis using arthrodesis nail. All operations were done under general anesthesia by the most senior anaesthetist and the senior surgeon (MAH). Deformities were corrected and he was able to walk and go back to work as an IT manager. Postoperative long leg film showed good alignment of both limbs. After 4 years follow up, the only complication was late skin problem related to one of the distal locking screws in the right ankle. This was improved after removal of the arthrodesis nail. Conclusion: Young medically fit patients with polyarthropathy could be denied the privilege of multiple joint reconstructions due to difficult anaesthesia. These patients could benefit from bilateral simultaneous arthroplasty using MIS techniques

### Abstract no.: 39369 MINIMALLY INVASIVE SURGERY OF PELVIC FRACTURES

Canjun ZENG, Liang WANG, Hui ZHANG, Tianbing WANG, Minghe QIN, Dadi JIN

Objective: To explore the approach and effects of minimally invasive surgery of pelvic fractures through small incision lateral to abdominal rectus during earthquake. Methods: 9 patients with pelvic fractures during Ludian 8.03 earthquake were treated with small incision lateral to abdominal rectus followed by anterior ring fixation with reconstruction plate or posterior ring fixation with percutaneous sacroiliac lag screws. Operation time, incision length, bleeding, pain level after operation and fracture reduction were recorded. Moreover, operative complications such as lateral femoral cutaneous nerve injury and hip adduction incapability were examined. Results: The clinical effects of minimally invasive surgery were satisfactory which manifested in more convenient operation, larger operative area, shorter operation time, less bleeding and pain. The patients obtained excellent fracture reduction and stable internal fixation without complications: The surgical approach through lateral abnominal rectus was suitable for the treatment of pelvic fractures with anteriorly interior fixation. Due to deficient blood, the minimally invasive surgery approach were worthwhile especially in the earthquake zone.

#### Abstract no.: 39337 MINIMALLY INVASIVE TREATMENT OF COMBINED FEMORAL FRACTURES; SINGLE VS DOUBLE FIXATION DEVICES. Sherif ABDELGAID, Ali JIRAGH, Jassim ALFILAKAWI

Combined femoral shaft and proximal or distal fractures represent a significant therapeutic challenge due to complexity of fracture geometry, complexity of soft tissue biomechanics acting through the fractures and alter reduction. Open reduction and internal fixation require extensive soft tissue dissection with potential complications of wound infection and soft tissues contracture affecting knee and patellofemoral biomechanics.in last decade minimally invasive techniques in such complex fractures become more popular as it decrease the complications associated with open reduction. This retroactive study comparing two protocols of fixation methods, single device fixation versus double device fixation. Material & Methods: using minimally invasive techniques, 68 cases with combined femoral fractures operated in between 2007 & 2012. Cases divided into two main groups, group (a) 33 cases operated on using single device fixation and group (b) 35 cases operated on using double device fixation. Results: the main intraoperative blood loss in group (a) was 200 cc and in group (b) was 345 cc. The average operation length was 2.5 hours in group (a) and 2 hours in group (b). Union complications occurred in 9% in group (a) and 4% in group (b) and the need for second surgical intervention occurred in 14.5% in group (a) and 6.5% in group (b). Conclusion: Combined femoral fractures fixed by double fixation devices had more favorable outcome than combined fractures fixed by single fixation device with less union complications and decreased need for second surgery.

# Abstract no.: 39790 MINIMALLY INVASIVE TREATMENT OF DISPLACED FEMORAL SHAFT FRACTURES WITH A RAPID REDUCTOR AND INTRAMEDULLARY NAIL FIXATION

Yingze ZHANG, Wei CHEN, Zhiyong HOU, Tao ZHANG, Zongyou YANG

Traction table-based intrameduallary (IM) nail fixation is an accepted treatment method for displaced femoral shaft fractures in adults. However, some complications have been well described with regard to this technique. To avoid the potential complications encountered in skin traction with the use of traction table, we invented a rapid reductor, which can be applied in a minimally invasive fashion to reduce the overlapping displacement by skeletal traction and correct the antero-posterior or lateral displacement using a Kirschner wire or Schantz pin with a "joy stick" technique. The rapid reductor can also maintain fracture reduction to facilitate subsequent IM nailing fixation. Between November 2012 and March 2013, 22 cases of displaced femoral shaft fractures were treated by the rapid reductorassisted closed reduction and IM nail fixation. Anatomical or nearly anatomical fracture reduction was achieved in all 22 cases and open reduction was not required in any case. The average operative time, fracture reduction time, fluoroscopy time and blood loss were 58 min (range, 43-95 min), 9.1 min (range, 6-15 min), 13.2 s (range, 4.5-41.0 s) and 87 mL (range, 60-150 mL), respectively. During the operation, no incident of reductor-induced neurovascular injury or Schantz pin-induced ilium splitting occurred. 22 patients were followed up for an average of 20.3 months (range, from 18 to 22 months). All fractures healed well on an average of 6 months. No limb length discrepancy was noted. The patients exhibited excellent functional recovery.

## Abstract no.: 40229 EARLY OUTCOMES OF MINIMALLY INCASIVE FOOT SURGERY Paul Ross MIDDLETON

Introduction: Minimally invasive foot surgery (MIS) is a relatively new procedure. By enabling surgeons to perform foot surgery which leaves minimal scarring, the procedure is growing in popularity. However it does have a steep learning curve and by its minimally invasive nature adjacent structures may be at risk. We reviewed our unit's early outcomes of MIS foot surgery 1 year after introducing the technique. Methods: 47 patents underwent MIS foot surgery in our unit. These included MICA, MICO and lesser toe procedures. Preoperative and 6 month post-operative PROMS were collected (VAS pain scale, EQ5D and MOXFQ). Radiographic corrections were calculated and any complications recorded. Results: The mean pre op VAS pain scores were 47.6 and MOXFQ scores were 40.5. 6 months post op these were recorded as VAS - 8.8 and MOXFQ - 12.4, a significant improvement (p<0.0001 for both scores). Radiographic outcomes also showed a good correction. In MICA procedures the mean Hallux valgus angle was corrected from 25.9 to 5.8 degrees. The inter-metatarsal angle was corrected from 18.3 to 8.0 degrees. Out of the 47 cases there was 1 conversion to an open procedure and 1 patient suffered a Sural nerve neuroma after a MICO procedure. There were no bone debris issues and no infections reported. Conclusions: Minimally invasive foot surgery appears to be safe with minimal complications. It has high patient reported satisfaction outcomes, and the procedures produce good radiographic deformity correction.

### Abstract no.: 41378 BIOLOGICAL PLATING TECHNIQUE FOR MANAGEMENT OF COMPLEX AND COMMINUTED SUB-TROCHANTERIC FRACTURES OF FEMUR Satya Ranjan PATRA, Naresh PANIGRAHI, Dibya Singha DAS

Introduction: Comminuted sub-trochanteric fractures of the femur are challenging problems. They are high-energy injuries with a lot of periosteal stripping and soft tissue damage and are often associated with nonunions and malunions unless managed wisely. Achieving reduction by nailing methods may be difficult, as the introduction of the implant can distract the fracture fragments away, thereby increasing the chances of nonunion. Attempts of anatomic reduction by open methods cause further damage to the soft-tissue attachments and vascularity of the fragments. In this scenario, biological minimally invasive plating method appears a logical alternative. Method: During a study period spanning almost 4 years, 21 cases of comminuted sub-trochanteric fractures were prospectively treated by minimally invasive 'biological plating' method. Three of them were compound fractures and four were female patients. Results: All the fractures except one united at a mean duration of 10.4 weeks. One patient who had a fall 3 weeks after surgery had re-fracture and was lost to follow-up subsequently. Seventeen patients had very good functional outcome and three patients had unacceptable lurch while walking. Three patients had delayed healing but there was no incidence of nonunion, infection or significant malunion. Conclusion: Biological minimally invasive plating is an excellent procedure for complex comminuted fractures of the sub-trochanteric region. It avoids any serious trauma to the already traumatized tissues and results in good predictable healing of the fractures.

# Abstract no.: 41000 ACCELERATED AND STANDARD WEIGHT BEARING REGIMENS FOLLOWING CARTILAGE REPAIR SURGERY – SYSTEMATIC REVIEW AND META-ANALYSIS

Vishvas SHETTY, Anan SHETTY

Purpose: This is a systematic review and metaanalysis comparing accelerated and traditional weight bearing regimens following cartilage repair surgery. Currently cartilage repair techniques are improving at a tremendous pace across the world, with the treatment being offered to more extremes of age. Yet the rehabilitation process is still long drawn and tedious which disrupts patients' quality of life. Methods and Materials: A thorough search of online databases (PubMed, Cochrane, MEDLINE) yielded five studiesdeemed fit for inclusion. The studies were critically reviewed and a metaanalysis was performed. The outcomes examined were the Knee Injury and Osteoarthritis outcome (KOOS), Short Form 36 (SF-36), Visual Analogue Score (VAS) scores and their subsets. Magnetic Resonance Imaging (MRI) outcomes were also studied. Results: The review showed good outcomes for the accelerated protocols as compared to the standard protocols. The metaanalysis, by and large, favoured the accelerated protocols, barring a few subset scores at particular time intervals. Conclusion: There is a dearth of published literature on this niche subject and only a few groups, internationally, are focusing on this branch of rehabilitation. The five studies do not have the same definition of accelerated and standard weight-bearing protocols and this confounds the matter. Additionally, the outcomes studied here were under strict clinical conditions and re-creation of these conditions will be difficult in normal practice. Compliance with the protocols given is also a difficult problem.

## Abstract no.: 40999 AUTOLOGOUS BONE-MARROW MESENCHYMAL CELL INDUCED CHONDROGENESIS: SINGLE-STAGE ARTHROSCOPIC CARTILAGE REPAIR. FOUR YEAR CLINICAL AND RADIOLOGICAL RESULTS. Vishvas SHETTY, Anan SHETTY, Seok-Jung KIM

We describe a single stage arthroscopic procedure for the treatment of articular cartilage defects in the knee. The novel procedure involves microfracture and application of bone marrow aspirate concentrate cells (BMAC) with hyaluronic acid and fibrin gel. The aim of the study was to evaluate the clinical and radiological outcomes at 4 years. A prospective study of 30 patients with symptomatic ICRS grade III/IV chondral defects, ranging from 2-8cm2, who were assessed clinically and radiologically. The surgical procedure involved debridement of the lesion, microfracture and application of concentrated BMAC with HA and fibrin gel under CO2 insufflation. Patients underwent morphological MRI, guantitative T2\*-mapping and d-GEMRIC scan. Clinical assessment used the Lysholm, IKDC and KOOS scores. Radiological assessment used the MOCART score. At 2 year follow-up, Lysholm score was 76.4, as compared to 50.8 pre-operatively (p < 0.05). KOOS (symptomatic) was 89.2, as compared to 65.7 pre-operatively. IKDC (subjective) was 79, up from 39 preoperatively. The mean T2\* relaxation-times for the repair tissue and native cartilage were 28.5 and 29.9 respectively. Average MOCART score for all lesions was 76. Our technique shows encouraging clinical results at 4 year follow-up. Clinical outcome scores show significant benefit. The morphological MRI shows good cartilage defect filling and the biochemical MRI (T2\*-mapping) suggests hyaline like repair tissue.

## Abstract no.: 42299 CHANNEL-ASSISTED MINIMALLY INVASIVE REPAIR OF ACUTE ACHILLES TENDON RUPTURE Hua CHEN

Introduction: Percutaneous (minimally invasive) suturing is a promising option for Achilles tendon (AT) repair with low rerupture and infection rates. Sural nerve lesions are the major problem to avoid with the technique. A new device was therefore designed for suturing the AT, resulting in channel-assisted minimally invasive repair (CAMIR). The purpose of this study was to compare the clinical and functional outcomes of CAMIR with traditional open techniques. Methods:82 patients with AT rupture were randomized into two groups: 41 for CAMIR, 41 for open repair. Follow-ups were at 6 and 12 months after surgery. Results: There was no difference between groups regarding plantar flexor strength, ankle range of motion, calf circumference, or time to return to normal sports. CAMIR significantly decreased the operative time compared to open repair (17 vs. 56 min). Mean scar length was greater in the open repair group (10 vs. 2 cm). There were no wound complications in the CAMIR group but four in the open repair group. Conclusions: CAMIR and open repair yielded essentially identical clinical and functional outcomes. CAMIR, however, produced a better cosmetic appearance and a lower rate of wound complications. Sural nerve injuries can be minimized using CAMIR. Achilles tendon; Tendon rupture; Minimally invasive; Sural nerve injury

#### Abstract no.: 40723 RECONSTRUCTION OF NEGLECTED RUPTURE OF ACHILLES TENDON BY IPSILATERAL FREE SEMITENDINOSUSTENDON GRAFT Abd Elrahman ELGANAINY, Mohammad BADRAN

Introduction:Achilles tendon is the most commonly ruptured tendon in the human body. Although clinical examination is sufficient to diagnose its rupture after injury, about 10-25% of complete acute ruptures are neglected initially and diagnosed late. Many techniques have been reported for the reconstruction of achilles tendon in chronic tears. In presence of large gap (more than 6 cm) tendon augmentation is required to overcome the gap between the ends of the tendon, scarring,retraction of the calf muscles, and loss of contractility of triceps surae. Methods:one surgeon operated on 11 patients (9 males & 2 females with the mean age: 33 years ) with neglected achilles tendon rupture using ipsilateral semitendenosus tendon harvested through small incision in the back of the knee. Median time from injury to surgery was 10.1 weeks. All patients were evaluated pre and post- operatively using (AOFAS) score. Results: pre-operative (AOFAS) was 53 and post-operatively was 93.3 at 6 months. 10 out 11 patients had resumed pre-injury daily activities.

## Abstract no.: 39082 FHL RECONSTRUCTION (DOUBLE INCISION TECHNIQUE) FOR NEGLECTED ACHILLES TENDON RUPTURE: MID-TERM RESULTS OF 21 PATIENTS

Aditya Krishna MOOTHA, Raghuveer Chander ALLURI

Introduction: The management of chronic neglected AT (Achilles tendon) ruptures is usually different from that of acute ruptures as tendon ends are retracted and atrophied with short fibrous distal stumps. Here we are reporting out results of reconstruction of neglected AT ruptures with FHL (Double incision technique). Material and Methods: 21 cases of neglected AT rupture are prospectively included from Jan 2010 to Jan 2014. All cases are operated by double incision technique, Medial plantar incision for FHL harvest and postero medial incision for AT exposure. In 17 cases FHL is tunnelled through calcaneus and in the other 4 it is tunnelled through the diatal stump of torn AT. Then FHL tendon is weaved through the proximal stump of AT before suturing. No attempt is made to repair the AT by end to end repair. Results: At a mean follow up of 25.2 months (9-36 months), AOFAS score increased from a preoperative score of 61.1 (57-67) to 88.5 (85-90) at final follow up. 2 cases had wound problems of which one required resuturing while the other healed on conservative management. None of the cases had re rupture at final follow up. Conclusion: FHL being an in phase muscle with AT and 2nd strongest muscle of the calf as well as good length of the tendon (harvested by double incision technique) is ideal for reconstruction of neglected AT ruptures with minimum donor site morbidity.

# Abstract no.: 42301 ENDOBUTTON ELASTIC FIXATION IN TREATMENT OF SYNDESMOTIC CHRONIC INSTABILITY

Jing TIAN

Objective: To observe the clinical efficacy of Endobutton elastic fixation in treament of syndemotic chronic instability. Methods: From January 2011 to January 2013, 13 cases with syndemotic chronic instability were treated by Endobutton elastic fixation methods. Including 9 males and 4 females, 32-46 years old, average is 37.5 years old. Surgery on the medial malleolus and the inferior tibiofibular joint space after debridement, using two Endobutton instead of traditional metal screws implementation AO3.5mm tibiofibular syndesmosis fixation. Follow-up included clinical evaluation, X-ray and CT examination and image-based PACS 5.0 system measurement, using the Foot and Ankle Surgeons American Association of ankle function score (American Orthopaedic Foot & Ankle Society, AOFAS) and visual analogue scale (VAS) for postoperative efficacy evaluation. Results: The patients were followed for 6 to 28 months, an average of 16 months. X-ray and CT scan tibiofibular joint gap is good after 3 d, 8 weeks and 6 months. After 6 months AOFAS score: excellent in 10 cases, good in 5 cases, passable in 1 case, excellent and good rate is 93.8%. Conclusion: Endobutton elastic fixation in syndesmotic chronic instability reserved physiological fretting, without secondary surgery to remove and prevent further separation. Postoperative ankle function recovered well without significant complications, short-term results were satisfactory. Endobutton, inferior tibiofibular joint, ankle joint, fixed

# Abstract no.: 42303 DOUBLE ARTHRODESIS THROUGH A SINGLE MEDIAL INCISION APPROACH FOR FLATFOOT

Guangrong YU

Objective To investigate the effectiveness of double arthrodesis to correct flatfoot deformity with pes valgus. Methods Between May 2009 and May 2012, 12 patients with flatfoot deformity and pes valgus were treated using subtalar and talonavicular joints arthrodesis through a single medial incision approach. There were 5 males and 7 females with an average age of 53.3 years (range, 21-78 years), including 5 left feet and 7 right feet. Of them, 11 cases had posterior tibial tendon dysfunctions; 6 cases were at Johnson-Strom stage III, 5 cases at stage II(c); and 1 case had tarsal coal ition. Preoperative American Orthopaedic Foot and Ankle Society (AOFAS) score and visual analogue scale (VAS) score were 48.75 ± 3.46 and 6.08 ± 1.14, respectively. Results The mean operation time was 85.6 minutes (range, 65-125 minutes). Eleven patients were followed up for 19.4 months on average (range, 13-30 months). All of the cases obtained primary heal ing of incision, with no compl ication of infection and nerve or blood vessel injury. X-ray film showed that the mean time of bone union was 9.8 weeks (range, 7-18 weeks); no bone nonunion occurred. No loosening or breakage of internal fixation was observed. Pain occurred at the calcaneal-cuboid joint (1 case) and at fixation site (1 case), and was rel ieved after symptomatic treatment. The mean AOFAS score and VAS score were significantly increased to 81.36 ± 2.98 and 0.72 ± 0.11 respectively, showing significant differences when compared with preoperative scores (t=19.946, P=0.000; t=16.288, P=0.000). Conclusion Subtalar and talonavicular joints arthrodesis by a single medial incision approach is a useful alternative to tri ple arthrodesis for the correction of flatfoot deformity with pes valgus. Flatfoot-deformity,

## Abstract no.: 42302 TOTAL ANKLE ARTHROPLASTY WITH THE STAR PROSTHESIS Yong WU

Objective: To report and evaluate the results of 52 cases of end stage post-traumatic ankle arthritis treated with STAR. Methods From Jan. 2005 to Jan. 2010. 55 patients with posttraumatic ankle osteoarthritis were treated with total ankle replacement. STAR prosthesis was used and 3 patients were lost follow-up. All cases were done only by the author and another consultant. Among 52 patients 28 were male and 24 were female, average age was 56 (36~78). Pre-operative X-ray pictures and CT scan were examed and AOFAS, Kofoed were evaluated, which were average 66 and 51 respectively. Results The follow-up time of the 52 patients was from 6 months to 60 months, average 32 months. 3 patients had minor wound edge necroses and healed spontaneously. 2 medial and 2 lateral malleolar fractured intraoperatively and fixed with screws, 1 patient was revised because of fracture of the meniscus component 2 years and 2 months after the first operation. AOFAS and Kofoed score were improved to 88 and 86 respectively at the time of followup. ROM were slightly improved(0—10degree). 19(36.5%) patients had no pain, 27(52%) patients had minor pain. 6(11.5%) patients had remaining medium pain. 42 (82%) patients were satisfied or somewhat satisfied with the operation. 10 (18%) patients were dissatisfied with the operation. Analyze the result of pre and post operation score in Kofoed and AOFASrespectively, by running the Paired Sample Test ankle replacement, in the hand of experienced surgeons, has an encouraging result. Ankle,Osteoarthritis,Joint Replacement, Traumatic

# Abstract no.: 42300 METALLIC SURFACING HEMIARTHROPLASTY OF THE FIRST METATARSOPHALANGEAL JOINT COMBINED WITH OSTEOTOMY OF THE METATARSAL FOR THE TREATMENT OF HALLUX RIGIDUS WITH HALLUX VALGUS

Hailin XU

objects Hallux rigidus is common seen in outpatient clinic, which is frequently complicated with hallux valgus. the surgical treatments include arthroplasty(resection arthroplasty or prosthetic replacement) and arthrodesis. While resection arthroplasty has the disadvantage of metastatic metatarsalgia and stress fracture of the lesser toe, and the arthrodesis procedure has reported complications of nonunion, malposition of the phalanx and limitation of recreational activities, etc. Traditional prosthetic arthroplasty commonly use the silicone implants, which also have lots of drawbacks. We performed metallic hemiarthroplasty of the first metatarsophalangeal (MTP) joint combined with osteotomy of the metatarsal procedure for the treatment of hallux rigidus with hallux valgus, and the clinical outcome is good. Methods From May 2010 to October 2012, 6 patients (7 feet) were surgically treated with metallic hemiarthroplasty of the 1st MTP joint combined with osteotomy of the metatarsal procedure, including 5 female, 1 male. Pre- and postoperative evaluations were done using the American Orthopaedic Foot and Ankle Society (AOFAS) forefoot score, visual analogue scale (VAS) pain score, and radiograph assessment including the 1,2 intermetatarsophalangeal angle(IMA) and hallux valgus angle (HVA), for the evaluations of function improvements and hallux valgus correction degrees. Results All the 6 patients were successfully followed, the mean follow-up time was 12 months (8-18 months). The mean AOFAS score was 40.57 ±4.47 points preoperatively and 75.43±4.20 postoperatively (p<0.01), and the VAS score was 7.57±0.79 points and 2.00±0.82 points pre- and postoperatively. The IMA and HVA were also improved significantly compared with preoperation(p<0.01). All the 6 patients felt satisfactory with the clinical outcome. Conclusions For the treatment of end stage hallux rigidus with hallux valgus, the clinical outcome of the metallic hemiarthroplasty combined with metatarsal ostemtomy is good, while it still need

#### Abstract no.: 41604 FOREFOOT RECONSTRUCTION AND ITS COMPLICATIONS Isabel PARADA AVENDAÑO, Alejandro SANTAMARÍA FUMAS, Jorge MURIANO ROYO, Alejandro DOMINGUEZ SEVILLA

Introduction: Maestro et al described a so-called "normal metatarsal parabola" which is based on a geometric progression that create a defined relationship between the length of the five metatarsals. From that comes the theoretical shortening required to obtain favorable clinical results in surgical Hallux Valgus pathology. Methods: Retrospective study of forefoot reconstructions (January 2010-December 2013). Inclusion criteria are procedures with a minimum approach in the second and third metatarsal. Gender, age, previous signs and symptoms, first ray principle technique and Weil's osteotomies of the lesser rays with or without fixation, post surgical index minus, elevated first metatarsal and complications in a mean follow up of 15 months. Analyzed with the statistical program SPSS 21.00. Results:131 patients (93% females, mean age 61 years). 6% of reconstructions were due to previous failures of isolated osteotomies. The most commonly used technique in reconstructions was Chevron osteotomy (36'6%) with Weil approach in 2nd, 3rd and 4th lesser rays in 45% of cases. General postoperative complications reached 35'8%, being more frequent metatarsalgia (14.5%) and recurrence (6.9%). 68% of patients with postoperative metatarsalgia present index minus in x-ray. Conclusion: Reconstructive surgery of the forefoot intend to provide a new anatomy and biomechanics for the foot as close as possible to the ideal given by Maestro; they are surgeries with high technical demands with higher percentage of complications than isolated first ray osteotomies. A long curve of learning and planning is necessary to reduce them.

# Abstract no.: 41503 INVESTIGATION OF THE BACTERIAL ISOLATION RATE FROM INDIVIDUAL ENDOPROSTHETIC COMPONENTS

Viktor JANZ, Benjamin BARTEK, Georgi WASSILEW, Carsten PERKA

Introduction: An isolated exchange of the mobile endoprosthetic components is a frequently performed procedure to treat periprosthetic joint infection (PJI). It is currently unclear, whether the causative bacteria only adhere to the mobile components or are ubiquitously distributed throughout the affected joint. The aim of this study was to analyze if individual endoprosthetic components or materials are more susceptible to bacterial colonization than others. Methods: The bacterial isolation rate, from 273 revision THA and TKA-patients, was investigated through sonicate fluid samples (SFC), from all endoprosthetic components, polyethylene (PE) versus non-PE and mobile versus nonmobile components in this retrospective cohort study. Additionally, the isolation rate of individual bacterial species for the individual components was registered. Results: No statistical significance was found in the bacterial isolation rate between the samples from PE or non-PE components (44% vs. 41%; n=130) or between the mobile and non-mobile components (48% vs. 40%; n= 147). Also, no statistically significant correlation was found between specific components and individual bacterial species. Conclusion: This study represents the largest patient collective, investigating the bacterial colonization of different endoprosthetic components through sonication. Our data shows that the bacterial colonization in cases of PJI does not favor certain endoprosthetic component and PJI should be regarded as a ubiquitous process encompassing the entire joint. If an isolated exchange of individual endoprosthetic components is performed, this should be regarded as a reduction of bacterial load and should be supplemented with an adequate antimicrobial therapy.

## Abstract no.: 41901 HISTOPATHOLOGICAL ANALYSIS OF LOCAL INFLAMMATORY REACTIONS FOR DIAGNOSING PERIPROSTHETIC INFECTION OF HIP JOINT

Saravanan SANKARANARAYANAN ARUMUGAM, Victor VOLOSHIN, Anatoliy EREMIN, Igor DOROZHKO, Dmitry MARTYNENKO, Sergey OSHKUKOV

Aim: To improve the results of surgical treatment for periprosthetic infection of hip joints . Materials and methods: From 2011 to 2015, data of 50 patients (23 men, 27 women) with periprosthetic infection of hip joints were analyzed . Preoperative aspiration from infected joint was sent to cytological study, in order to determine the character of the inflammatory process and the further surgical treatment method. Local inflammatory response was assessed by quantitative and qualitative composition of the cell. Depending on the stage of inflammatory process and the tissue involved, the following types of surgical methods are performed : One-stage revisional endoprosthetic replacement, Surgical currettage of the inflammed area without removing the prosthesis, A two-stage treatment implanting cement spacer impregnated with antibiotics followed by revisional endoprosthesis, Removal of the prosthesis with the formation of the iliac- femoral neoarthrosis or bony ankylosis of the joint. Results: Reactive response to a foreign body was obtained cytologically from 10 patients with early periprosthetic infection of the hip joints. Surgical currettage debridement with preservation of the prosthesis was performed in these cases. Chronic productive inflammation was noted in 32 cases. We determined number of segmented neutrophils in the frozen- para-articular tissues of the hip joint, for choosing the surgical method. If less than 5 neutrophils in the field, we did revisional arthroplasty. Chronic inflammation with bone resorption was observed in 8 cases. In cytological material, osteoclasts were found along with leukocytes, fibroblasts and fibrocytes. Removal of endoprosthesis was the choice in this group.

#### Abstract no.: 41863 NOVEL TECHNIQUE FOR MAKING CEMENT SPACER FOR ARTHROPLASTY Mathew VARGHESE

Infection rates following primary hip remains at 0.5-1.4%1, the large number of THRs done ensure a very large burden of infected cases. Two-stage revision of the infected hips with usage of cement spacer has become the accepted modality of managing infection. We describe an inexpensive and quick method of making unipolar articulating cement hip spacer of desired size on the operation table. The technique was an on table innovation when commercially available mould was found to be too small for the patients acetabulum. The technique has since been refined to be done for any case requiring a spacer. The material requirement of our procedure is plain bone cement, antibiotic loaded bone cement, an Austin Moore or Thompson prosthesis of pre or intraop measured size, Steinman pins or Rush pins or Austin Moore or Thomson or Charley's prosthesis of smaller size than the previous one for use as scaffolding in the spacer, packets of sterile bone wax and about twenty five to thirty minutes of time. The basic steps include the creation of a Cement Mould around an appropriate size AM prosthesis or Thomson's Prosthesis and using this mould to create the spacer. The unique feature of this is the use of bone wax to prevent cement sticking to the cement mould. The cement spacer is strengthened further by using a curved Steinmann Pin. We describe the technique and use of this Procedure.

Abstract no.: 40854

## THE EFFECTS OF SELECTIVE UPWARD DISPLACEMENT OF THE ACETABULAR COMPONENT ON THE LENGTH AND FUNCTION OF LOWER LIMBS WITH DEVELOPMENTAL DYSPLASIA OF THE HIP AFTER TOTAL HIP ARTHROPLASTY

Zhiyu HUANG, Zhiqi ZHANG, Ming FU, Guangxin HUANG, Peihui WU, Baoxi YU, Puyi SHENG, Weiming LIAO

Objective: To examine the influences of selective upward displacement of acetabular components in THA on the length and function of lower limbs of patients with DDH after surgery. Method: 26 DDH patients who underwent THA from January 2008 to December 2013 were included. Patient age ranged from 36 to 80 years. 12 cases were Grade I, 8 Grade II, and 6 Grade III, according to Crowe's Classification. The patients had an average Harris score of 42.30±12.84 mm, and an average WOMAC Index of 59.08±13.84. Patients underwent pelvic X-ray and CT. Preoperative design with TraumaCad was employed to ensure the minimum magnitude of upward displacement for good stability of the acetabular component. During the surgery, the rotational center of the acetabulum was displaced upward based on the acetabular bone mass to allow for at least 70% bone coverage of the acetabular component. Results: The 26 patients were followed for 6-73 months (average 36 months). the Harris score at the last follow-up after surgery (91.18±7.09) increased (t=19.98, P<0.001), while the WOMAC Index (9.85±3.75) decreased (t=17.95, P<0.001). Compared to the length of the affected limb before surgery, patients' affected limbs were significantly lengthened by 9.23±7.54 mm on average (t=6.24, P<0.001). No loosening or displacement of the acetabular components occurred during follow-up. Conclusion: For patients with deformed acetabulum due to DDH, as long as the preoperative design and intraoperative procedures are appropriate, selective upward displacement of the acetabular component in THA will have no significant adverse influences on the recovery of lower limb length.

# Abstract no.: 40677 TOTAL HIP ARTHROPLASTY OF POST-TRAUMATIC ARTHRITIS FOLLOWING ACETABULAR FRACTURE

Daozhang CAI, Chun ZENG, Hang FANG, Chang ZHAO, Jianying PAN

Objective: To access the clinical efficacy of total hip arthroplasty (THA) for patients with post-traumatic osteoarthritis (PTOA) following acetabular fracture. Method: Patients were subjected to two groups according to their Judet-Letournel classification: 10 cases of simple fracture type and 13 cases of combined fracture type. 17 cases underwent ORIF after injury. PTOA was evidenced 1-4 years (2 years on average) after injury. 6 cases developed avascular necrosis of the femoral head. 15 cases had lower limb discrepancy and 17 cases had bone defect of acetabula. Patients' age at THA was among 29-71. Patients were followed with Harris score and post-surgical imaging. Results: Average follow-up was 39.6 months (10-93 months). Harris score significantly increased from 47.2±10.9 pre-surgery to 88.3±8.5 at the last follow-up (P<0.01). No severe complications such as infection, dislocation, atopic ossification or injury of vascular and nerve occurred in any of these patients. No one need revision of their hips by now. Conclusions: Acetabular fracture must be treated with anatomical reduction and rigid internal fixation at primary surgical management, or PTOA will developed soon after the injury. THA is effective for PTOA following acetabular fracture if personally prepared, sufficient bone graft used, and right prosthesis chosen.

## Abstract no.: 41920 NEGLECTED POSTERIOR DISLOCATION OF HIP TREATED WITH SUBTROCHANTERIC OSTEOTOMY AND PRIMARY THR- A CASE REPORT

V. SATHYANARAYANA, Maulik Tulsibhai PATEL, Sivaram RAGHAVAN, D. NARESH

Neglected hip dislocation is rare in today's world. Management of these patients is a challenge to the treating surgeon and need to be tailored suiting to patient's demands, expectations and constraints of financial resources. Case report: 37 years old male presented with history of trauma 20 years back with fixed flexion deformity of 30\* and 20\* abduction deformity with 2 cms of shortening of left hip. Patient has not taken any treatment after trauma for 3 years. After that he was undergone open reduction of hip joint. Patient was advised to continue traction at home but he did not follow that and again dislocated hip 3 weeks post op. Patient was again operated in the form of subtrochanteric osteotomy. After that he started walking with stick for next 17 years until he presented to us. X ray and MRI shows neglected dislocation of hip with completely flattened weight bearing dome of acetabulum. Patient was treated with subtrochanteric osteotomy for deformity correction with total hip replacement. He patient is walking independently with full range of motion at the hip at 6 month of follow up and able to perform all activities of daily living independently. Conclusions: Neglected cases of hip dislocation can have devastating complications and early diagnosis and treatment of these can prevent an early replacement. In cases where the patient comes with a neglected dislocation treatment by total hip replacement can give a functional and stable hip.

## Abstract no.: 42314 DETERMINATION OF ACCURACY OF LESSER TROCHANTER AS INTRAOPERATIVE REFERENCE LANDMARK FOR ENTRY POINT FOR LAG SCREW INSERTION IN HIP FRACTURES MANAGEMENT Jianlin XIAO

Purposes: The goal of this study was to evaluate the accuracy of LT for entry of lag screw placement in the fixation of hip fractures. Methods: Radiographs of pelvis with both hips of 50 Chinese patients were analyzed to determine the accuracy of using the LT as a reference landmark for inserting lag screws. Femoral necks were divided into four parts, the distal second part was classified as the safe zone. Cobb angles of 1250 and 1300 were used as representative lag screw insertion angles referencing lateral cortex of LT for the measurement, and drawn insertion tracks in the neck of the femur. Accuracy of the placement in the defined safe zone was evaluated. Results: Entry points at the superior tip, apex, and inferior tip of LT had a 78%, 39%, and 0% accuracy of safe zone placement respectively in case of 1250 Cobb angle, and 31%, 74%, 6% respectively in case of 1300 Cobb angle. Entry point at the level of LT inferior tip had a 95% and 71% incidence of cut out of the neck for 1250 and 1300 screws, respectively. Conclusion: We recommend that the LT superior tip is a good reference for the 1250 lag screw insertion, and that the LT apex was a good reference for entry point for insertion of 1300 lag screw. Entry point made at the level of LT inferior tip has a very high rate of the cut-out and should be avoided.

# Abstract no.: 40238 TREATMENT OF ABDUCTOR PALSY IN ADULT USING ILIO PSOAS TRANSFER

Laurent SEDEL

Introduction Hip abductor palsy is a very significant problem. Few techniques have been described and gave good results. Surgical technique Modified Sharrard procedure consisted in ilio-psoas muscle transfer onto the greater trochanter through the iliac bone. The technique was modified in order to obtain a bony fixation. Material and methods Twelve patients were operated on a period of 30 years. 7 men and 5 females aged 18 to 62. Four had had severe acetabular fracture initially treated by open reduction and internal fixation, one had a fused hip transformed in total hip, one after hip dislocation, one a severe limp after total hip for a Crowe 3 DDH, two in conjunction with total hip after tumour excision or gluteus medius lesion, one for spina bifida, and one poliomyelitis, one after muscle excision for Idiopathic Tumoral Calcinosis. Six had had a total hip, of which four during the same procedure. Results were evaluated regarding limp, muscle function, and patient satisfaction. Follow-up periods extended from 2 to 20 years. None recovered a full abduction, 4 had no limp, 4 had a grade 4 muscle with limited limp, one improved with limited abduction, and 3 were considered as failures. Eight where satisfied of the results. Conclusion and discussion: Best results were obtained in conjunction with total hip replacement and when the transferred muscle was intact. Patient proper selection was a prerequisite.

### Abstract no.: 40134 TACTICS OF TREATMENT OF PERIPROSTHETIC INFECTION IN PATIENTS WITH RHEUMATIC DISEASES AFTER HIP AND KNEE ARTHROPLASTY

Alexander KHRAMOV, Maxim MAKAROV, Evgeniy BYALIK, Sergey MAKAROV, Vadim PAVLOV, Vera AMIRDZHANOVA, Gayane VARDIKOVA

Introduction: One of the most dangerous complications of replacement of large joints in patients with RD is the development of periprosthetic infection. Objectives: To determine the tactics of treatment for periprosthetic infection in hip and knee arthroplasty in patients with RD. Methods: During the period from 2009 - 2013 produced 654 knee and 549 hip arthroplasty. Results: Periprosthetic infection developed in 12 (3.63%) patients after knee and 8 (2.95%) patients after hip arthroplasty. In 11 patients there was an early, at 6deferred, 3-late form periprosthetic infection. In 11 patients with an early form of periprosthetic infection has performed revision arthroplasty/debridment with preservation the prosthesis and replacement of plastic liners and the heads of hip endoprosthesis. Total antibiotic therapy was appointed for a period of 4-6 weeks. In 9 patients with delayed or late periprosthetic infection has performed the following operations: 2 cases with stable component of the endoprosthesis, performed one-stage revision. It was mandatory to use cement with antibiotic collagen hemobiotech system and antibiotic therapy for 6 weeks. The remaining 7 patients with unstable components of implants performed a 2-stage revision. Step 1: remove implants of the prosthesis and install the spacer with an antibiotic, 6-12 weeks after healing of surgical wounds in 6 patients was performed in 2 steps: remove the spacer and the install the new implants of prosthesis. Conclusions: The above tactic of treatment of periprosthetic infection was effective and allowed us to avoid recurrence of the infection in the follow-up period 1 - 5 years in 70% of the patients.

### Abstract no.: 40133 ALGORITHM OF VENOUS THROMBOEMBOLISM (VTE) PROPHYLAXES IN PATIENTS WITH RHEUMATIC DISEASES UNDERGOING JOINT ARTHROPLASTY.

Alexey RYBNIKOV, Evgeniy BYALIK, Tatyana RESHETNYAK, Sergey MAKAROV, Vadim PAVLOV, Gayane VARDIKOVA

Introdution: DVT of the lower limbs during operations knee and hip arthroplasty in patients with rheumatic diseases(RD) are observed in 8-25% cases.Objective: trace incidence efficiency and prevention of DVT in patients with RD and the control group of patients with osteoarthritis(OA) under comparable conditions. Methods: We studied 304 patients for the period 2012-2014.188-with RD,116-with OA.A distinctive feature of patients with RD was the presence of concomitant drug therapy for underlying disease. Thus, 92.3%-received NSAIDs,84.1%-received DMARDs,36.6%-received alucocorticosteroids,27.5%-received biologic DMARDs. These drugs indirectly affect the hemostatic system , enhance the effect of each other and depress platelet hemostasis ,which requires amendments of the basic therapy.Patients with RD, long-term NSAID users, this group of drugs was discontinued for 5 half-lives. The study used the following anticoagulants: new oral and low-molecularweight heparin.Patients with post-thrombotic venous disease of the lower extremities for 7 days prior to surgery in minimal doses taken low-molecular-weight heparin or fondaparinux sodium,after the removal of the epidural catheter patients was transferred to oral anticoagulants.DUS was routinely performed preoperatively and on postoperative day 7,14,then 1 time a month. Time of observation was 1 year. Results: None of the patients with RD in early postoperative period DVT of the lower limbs were found. In the control group of patients with OA in early postoperative period identified 8 cases(6.9%) DVT of the lower perioperative period of clinically significant bleeding limbs.In the was not seen.Conclusions: algorithm of prevention of DVT of the lower limbs has been effective and convenient in the postoperative period in patients with RD, but requires further study in patients with osteoarthritis

### Abstract no.: 39113 WRIST ARTHRODESIS IN SEVER ARTHRITES OF WRIST IN RHEUMATOID ARTHRITIS PATIENT Amit LAKHANI

Introduction : Rheumatoid arthritis is a disease of chronic polyarticular inflammation that leads to joint swelling, joint deformity and loss of joint function. Management depends upon pain and loss of function. We reviewed result of wrist fusion in five patients of rheumatoid arthritis from agricultural background with sever wrist arthritis and pain, treated with wrist arthrodesis using 3.5mm reconstruction plate and iliac crest bone graft. Meterial and methods: Five patients( four female and one male) aged between 28 to 44 years underwent this procedure in our hospital. All conservative methods including wrist brace, intraarticural steroid and PIN denervation were tried. Patients were explained about the procedure and limitations. wrist arthrodeis was done through dorsal approach and fusion was done in 10 to 20 degree of dorsiflexion and neutral to 5 degree of ulnar deviation. Results : Patients were followed for a period of ten months. Finger motion was regained after 3 months of aggressive physiotherapy in four cases. One female aged 44 years took 5 months to regain full finger movements due to poor follow up and uncomplianced physiotherapy. All cases united well between 12 to 16 weeks.conclusion :Rheumatoid arthritis with painful destruction of wrist joint is a common indication for wrist fusion. Plate fixation provides great stability in all directions and delivers a high fusion with functional rate.

### Abstract no.: 40521 PATIENTS UNDERGOING MEHTA CASTING EXPERIENCE A DECREASE IN HEALTH RELATED QUALITY OF LIFE

David ROYE, Hiroko MATSUMOTO, Julie YOSHIMACHI, Evan TRUPIA, Sumeet GARG, Peter STURM, Lindsay ANDRAS, James SANDERS, Michael GLOTZBECKER, Michael VITALE, Children'S Spine STUDY GROUP, Growing Spine STUDY GROUP

Introduction: The treatment of children with Early Onset Scoliosis (EOS) is controversial and evolving. Mehta casting represents a non-surgical method. It is important to understand the impact on patients and caregivers. The purpose of this study is to examine the HRQoL and family burden of patients with EOS undergoing Mehta casting treatment. Methods: 108 patients with EOS who had undergone casting were identified from two national databases. Among these patients, 32 patients/families completed both pre- and post-casting Early Onset Scoliosis Questionnaire (EOSQ-24). The 18 idiopathic and 14 non-idiopathic patients were in casting for an average of 7 months (range: 2-36) at time of post-casting EOSQ-24. Results: Patients with idiopathic infantile scoliosis (N=65) had similar HRQoL before casting compared to age-matched norms. However, after placement of the Mehta casting, their HRQoL significantly decreased (mean difference: 8.6; 95% CI: 1.7-15.4, p=0.017) compared to that of pre-casting. Non-idiopathic patients had worsened HRQoL and family burden compared to age-matched norms before the casting, and further trends of deterioration were seen, though this effect did not reach statistical significance. Conclusions: EOS patients undergoing Mehta casting experience a decrease in HRQoL during casting. This was particularly prominent in idiopathic patients who were healthy before the treatment. While casting plays an important role in the treatment of a subgroup of patients with EOS, this treatment modality does negatively affect the health related quality of life of patients and families during treatment, a finding that needs to be followed prospectively over time in this at-risk patient population.
# Abstract no.: 41427 ONE YEAR SURVIVAL IN PATIENTS UNDERGOING SURGICAL MANAGEMENT FOR PROXIMAL FEMUR FRACTURES IN ELDERLY POPULATION

Rahul UPADHYAY, Himanshu VIJAY, Deepak RAINA

introduction: Hip fractures for long have been associated with high mortality, significant morbidity and loss of independence amongst the geriatric age group. With increase in life expectancy, the incidence of hip fractures is expected to increase. The treatment for hip fractures has come a long way from being a mostly conservative in the past to various surgical options present today. The effect of surgery on the overall mortality and functional status of individuals in this vulnerable age group post hip fractures has been studied in various single and multicentric studies. Results have varied and the reported 1-year mortality after sustaining a hip fracture has been estimated to be 14% to 58%. Aims & objectives: To study 1 year survival rate in patients undergoing surgical treatment for hip fractures at indian spinal injuries centre, new delhi. To compare and analyze the results thus achieved with the available international literature. Materials and methods. 112 patients with hip fractures were admitted to indian spinal injuries centre between 1st january 2012 to 1st january 2013. All patients were identified at the time of admission and were prospectively followed for a period of 1 year, respectively.observation:Out of 112 patients operated for proximal femur fracture, 101 patients survived at one year post operative period.11(9.8%) out of a total of 112 cases reviewed died within one year with survival rate Of 90.2%. The Kaplan Meier analysis was done and the survival data was analysed.results:One year survival rate was found to be 90.2% in our study, which was higher than that reported in majority of studies.

Abstract no.: 41640

# DEFINING AN INTERNATIONAL STANDARD SET OF OUTCOMES MEASURES FOR PATIENTS WITH HIP OR KNEE OSTEOARTHRITIS: CONSENSUS OF THE INTERNATIONAL CONSORTIUM OF HEALTH OUTCOME MEASUREMENT HIP AND KNEE OSTEOARTHRITIS WORKING GROUP

Thami BENZAKOUR, Rob NELISSEN, Ola ROLFSON, Stephanie WISSIG, Caleb STOWELL, Working Group ICHOM HIP AND KNEE OSTEOARTHRITIS, Patricia FRANKLIN

Background: Hip and knee osteoarthritis is a major contributor to disability globally. Uncertainty regarding treatment outcomes and unsustainable growth in healthcare expenditures have driven interest in the development of standardized health outcome measures for assessing the quality of care and comparing treatment efficacy across populations. We aimed to define a standardized set of outcome measures for evaluating the care of patients with clinically diagnosed hip or knee OA. Methods: An international group of patients, orthopaedic surgeons, general practitioners, rheumatologists, physiotherapists, and registry experts representing 10 countries convened for a series of seven teleconferences. After reviewing existing literature and practices, a modified Delphi process involving structured discussions and formalized voting was used to select measures for inclusion in the set. Only items voted for inclusion by 2/3rds majority were included in the set. Results: The group reached consensus on a concise set of outcomes measures evaluation patients' joint pain, physical functioning, quality of life, work status, mortality, reoperations, readmissions, and overall satisfaction with treatment. Pertinent baseline characteristics and risk factor metrics were also defined such as age, sex, education level, medical and surgical history, BMI, physical activity, smoking status, and co-morbid conditions. Annual outcome measurement is recommended for all patients. Conclusion: We have defined a standard set of outcome measures recommended for monitoring the care of hip and knee OA patients. We believe this set provides meaningful, comparable, and easy to interpret measures readily implementable in clinics/registries globally and represents an initial step towards value-based healthcare in hip and knee OA.

### Abstract no.: 40837 MUSCULOSKELETAL CONSIDERATIONS DURING PREGNANCY Thamer HAMDAN

Pregnancy related musculoskeletal impairment is a common complaint among pregnant women; it can potentially have a negative impact on their quality of life. The specific anatomic and physiological changes of pregnancy predispose to a specific set of diagnosis. This is prospective study conducted in Basrah governorate between January 2013 – January 2014. Pregnant women were asked and examined for musculoskeletal pathology, and then analysis of those with musculoskeletal pathology was done. A total of 500 pregnant women were recruited, statistical analyses were performed using SPSS version, incidence and frequency were calculated. Out of the 500 pregnant women, two hundred sixty (53.8%) presented with some sort of disorders, age range between 20 - 30 years, 63.8% showed the disorders in the third trimester, 71.9% were multipara, 62.3% had low back pain followed by 20.8% presented with carpal tunnel syndrome. Analysis of the underlying causes and the pattern of treatment will be discussed.

# Abstract no.: 40562 ANTI CCP 2 ANTIBODY ASSAY: A DIAGNOSTIC DILEMMA IN TUBERCULAR ARTHRITIS.

Saurabh SINGH, Hemant BANSAL, Kumar PRITESH, Samrat Smrutiranjan SAHOO

Background: Use of anti- CCP 2 antibody for the diagnosis presents with the dilemma of the marker being positive for spondyloarthropathies as well, treatment of which may flare up tuberculosis. Clinically both the diseases may mimic each other in early stages, presenting as mono- or pauci-articular pain, especially in developing countries, where the incidence of both are high. In this study we intend to study prevalence of anti-CCP 2 positivity in case of active tubercular arthritis of knee and compare with its prevalence in healthy controls.Methods: Serum levels of anti-CCP 2 antibodies were measured in 31 biopsy proven patients of active tubercular arthritis of knee and were compared with equal number of age matched healthy controls.Results: 38.7% patients of tubercular arthritis patients showed positive results on serum anti CCP 2 antibody assay and the mean [SD] of anti CCP 2 levels in patients of tubercular arthritis was significantly more than that in the control group 9.95[10.81] versus 4.09[0.83]Discussion: Anti CCP 2 assay for diagnosis may lead to use of steroids for the treatment of rheumatoid arthritis (spondyloarthropathy) which will flare up tubercular arthritis. This diagnostic dilemma may result in delay in initiation of anti-tubercular treatment. Conclusion: Anti-CCP 2 assay for diagnosis of rheumatoid arthritis or tubercular arthritis in TB endemic region is dicey and biopsy remains 'gold standard' for early diagnosis and treatment of mono or pauci articular arthritis.

### Abstract no.: 41289 AN UNUSUAL CASE OF BILATERAL MULTIPLE TENDON XANTHOMATOSIS AFFECTING ALL FOUR EXTREMITIES. Dibya Singha DAS, Naresh PANIGRAHI

Tendon xanthomatosis often accompanies familial hypercholesterolaemia, but it can also occur in other pathologic states of the musculoskeletal system. Along with tendoachilles, bilateral extensor tendons of hands, elbows, knees are affected in the same case, due to xanthomatosis that causes restriction in the range of motion is very rare. Thus, the case that will be presented in this report is therefore unique.CASE REPORT:25 years old male admitted to our hospital with chief complain of non- tender firm swelling over bilateral -Achilles tendons, extensor tendons of knee joints.3rd MIP joints of right hand and at 3rd &4th MIP joints of left hand and elbow joints at olecranon process.All swellings were movable from side to side along with under lying tendons. Ultrasonography of swellings showed multiple solid masses that were engaged to the extensor tendons suggestive of tendinopathy or tendon xanthoma.MRI reports of bi-lateral ankles showed xanthomatous infiltration of both achilis tendons. FNAC revealed cholesterol clefts admixed with histiocytes and occasional giant cells in fibrous stroma suggesting a tendinous xanthoma (hematoxylin-eosin x 200). DISSCUTION: Xanthomas are benign tumors that represent a physical manifestation of hyperlipidemia. Particularly, tendon xanthomas often appear as a clinical manifestation of familial hypercholesterolemia (FH). musculoskeletal symptoms (xanthomas) often precede the diagnosis of hyperlipidemia, it is important that orthopaedic surgeons are familiar with FH, because patients with FH are at high risk for premature coronary atherosclerosis. Early diagnosis of this metabolic disorder is important to institute medical therapy to alter course of disease before the onset coronary arterial disease and other systemic disorders.

### Abstract no.: 41956 SUPRACONDYLAR FRACTURES IN CHILDREN Atul SRIVASTAVA

A review of literature reveals that supracondylar fractures in children presenting later than a week warrant open reduction and internal fixation as sufficient callus has already formed by then. In developing and under developed countries, the presentation of these fractures is not infrequently delayed, may be upto 2-3 weeks Our series intends to highlight an indigenous and innovative technique through which these fractures presenting as late as 2-3 weeks can also be treated by closed reduction and K wire fixation, despite sufficient soft callus formation. The technique is simple, easily reproducible and patient and surgeon friendly. Our series includes 32 children with late presenting supracondylar fractures of the humerus treated by this technique and followed up for an average period of 5 months with satisfactory results and minimal complications. Conclusion: In developing countries, where the fractures usually present late, this indigenous technique of closed manipulation and per cutaneous pinning is recommended.

# Abstract no.: 40636 CROSSED-PIN CONFIGURATION VERSUS LATERAL PINS IN TREATMENT OF SUPRACONDYLAR HUMERAL FRACTURE IN CHILDREN

Elsayed SAID, Ahmed ADDOSOOKI

Supracondylar fractures of humerus are the commonest fracture in first decade of life for which closed reduction and percutaneous pinning is the preferred treatment. Controversy persists regarding the optimal pin configuration. The purpose of this study was to assess results and complications of fixation of supracondylar humeral fracture (type III) by crossing pinning versus two parallel lateral pinning. Between June 2012 and May 2013, we evaluated 44 children. 4 children lost in follow up, they were allocated to Group-A (two parallel Lateral wires) 20 children, and Group – B (Medial and lateral wires) 20 children. The two groups were evaluated for pre-fracture characteristics and post reduction evaluation at first week, third week, fourth week, two months, three months and four months. The mean follow up in group A was 3.6 months and group B was 3.8 months. Both groups were also similar in sex distribution, pre-operative displacement, mode of injury and neurovascular status. No major loss of reduction was observed in both groups where as there was no significant difference between mild loss of reduction (3 cases in group-A), change in Baumann angle, change in Humerocapitellar angle, Flynn grade, elbow extension flexion, carrying angle, total range of motion. There was only one case of ulnar nerve injury in group B that had completely improved after three months follow up. Conclusion: there was no significant difference between medial and lateral crossing wires and 2 parallel lateral wires as regard postoperative clinical results, complications and incidence of iatrogenic ulnar nerve injury.

# Abstract no.: 39551 NEW DEFINITION OF FRACTURE DISPLACEMENT TO AVOID DELAYED SURGERY IN TREATING FRACTURE LATERAL CONDYLE OF HUMERUS IN CHILDREN

Ibrahim ALSHAYGY, Fawzi ALJASSIR, Mohamed Medhat ZAMZAM

Background: The diagnosis and treatment of fracture lateral humeral condyle in children remain controversial. The main objective of the current study is to define fractures prone to later displacement so they could have early surgical treatment. Methods: In a retrospective study, the authors reviewed 106 children who were treated surgically for fracture lateral humeral condyle. The study involved 74 boys (69.8%) and 32 girls with age range from 3-10 years. The authors blindly reassessed the radiographs of all patients. Results: Initial assessment diagnosed 27 minimally displaced fractures (25.5%), and 79 displaced fractures (74.5%). All minimally displaced fractures showed subsequent displacement and were treated by delayed surgery. The average follow-up was 50 months. Patients' ages, initial assessment, and time lag to surgery were significantly associated with the final outcome by crude analysis (p=0.041, p<0.001, and p<0.001 respectively). Binary logistic regression model revealed that 6-8 years old children with minimally displaced fracture and had immediate surgery, have better chance for satisfactory results. The ROC curve indicates that fracture displacement greater than 1.6 mm increase the likelihood of unsatisfactory results if surgery is delayed. Conclusion: The authors concluded that careful initial assessment is crucial for early and adequate treatment of lateral humeral condyle fractures. The routine use of 2 mm displacement for treatment decision should be changed to avoid delayed surgery. Level of Evidence: Level II retrospective study.

### Abstract no.: 39125 A PROSPECTIVE STUDY TO ASSESS WHETHER COXA VARA OCCURS IN PATIENTS TREATED WITH VARUS DEROTATION OSTEOTOMY COMPARED WITH PATIENTS TREATED NON-OPERATIVELY WITH PERTHES' DISEASE Jefferson GEORGE

Introduction: Persistent coxa vara in Perthes' may lead to limp and shortening. Little literature exists regarding frequency and severity of coxa vara in children who have reached skeletal maturity. The aim of the study is to compare the neck shaft angle(NSA) and frequency of coxa vara in children with Perthes' disease treated with and without varus derotation osteotomy(VDO). Methods: 110 consecutive children (80 boys, 30 girls) with unilateral Perthes' disease treated during active stage of disease were prospectively followed up till skeletal maturity. 65 patients were operated with VDO and 45 were treated nonoperatively. Catterall and Herring classification were assessed. NSA was measured on the normal and affected side on serial radiographs. Outcome was assessed using Stulberg classification. When NSA of affected hip at skeletal maturity was less than fifth percentile of normal NSA, it was considered incomplete remodeling (coxa vara) and when more than fifth percentile, was considered complete remodeling. The independent "t" test and Chi square test compared the frequency distribution between groups. Results: The mean age of onset, skeletal maturity between both groups was same. The mean preop NSA between operated and non-operated groups was 135.93 and 135.67 and postop NSA at skeletal maturity were 127.23 and 125.78 respectively. Coxa vara occurred in 32 patients and complete remodeling in 78 patients. There was negative correlation between Stulberg and age of onset of disease. Conclusion: Frequency and severity of coxa vara are similar in children with Perthes' disease at skeletal maturity with/without varus osteotomy.

### Abstract no.: 41431 EFFECT OF EARLY SCREENING ON THE RATE OF OPERATION FOR DEVELOPMENTAL HIP DYSPLASIA IN TIANJIN Shuzhen DENG, Jianping YANG

Subjective: To evaluate the effect of early screening for developmental hip dysplasia (DDH) on the rate of operation in Tianjin.Methods: The DDH screening program in Tianjin began in 2009 January. We calculated the number of the cases undergoing operation from 2005 to 2008 and from 2009 to 2012 respectively. The patients without early screening were excluded .We compared the ratio of operation between the two groups. The date was collected from Tianjin children hospital, Beijing jishuitan hospital and Tianjin women and children health center and our hospital. Results: From 2005 to 2008, the number of patients with operation were respectively 23, 29, 20, 12, the ratio were 0.28 ‰, 0.33 ‰, 0.22 ‰, 0.13 ‰, 24 ‰. There were 10 cases undergoing operation in the newborns in 2009, but 6 cases were without early screening, 8 cases in 2010 and 3 cases without early screening, 6 cases in 2011 and 2 cases without screening, there are 5 cases in 2012 and failure with conservative treatment all. The ratio of operation is 0.059 ‰ in 2009, 0.056 ‰ in 2010, 0.043 ‰ in 2011, 0.046 ‰ in 2012 and 0.050 ‰ in all. There is statistical differences between the two groups(P = 0.000, chi-square).Conclusion: The early screening for DDH could achieve early diagnosis and early treatment, then to reduce the ratio of operation. The model of early screening for DDH in Tianjin is effective, reliable and suitable for national conditions, is worthy of further promotion.

### Abstract no.: 40051 CLINICAL STUDIES OF ARTHROSCOPIC TREATMENT FOR DDH IN INFANTS AFTER THE FAILURE OF CLOSED REDUCTION Liang ZHAO, Yijun WANG

Introduction To evaluate the effect of arthroscopic treatment for developmental dysplasia of the Hip(DDH)in infants after the failure of first closed reduction. Methods From January of 2010 to January of 2012, 13 infants(13 hips) aged from 11 months to 21 months (average 15.5 months;M=2,F=11;8 left and 3 right hips) received closed reduction after arthroscopic debridement of the acetabulum.Before treatment,3 infants were placed in Pavlik harness and 10 infants suffered hip dislocation again after the adductor tenotomy .MRI examinations performed on all infants before treatment showed soft tissues filled with acetabulum .At arthroscopic surgery ,ligament teres were excised, fibrosis , fat tissues on the acetabular bottom were removed, the transverse ligament of acetabulum was released and acetabular labrum was incised .Hips were given an external postoperative fixation with plaster cast for 3 months at least , and maintained reduction with external fixation with frog gypsum .Results All 13 cases obtained successful reduction without aseptic necrosis of femoral head during the 2-3 years follow-up (average 32.5 months). Traditional treatment such as open reduction or osteotomies femoral surgery for infants with DDH failed to obtain reduction for the first closed reduction or repeated closed reduction doesn't work until they grow older. If we master the indications strictly, the operation under arthroscope has the advantages of less injury, less complications, more rapid recovery, higher success rate, and satisfactory curative effect.

### Abstract no.: 39388 RISK FACTORS FOR LOWER RATE OF ANGULAR CORRECTION: A RETROSPECTIVE STUDY OF TEMPORARY HEMIEPIPHYSIODESIS FOR THE MANAGEMENT OF GENU VALGUM AND/OR VARUS Wu ZHENKAI, Zhao LI

Purpose The rate of angular correction(ROAC) is very unpredictable and may be affected by various factors in the treatment of genu valgum and varus with temporary hemiepiphysiodesis. The purpose of this study was to assess the ROAC in the cases from our institution and to identify the risk factors associated with lower rate of angular correction. Methods We retrospectively reviewed the records of 68 patients undergoing temporary hemiepiphysiodesis with figure eight plate for the management of genu valgum and varus. Based on the data from these patients, the annual increment of physeal gorwth was calculated and compared with those from Anderson chart. The associations between patient characteristics and rate of angular correction were evaluated with use of univariate logistic regression. Results The mean rate of femoral angular correction was 10.29 degree/year while the mean rate of tibial angular correction was 7.92 degree/year. In a univariate logistic regression analysis, the variables associated with a higher risk of lower rate of angular correction included a non idiopathic genu coronal deformity (odds ratio = 13.58, p = 0.000) and a body weight at or above the 95th percentile for children (odds ratio = 2.69, p = 0.020). Conclusion It is demonstrated that the weight of obesity and the condition of non idiopathic genu coronal deformity are the risk factors for lower rate of angular correction. It is still uncertain whether severity of deformity, race and operative procedure make any substantial effect on the rate of correction.

### Abstract no.: 41107 TEN YEAR EXPERIENCE OF LONG BONE FRACTURE IN PEDIATRICS BY ELASTIC STABLE INTRAMEDULLARY NAILS (ESIN) Waleed AMRHASSAEN, Mohamed Slah ABDELAAL

PEDATRIC FRATURE FEMUR&TIBIA IS one of the commonest injuries involving the lower extremities in children and adolescents. Objectives: the objectives of this study were to investigate the safety and efficacy of elastic stable intramedullary nailing in treatment of pediatric LONG BONE fractures Methods: Methods a retrospective study of 260 child with femoral shaft fracture AND235 CHILD WITH TIBIAL SHAFT FRACTURE that had been admitted to EL HELAL Hospital between Mar 2003 and Jun 2013, all patients had diaphyseal fracture. The average age of the patients in this series was 11.3 years (range 5-15 yearsIN FEMUR GROUP&11.6 IN TIBIAL GROUP). Patient charts and radiographs were prospectively reviewed. Outcomes were classified as excellent, satisfactory, or poor according to the Flynn's classification for flexible nail fixation as functionally assessment and associated with radiologically assessment using Radiographic assessment of union in 4th week and 12th week. Results: All patients achieved full weight bearing at a mean of 9.8weeks (range 8-17weeks). The results were excellent in82% of patients and satisfactory in (15%) of patients .3% of patient show 5-10 °degree of angular malalignment, other 3 cases were complicated with nail end protrusion and limb length discrepancy = 2 centimeter. No patient was with poor result Conclusions: Based on these results, elastic stable intramedullary nailing with titanium elastic nails is an effective surgical technique which allows rapid healing of LONG BONE fractures with an excellent long term follow up results.

### Abstract no.: 39066 DISPLACED TIBIAL TUBEROSITY FRACTURES IN ADOLESCENTS: KIRSCHNER WIRES AS AN ALTERNATIVE TO CANCELLOUS SCREWS Stacy Wei Ling NG, Kevin Boon Leong LIM

While the mainstay of treatment for displaced tibial tuberosity fractures in adolescents is surgical screw fixation, we wish to evaluate if Kirschner wires (K-wires) are an efficacious alternative. A retrospective review of 24 patients with unilateral, displaced, surgically treated tibial tuberosity fractures at our institution from 2003-2013 was performed. 66.7% were received cancellous screws while 33.3% received K-wires (buried). Mean age of the cohort was 14.2 ± 1.0 years and all were male. Tegner-Lysholm scoring was performed at the final clinic visit. The fractures in all 24 patients healed uneventfully. In the early postoperative period, 4 patients in the screw fixation group experienced surgical site pain, while 1 developed blisters at the surgical site. These were not observed in the K-wire group. Median Tegner-Lysholm score for the screw and K-wire fixation groups were 100 (80-100) and 100 (91-100) respectively. There was no difference between the 2 groups with regards to clinical outcome, mean operating time, duration of immobilization, time to functional return, and final range of motion of the injured knee. Both cancellous screws and K-wires are effective in the surgical stabilization of displaced tibial tuberosity fractures in adolescents, with both groups demonstrating excellent clinical outcomes. In this small series, screw fixation appears to result in a relatively high incidence of surgical site pain, likely from local implant irritation. K-wires can serve as an alternative to cancellous screws, particularly in resource-limited centres, or when junior surgeons want to minimise iatrogenic injury to the physis from multiple, suboptimal drill passes.

### Abstract no.: 40362 A PROSPECTIVE STUDY OF COMPREHENSIVE TREATMENT OF 1373 INFANTS WITH CONGENITAL MUSCULAR TORTICOLLIS Shengping TANG, Zhang-Shuai ZHAO, Gui-Bing FU, Ke SUN, Jiang-Long

XU, Wei SHI, Shi-Zhe LIU

Objective: The main objective of this prospective study was to analyze and evaluate the comprehensive treatment outcomes of infants with congenital muscular torticollis. Methods: Subjects were consisted of 1373 patients with first diagnosed congenital muscular torticollis and all under one year old. All patients were treated by standardized treatment programs including manual stretching, lump massage and short-wave ultrasonic physiotherapy in torticollis outpatient of Shenzhen Children's Hospital. In addition, localized glucocorticoid injection to sternocleidomastoid was applied to assist the treatment. Curative efficacy was assessed after the treatment all patients were followed-up for at least one year. Results: The curative ratio of comprehensive treatment was 90.97%, with only 124(9.03%) cases underwent surgery. Statistical analysis showed that: (1) There were significant relevance between curative efficacy and different factors, including lump, give-way, first diagnosis age (P < 0.001), rotation deficit and gender (all P < 0.05); (2) Patients sudden giving-way or snapping of the sternomastoid was significantly associated with first diagnosis age and dystocia (all P <0.05); (3) Patients treated by glucocorticoid injection were significantly associated with first diagnosis age, rotation deficit, male, left side affected, malposition of fetus and eutocia (all P < 0.05). Conclusion: Through the comprehensive treatment of CMT prospective study, the analysis shows that the comprehensive treatment, combined with manual stretching, lump massage, ultrasonic physiotherapy and localized glucocorticoid injection (if necessary), was a safe and effective method for infants with congenital muscular torticollis. Key words: Infant; congenital muscular torticollis; treatment; prospective study

### Abstract no.: 41094 OPEN VS ARTHROSCOPIC ANTERIOR RELEASE FOR INTERNAL SHOULDER CONTRACTURE IN OBSTETRIC BRACHIAL PLEXUS PALSY Amr ALY, Moustafa EL-ABD, Moustafa ELSHERBINI, EI-Beshry SHADY, Ghali NABIL

Background: Internal rotation contracture is the most common deformity in obstetric brachial plexus palsy (OBPP). The goals of treatment are improvement of range of motion, stable concentric glenohumeral articulation, and balanced muscles, which could provide an opportunity for joint remodelling. Reduction of the glenohumeral joint needs considerable capsular and subscapularis muscle release with or without tendon transfers. Contracture release can be either performed through open or arthroscopic techniques. Purpose: We present a retrospective study comparing open versus arthroscopic release for shoulder contracture treatment in OBPP. Methods: Twenty-one patients who presented with internal shoulder contracture secondary to OBPP before the age of 6 years have been included in our study. Eleven patients with mean age 4 years were treated by open release and tendon transfers while 10 patients with mean age 3 years were treated through arthroscopic release with or without tendon transfers. Results: All patients have completed a minimum of one year clinical follow-up. A significant increase in the active external rotation was observed in the two groups. But regarding the active internal rotation, marked loss was noted in nearly 35% of patients treated by open release while no significant loss was noted in patients treated through arthroscopic release. Conclusions: Arthroscopic release for internal shoulder contracture allows for selective release for the subscapularis muscle and the anterior capsule in contrast to the open release that requires release of multiple superficial structures as well, which could potentially led to functionally significant external rotation contractures.

# Abstract no.: 39209 DIFFERENTIATED SURGICAL TACTICS OF SURGERY OF A CAPITELLUM PSEUDOARTHROSIS OF HUMERUS WITH CUBITUS VALGUS DEFORMATION IN CHILDREN

Khujanazarov ILKHOM, Khodjanov ISKANDAR, Khakimov SHERALI

Actually Damages of bone structures of an elbow joint in children, according to various authors are occurred between 16 and 40% among all of skeleton fractures and makes up 50-80% from all intraarticulate damages of the upper extremity. It was required to develop of a differentiated surgical tactics for surgery of capitellum pseudoarthrosis of humerus with cubitus valgus in child aged patients, that, the cases associated with the nonunion of capitellum or the extension necrosis process, causing to be hypermobility of elbow joint and to pull of ulnar nerve. Object of research was the capitellum pseudoarthrosis with or without cubitus valgus, which is diagnosed in 59 patients, whom three types of surgical correction are spent depending on weight of deformation, prescription of the got trauma and age of the patients. The capitellum pseudoarthrosis liquidation or necrosis field resection are made in 21 (35,6%) patients, for 8 (13,6%) patient are admitted the extraarticular supracondylar osteotomy of humerus with ulnar nerve transposition and stabilization by Ilizarov's apparatus and other 30 (50,8 %) patients was corrected by the developing own clinic technique - «Capitellum pseudoarthorosis resection of the humerus, supracondylar osteotomy of humerus and osteosynthesis by Ilizarov's apparatus». Conclusion We believe it is reasonable to use our repair techniques when dealing with nonunion of the lateral humeral condyle with cubitus valgus. These differential techniques help to shape the distal part of humerus, thus, restoring the function of the elbow joint.

### Abstract no.: 40970 DISPLACED RADIAL NECK FRACTURES IN CHILDREN: ASSOCIATION OF THE METAIZEAU AND BOHLER SURGICAL TECHNIQUES Lucas BOECHAT, Gilberto BRANDAO, Claudio BELING SOARES, Luiz Eduardo MOREIRA TEIXEIRA

Introduction: Displaced radial neck fractures are relatively rare injuries in children, but may lead to serious complications, such as deformities and loss of motion. This study evaluates the results of the surgical treatment using an association of the Böhler reduction technique and the intramedullary fixation described by Métaizeau. Methods: 31 children diagnosed with acute radial neck fractures classified as O'Brien type III were surgically treated by the association of Böhler and Métaizeau techniques between 1998 and 2014. The mean follow-up period was 51 ± 3.3 months. Results: Consolidation was achieved in all fractures at 5 weeks postoperatively. None of the patients presented perioperative complications or late infection. Only 1 child developed pain and loss of motion, requiring surgical revision. According to Tibone and Stolz classification, 21 children (67.7%) healed with excellent results, 7 children (22.6%) with good results, 2 children (6.5%) with fair, and 1 (3.2%) with poor results. Conclusions: This association of techniques presents an excellent option for O'Brien type III fractures of the radial neck. It is easily executed, does not require elbow arthrotomy, and shows few complications. Level of evidence: Therapeutic study, level IV (case series).

### Abstract no.: 39517 RAPID PROTOTYPING TECHNOLOGY FOR SURGERIES OF THE PEDIATRIC CHRONIC ANTERIOR MONTEGGIA LESIONS Wei TAN

Introduction: To assess the usefulness of rapid prototyping technology for surgeries of the pediatric chronic anterior monteggia lesions. Methods: 8 patients of chronic anterior monteggia lesions were examined by lamellar CT to gain two-dimensional data of bilateral forearms, Three-dimensional reconstructions of anatomical models were accomplished by computer aided technology. The radioulna models were manufactrured by rapid prototyping. Which operation project were formulated, preoperative sham operated were enforced and superise the operation of the chronic anterior monteggia lesions(in addition to the asymptomatic contralateral extremity for comparison, Simulating ulnar osteotomy, and fixing the osteotomy with the hinged external fixator, The position of the hinge).Results: Results indicated that RP models is useful for preoperative planning, reference during surgery, communication with patients, and for increasing the safety of the procedure. Preoperative sham operation shortened the time of operation. Conclusions: RP models could provide significant benefits for complex surgeries of the chronic anterior monteggia lesions in the areas of preoperative planning, intrasurgical navigation, and communication with patients. A reduction in operating time may also be expected for cases of chronic anterior monteggia lesions.

### Abstract no.: 40322 A STUDY OF 50 CASES OF MANAGEMENT OF NON-PHYSEAL FOREARM FRACTURE IN CHILDREN UPTO THE AGE OF 12 YEARS Vishal MANDLEWALA, Prafulla HERODE

Introduction: Injuries to the shaft of the radius-ulna are the most common reasons for children to receive orthopaedic care. Diaphyseal fracture of both bones of forearm in mature bone are now treated by open reduction and internal fixation. But it is not true for immature bones. Diaphyseal fractures of the forearm in children are accounting for 6%-10%. Ninety percentages of them are treated conservatively i.e. closed reduction and plaster casting. The remaining of 10% are irreducible and/or unstable fractures, requiring different treatment methods. Aim and objectives: Identify the factors such as angulation at fracture site, inclination of epiphyseal plate of radius with the proximal fragments, type of fractures etc. with regards to supination & pronation in the patients treated by closed and open methods. Materials and methods: This is a prospective study of management of 50 patients having non-physeal fractures of radius-ulna in children upto the age of 12 years. All the patients were treated D.Y.Patil medical college and research centre, pune from 20/05/2011 to 15/11/2013. Pt were treated by closed reduction. Pt with unacceptable alignment were randomly treated with open reduction internal fixation by Intra-medullary nails i.e. a) Rush nail b) K-wire and Plates i.e. a) 3.5mm DCP b) Reconstruction plate c) 1/3rd tubular plate. Result: At final follow-up, for closed methods, 90% patients had excellent results & 6.7% patients had good results. For operative method, 88.2% patients for IM nailing & 66.6% patients for plating had excellent results. Conclusion: Close methods is better than operative methods.

# Abstract no.: 40124 EFFECT OF RADIUS AND ULNA OSTEOTOMY COMBINING WITH LENGTHENING ULNAR BY UNILATERAL EXTERNAL FIXTOR ON TREATMENT OF FOREARM MALFORMATION CAUSED BY HEREDITARY MULTIPLE OSTEOCHONDROMATOSIS

Shangwu DAI, Haomiao LI, Zixiong LEI, Ming LU, Dadi JIN

Purpose: To explore the efficacy of radius and ulna osteotomy combining with lengthening ulnar by unilateral external fixtor on treatment of forearm malformation caused by Multiple Hereditary osteochondromatosis (MHO). Materials and Methods: We retrospectively re¬viewed the cases of 8 patients 12 forearms who had deformities of the forearm with multiple hereditary osteochondromatosis (aged 7 to 15, mean age 10.2 years). According to Kazuhiko classification, type I Wasa2 4, III was 6. Radiographic measurements

included radial articular angle, radial length, ulnar length, and ulnar bow , flexion/extension, pronation/supination arch of the forearm.The operations included radius and ulna osteotomy, lengthening ulnar by unilateral external fixtor postoperatively, radius internal fixtion,radial head reduction or resection,excision of the osteochondromas. After operation, gradual ulnar distraction was initiated at a rate of 1 mm 3 times per day 7 days later. Results: Good clinical and radiological results were obtained after a mean follow-up of 5 to 28 months, the average was 14.8 months. At the most recent follow-up, the bone heald, painless , radial bowing, ulnar shortening, carpal slip, and the flexion/extension, pronation/supination arch of the forearm had improved. Conclusion: The treatment for the forearm malformation caused by MHO using radius and ulna osteotomy combining with lengthening ulnar by unilateral external fixtor was effective.The functions of the forearm improved obviously and all patients were satisfied with the final results.

## Abstract no.: 40659 CAUSES ANALYSIS AND MANAGEMENT OF POSTOPERATIVE FEMORAL FRACTURES IN CHILDREN WITH DDH Shi QIANG, Li XU

Introduction: Proximal femoral corrective osteotomy produces excellent clinical results for developmental dysplasia of hip and locking compression plates are being increasingly utilized in fixation of osteotomies in the pediatric population. However, plate insertion or removal may pose a risk of femoral fractures or refractures. The goal of this study was to analyze postoperative femoral fractures associated with LCPs and identify possible contributing factors in children with DDH. Methods: From May 2008 to January 2012, 5 cases from 86 DDH patients with postoperative femoral fractures in our department were retrospectively reviewed. There were 1 males and 4 females with the age range from 2 to 6 years (mean 3 years and 5 months). In cases of femoral fractures, the timing, circumstances, fracture location, and refixation method were recorded. Three patients sustained refractures after plate removal, all at the original fracture or regenerate site: 1 after a fall and 2 spontaneously. The mean follow-up time was 10.6 months (2-27 months). There seems to be an increase in risk of refracture immediately after plate removal. Caution should be taken in the first weeks after plate removal. Results: Many factors such as injuries from the surgery, prolonged immobilization or the internal fixation devices can result in postoperative femoral fractures in children with DDH. In order to reduce or prevent occurrence of femoral fractures, measures including rehabilitation exercises, drugs, and standard operational principle should be directed properly.

### Abstract no.: 41166 CORRECTION OF POPLITEAL PTERYGIUM SYNDROME BY ILIZAROV EXTERNAL FIXATOR Md Mofakhkharul BARI

Introduction: Popliteal ptervgium syndrome is rare congenital anomaly characterized by a web like skin formation in the Popliteal area leading to fixed flexion contracture. This may be due to Dermatogenic, Desmogenic, Myogenic, Osteogenic, Neurogenic, Primary treatment goals are improvement in functional extension, hygiene independence and cosmesis. Reported treatment options are anterior femoral stapling, supracondylar extension osteotomy, feumoral shortening and Ilizarov external fixator. Materials & Method: We report 8 cases with severe webbing causing FFD of both knee joints (ages ranged from 3-14 years). One 14 years old boy presented to us with severe right sided webbing causing FFD of knee with 8cm shortening (3cm femur, 5cm tibia fibula), his daily activities were limited a movement was only by crawling or jumping. He used to walk upright. We corrected his deformity using gradual soft tissue distraction with Ilizarov fixator for 120 days. After correction of the deformity, we lengthened his tibia fibula; immediately after removal of Ilizarov fixator he was in plaster for four weeks. Conclusion: Correcting Popliteal pterygium syndrome with Ilizarov method is good choice in managing this difficult problem. ILIZAROV means: I = You must have intelligent. L = You can lengthen limb whatever you like. I = You can control infection. Z = You can correct Zigzag (deformity). A = You will get angiogenesis with adaptation. R = This technique is of course reliable with a lot of , O = Opportunities, having, V = Versatile effect.

### Abstract no.: 41229 MINIMALLY INVASIVE APPROACH TO MANAGEMENT OF CONGENITAL PSUEDOARTHOSIS OF TIBIA. Sandeep SHRIVASTAVA

The biological defect and deformity, makes Congenital pseudoarthrosis of tibia (CPT) as one of the most difficult to treat orthopedic disorder .The repeated tendency to deform & re-fracture is another challenge The treatment mostly consists of wide resection of pathological part of bone and reconstruction with bone grafts (including vascularized), or bone transport/ lengthening . Common problem associated are small limbs , precarious soft tissue, lack of availability for autologous grafts, resultant shortening, late re-fracture and recurrence of deformity. We discuss in this Paper an integrated refined 3 R- approach which includes minimal invasive "Resection" with preservation of local biology & vascularity, "Reconstruction" : a. With stabilization with intramedullary implants, a; b. autologus bone graft engineered in-situ from the pseudoarthosis part of bone & preserved with local vascularity additionally reinforced with infiltration of bone marrow aspirate / plasma rich platelets; and c. application of Ilizarov external fixator to overcome shortening and control the deformity, utilizing the principles of distraction histogenisis ,hence promoting increased blood supply to the local bone. And "Rehabilitation" till normalcy, including protection with weight bearing knee -ankle Orthosis, occupational and psychological support. We analyze 7 such cases with detail observations, results including complications and reasons for failures. It is concluded that for an effective solution a holistic refined approach such as 3R (resection, reconstruction, rehabilitation) aimed with minimal invasive ness and towards preservation of every little thing, resolves CPT towards favorable & predictable outcome.

### Abstract no.: 40245 CHILDREN CONGENITAL CLUBFOOT MEDICAL TREATMENT ADVANTAGES BY METHOD OF ALIMKHANOVA R.S. Roza ALIMKHANOVA

Absence of adequate methods for congenital clubfoot medical treatment is an actual problem. With the aim of medical treatment effectiveness improvement the traction method is developed and implemented. Comparative evaluation of existing methods gave an opportunity to determine traction method advantages. Device advantages are simple design, multifunctional performance, and availability, expressed in economical and curative effect. Method developed by me (since 1981) has an age criteria for device application: till 3 month the device is used as a cuff on shank, underfeet plate, for patients elder than 3 month the device in the form of traction belts. My research belongs to first fundamental developments, which radically changes views on feet deformation treatment principles. I consider pathology, as a «biological unified system», with application of biological, mutual feed-back of limb altogether: « thigh - shank -foot». The clinical demonstration of clubfoot proves pathology mutual relation, such demonstrations are shank bones torsion in knee joint. The basis of traction method as per Alimkhanova is the principle of muscular imbalance elimination. Medical treatment performed in ambulatory conditions by parents. Doctor examination was performed once in a month. Trophic disturbances are absent. Conclusions: 1. Developed conception of progressive traction correction is an innovative basis for methodological procedure in clubfoot medical treatment. 2. Traction medical treatment is performed ambulatory, special qualification is not required, the cost is reduced, can be applied in any habitation region.

### Abstract no.: 41668 COMPARISON OF TWO CAST METHODS POST TENOTOMY IN PONSETI CLUBFOOT MANAGEMENT.

Olayinka Oladiran ADEGBEHINGBE, Joseph Olorunsogo MEJABI, Oluwadare ESAN, Hakeem David BADMUS, Olalekan Akeem ANIPOLE, Lawrence Magbagbeola OGINNI

Introduction: Variation in cast application post tenotomy has not been evaluated in Ponseti clubfoot management (PCFM). Prospectively in a university teaching hospital setting, we compared early recurrence in above knee cast (AKC) and below knee cast (BKC) after tenotomy in PCFM.Methods: The setting was a university teaching hospital. The ethical research committee approved study protocol and informed consent of patients' parent was obtained. The selection criteria include patients' diagnosed congenital idiopathic clubfoot, age < 2years, no history of previous treatment and tenotomy was indicated. An evaluation of patient was assessed by orthopaedic surgeons trained on Ponseti method and has above 5years experience. Data analysis was performed on the age, sex, Pirani scores at onset of treatment, at tenotomy, and after initial full correction using the SPSS version 17. Forty patients with 67 clubfeet were randomized into 32AKC and 35BKC groups after tenotomy using Ponseti protocol. All had foot abduction brace after post tenotomy cast. The main outcome measures includes relapse, recurrence and treatment cost. Results: The age.sex.pre-and post-treatment mean Pirani scores were not significantly different between AKC and BKC. The mean Pirani score at twelve months post-tenotomy (p=0.038), mean number of casting (AKC-6.4 vs BKC-4.7,p=0.003) and mean treatment cost (p=0.002) differ between the two groups. There was no significant relapse and recurrence in both groups. Conclusions: It appeared midterm results of below knee cast after tenotomy were comparable to the classical Ponseti protocol of above knee casting for clubfoot.

### Abstract no.: 40239 THIRTY YEARS RESULTS OF CERAMIC ON CERAMIC COUPLE IN TOTAL HIP Laurent SEDEL

Introduction In the year 1977 a new generation of total hip prosthesis with a ceramic on ceramic couple was implanted. The purpose of this study was to identify specific problems after 30 years. Methods The study design did include all patients less than 50 years of age operated consecutively between 1977 and 1986. Eighty six hips in 75 patients, 34 females and 41 men. Mean age 43 (18 to 50). Sixty hips were performed primaries while 20 consisted in revision procedure. Results Thirteen hips in 12 patients were lost to follow-up. Six deceased from one to 28 years after index procedure. A group of 22 hips in 19 patients that were reached recently (some are still followed some were found by Google and reached by phone), and had not been revised, except one for a femoral fracture at 21 years. The last group consisted in 49 hips in 48 patients who were followed for periods from 2 to 20 years and could not be reached again. Four of these were revised for socket loosening at period from 12 to 18 years. No reoperation for stem loosening. The group of 22 patients effectively followed more than 20 years, 10 more than 30 years, presented no limitation on the operated hip and an absence of osteolytic lesions. Discussion conclusion. Ceramic on ceramic with a proper design could provide permanent answer to severe hip problems.

## Abstract no.: 39193 CERAMIC-ON-CERAMIC BEARING DECREASES DISLOCATION AND PREVENTS MUSCLE FATTY DEGENERATION BY PRESERVING MUSCLE PROGENITORS

Philippe HERNIGOU, Alexandre POIGNARD, Charles Henri FLOUZAT LACHANIETTE

Little is known about muscular changes after total hip replacement. We hypothesized that muscle atrophy would differ with different bearing surfaces and could be related to a decrease of myogenic stem cells number. We retrospectively reviewed 240 patients (240 hips) who had THA revision and the contralateral hip normal. All patients had received the same implants for the primary arthroplasty (32 mm head) except for bearing surfaces (80 hips with ceramic on ceramic, 160 with polyethylene). Before revision osteolysis, muscle atrophy and fatty degeneration were were evaluated on CT scan and compared with the contralateral side. Bone muscle progenitors were evaluated by bone marrow mesenchylmal stem cells and and satellite cells for muscle. At revision, all the hips received the same implants with the same head diameter (32 mm) and a standard liner. For the 80 hips with ceramic on ceramic no osteolysis was detected before revision, there was no muscle fatty degeneration of the gluteus muscles (GM) on CT scan or histology, and only one dislocation was observed during followup (minimum 10 years). For the 160 hips with PE liners, osteolytic lesions on acetabulum and femur were observed in 100% of the hips; the fatty muscle degeneration observed on CT scan or on histology increased with the amount of osteolysis (p=0.01); In patients with PE hip a significant decrease of bone marrow mesenchymal stem cells and muscle satellite cells also was observed. Osteolysis and fatty atrophy were associated to a decrease of MSCs in bone and in muscleThe rate of dislocation was 18% at ten years. Ceramic surfaces decreased the risk of dislocation after revision as compared with polyethylene bearing surfaces. The reasons are probably the difference observed on the muscles (fat atrophy or not) with the two bearing surfaces.

#### Abstract no.: 40810

# A PROSPECTIVE STUDY OF CERAMIC-ON-METAL BEARINGS IN TOTAL HIP ARTHROPLASTY AT FOUR YEARS: CLINICAL RESULTS, METAL ION LEVELS, INFLAMMATORY FACTOR LEVELS AND LIVER-KIDNEY FUNCTION.

Yi ZENG, Bin SHEN

Introduction To prospectively investigate the clinical results, serum metal ion levels, inflammatory factor levels and liver-kidney function in a cohort of patients received total hip arthroplasty (THA) with a ceramic-on-metal (CoM) bearings. Methods The cohort comprised 82 THAs in 71 patients (41 men and 30 women) with a mean age of 54 years (22 to 77). The mean follow-up was four years. All patients had pre- and post-operative clinical assessment using Harris hip score (HHS), Short-Form 12 (SF-12), Western Ontario and McMaster Universities osteoarthritis index (WOMAC) and radiographic analysis. The serum metal ion levels of cobalt, chromium, molybdenum and titanium were measured usina high-resolution inductively coupled plasma-mass spectrometry (ICP-MS). Inflammatory factors included C-reaction protein (CRP), erythrocyte sedimentation (ESR) and interleukin-6 (IL-6) and liver-kidney function included alanine aminotransferase (ALT), aspartate aminotransferase (AST), total bilirubin (TBIL), creatinine (CREA) and blood urea nitrogen (BUN) were also measured. Results All clinical assessment showed a statistically significant improvement. Although the inflammatory factor levels and liver-kidney function were within normal ranges, the serum levels of metal ion were significantly elevated compared with normal values: cobalt 2.8 ug/L, chromium 2.2 ug/L, molybdenum 0.9 ug/L, titanium 2.1 ug/L. Spearman's correlation analysis showed there was correlation between cobalt, chromium and titanium metal ion levels and BMI index. Conclusions Our study concluded that the use of a CoM THA is effective clinically and metal ion levels elevated significantly at midterm follow-up. Whether the elevated metal ion levels may reduce adverse reaction is unkown and long term follow-up are need.

### Abstract no.: 39142 METAL IONS IN WELL FUNCTIONING CERAMIC ON CERAMIC THR. Jan SOMERS

In THR with modular necks, corrosion of the neck taper junction can lead to the release of toxic metal ions. The objective was to measure cobalt and chrome in serum of active patients with a well-functioning THR with a modular neck. Patients were recruited from a cohort of 500 THR that are followed prospectively. In this consecutive series, there have been no revisions or adverse reactions to date. Inclusion criteria were patients with a hybrid THR with conventional diameter ceramic-on-ceramic bearing couple, used in conjunction with a modular titanium neck and a cobalt-chrome polished tapered stem, a UCLA-activity score of >6/10, without any other metallic implant. Average age at implantation of THR was 64 years. Twenty patients had a long titanium neck, and 8 had a short titanium neck. Average cup diameter was 52mm; none had screws inserted. Followup was 27 months (range 16-49 months). Average modified Charnley score was 17 (range 13-18). There were no differences in subgroups with short necks vs long necks in regard to age, follow-up, cup or stem size, Charnley score, UCLA-activity score or neck type distribution. Radiographic evaluation of all hips showed no signs of osteolysis or radiolucent lines and no abnormalities on plain X-ray. Cobalt in serum averaged 1.20 µg/l (range 0.8-2  $\mu$ g/l) in the short neck group and 1.26  $\mu$ g/l (range <0.5-2  $\mu$ g/l) in the long neck group. Overall average cobalt in serum was 1.21 µg/l. In none of the samples we could measure a quantifiable amount of chromium.

### Abstract no.: 40237 RESULTS OF COC HIP PROSTHESIS WITH CONTEMPORARY DESIGN Laurent SEDEL

Introduction: although ceramic on ceramic bearing in total hip has been documented since 40 years, few series concerned long term results with contemporary materials. Materials and methods Socket was a press fit titanium alloy shell with ceramic liner. Titanium alloy stems were covered with titanium oxide smooth and cemented. Cone was of 14/16 and ceramic head were of 32 mm in diameter. Two hundred and five consecutive THR in 206 patients were implanted from January 1990 to December 1992: 99 females, 107 males, mean age 58. Results All patients were followed annually and checked at the longest follow-up by an independent observer. Clinical evaluation radiological grading and Revision for any reasons and revision due to material were recorded. 43 died from unrelated reasons, 75 were followed and examined. 14 revisions were recorded: 6 aseptic loosening of the acetabular component, 2 component fractures, 2 revised for unknown reasons, 2 for recurrent dislocations,1 psoas impingement,1 infection. Survivorship depicted 88, 2 (82, 3-94, 5) at 20 years. No osteolysis on the socket side, 3 limited osteolysis on the femur. Discussion Observational, retrospective, lost to follow-up. But It is the first study on results of ceramic on ceramic with contemporary design.

### Abstract no.: 39401 STUDY OF FRACTURE NECK FEMUR TREATED WITH CEMENTED BIPOLAR PROSTHESIS VS AUSTIN MOORE PROSTHESIS IN ELDERLY Vishal MANDLEWALA, Prafulla HERODE, Abhijeet SHROFF

Introduction: Intracapsular femoral neck fractures are common in the elderly population. Replacement Arthroplasty is now the established modality of treatment in fracture of femoral neck in the elderly due to reasons like failure of internal fixation, high rate of nonunion and avascular necrosis, poor hold of implant in internal fixation due to osteoporosis, pulmonary complications and deep vein thrombosis. This is a prospective study and results are short term. Outcomes was analyzed by Harris Hip scoring system and radiographs taken during follow up. Aim and objectives : To analyze the results of Hemi replacement arthroplasty with Bipolar or Austin Moore Prosthesis using Harris Hip score and determined the ideal prosthesis for study group. To study the morbidity and mortality rate and associated complications with the procedure. Materials and methods :This prospective study of 60 patients of more than 60 years of age of both sexes with intracapsular neck femur fracture where randomly allocated to be treated by either bipolar or Austin moore hemiarthroplasty was done at Dr D.Y. Patil medical college and research centre . Result: Showed excellent results in 93.33% of bipolar group of patients as compared to 73.33% of Austin moore group of patients with p value 0.05 which is significant and thus bipolar group patients have significantly higher scores as compared to Austin moore group patients. Conclusion: Though the results of Bipolar prosthesis seems to be better compared to Austin moore prosthesis, no definite conclusion can be arrived at as this is a short term study.

### Abstract no.: 41287 BIPOLAR HEMIARTHROPLASTY FOR UNSTABLE INTERTROCHANTERIC FRACTURES: IDENTIFICATION OF NECK-OF-FEMUR FRACTURE PATTERN.

Mohamed ABO-ELSOUD, Elsayed KASSEM, Ihab NEGM, Ahmed ATYAT ALLAH, Fouad SADEK

Introduction: Treatment of elderly patients with unstable intertrochanteric fractures is still debatable. We think most of failures of internal fixation result from the failure to diagnose NOF fracture pattern. Patients: starting from 2009 CT scans were done for all trochanteric fracture patients to diagnose NOF pattern. 68 patients above the age of 60 years with NOF fracture pattern were included for cemented bipolar hemiarthroplasty (75% were females). All patients were done through posterior approach. We used cemented stem after restoration of the posteromedial fragment with K-wires and cercelage wires. Then the posterolateral fragment was fixed using ethibond sutures or tension band wiring according to its size. Immediate weight bearing was started and anticoagulation was continued for 35 days. Results: Patients were followed for a minimum of 12 months (mean 2.4 years). Mean operative time was 86 min (70-100). Average blood loss was 500 cc (400-800). Harris hip score increased gradually for the first 6 months (average 78) to reach a plateau thereafter with 88% of the patients returned to their prefracture activity levels. We had 4 cases with superficial wound infection and 1 case of deep infection. 2 cases had DVT, which resolved on medical treatment. We had 3 mortalities, 2 of them in the early postoperative period. All implants were stable and well functioning at the last follow-up. Conclusion: NOF pattern should be looked for in all elderly atients with trochanteric fractures. Cemented hemiarthroplasty in these cases allows for early rehabilitation and good hip function with low complication rate.

### Abstract no.: 39623 A MODULAR HEAD-NECK ADAPTER SYSTEM IN REVISION HIP ARTHROPLASTY Maximilian RUDERT, Andre STEINERT, Christian KONRADS, Maik

HOBERG

Introduction: Revision hip arthroplasty using a modular head-neck-adapter gives the possibility to keep a well fixed femoral component while revising the acetabular prosthesis or femoral head and adapt leg length and femoral offset to the individual anatomy intraoperatively. The success of this kind of surgery is still unclear due to the lack of medium to long-term follow-up. Therefore we analyzed the clinical and radiological outcome of the modular Merete BioBall<sup>©</sup> adapter system in revision hip surgery. Methods: In this retrospective study we included 95 consecutive patients with a Merete BioBall© adapter system implanted during revision hip arthroplasty. The average follow-up was 52.5 months. For clinical evaluation we used the Harris Hip Score. The health-related quality of life was determined with the visual analogue pain scale. Results: The surgeries were performed 97 months after prior hip arthroplasty on average. The main indications for the Merete BioBall© adapter system were dislocation, acetabular loosening, and wear. In the clinical outcome patients achieved 80.9 points in the Harris Hip Score. Mean level of persisting pain was 1.4 (VAS). The overall survival of the Merete BioBall<sup>©</sup> system in revision hip arthroplasty revealed 92.8 % survival at 8.17 years follow-up with a repeat revision rate of 5.2 %. Conclusions: Performing revision hip arthroplasty using the Merete BioBall© adapter system revealed good clinical outcome. There is a tendency for better results in comparison with the rare information given in the literature for head-neck adapters including a lower rate in rerevisions.

Date: 2015-09-18 Session: Free Papers Trauma Tibia Miscellaneous Time: 14:00 - 15:30 Room: Maoming Hall

## Abstract no.: 40881 THE NOVEL SURGICAL LAGLOC TECHNIQUE FOR LOCKING PLATE SYSTEMS. BIOMECHANICAL INVESTIGATION AND FIRST CLINICAL APPLICATIONS

Boyko GUEORGUIEV, Miguel TRIANA, Tobias HELFEN, Ivan ZDERIC, Yash AGARWAL, Fabian KRAUSE, Geoff RICHARDS

Treatment of obligue and spiral fractures still remains challenging. The aim of this study is to introduce and investigate a novel technique for fixation of such fractures, combining advantages of lag-screw, far-cortical-screw and locking-head-screw techniques. Oblique fracture was created in eighteen artificial diaphyseal bones, assigned to three groups for plating with 7-hole 4.5/5.0 LCP. Group I was plated with three locking screws in 1, 4 and 7 LCP holes. The central screw crossed fracture line. In Group II the central hole was occupied with lag screw perpendicular to fracture line. Group III was instrumented applying the new LagLoc technique. The 4 hole was predrilled perpendicularly to the plate, followed by overdrilling of the near cortex and insertion of locking screw. The 1 and 7 LCP holes were then occupied with two locking screws. Interfragmentary compression in the fracture gap was measured after fixation using pressure sensors. Compression force in Group I (167±25N) was significantly lower in comparison to Group II (431±21N) and Group III instrumented with the new LagLoc technique (379±59N), p≤0.005. The difference in compression between Group II and Group III was not significant. The clinical application of LagLoc technique is reproducible with good clinical outcomes, observed radiologically after 12-week follow-up with full weight bearing in several cases with AO/OTA 32-A2 and AO/OTA 41-B1 fractures. LagLoc combines biomechanical and clinical advantages of the lag-screw, far-cortical-screw and locking-head-screw plating techniques and can be recommended for fixation of oblique and spiral fractures.

Date: 2015-09-18 Session: Free Papers Trauma Tibia Miscellaneous Time: 14:00 - 15:30 Room: Maoming Hall

# Abstract no.: 40484 USE OF EXTERNAL FIXATION AS A MEANS OF DEFINITIVE MANAGEMENT IN ANKLE FRACTURES: A RETROSPECTIVE ANALYSIS OF OUTCOMES FROM A MAJOR TRAUMA CENTRE

Daniel THURSTON, Rajpal NANDRA, Katerina PELEKI, Pantelis TSANTANIS, Seyed Ashgar ALI, Paul FENTON

Introduction: External fixation (EF) of ankle fractures may be used as a means of definitive management in patients of advanced age, with more co-morbidities and poorer bone quality when open reduction & internal fixation (ORIF) may not be appropriate. We investigated the use of EF as a means of definitive fixation and the associated outcomes & complications. Method: Retrospective analysis of consecutive ankle fractures treated with EF in a single trauma centre over a four-year period. Data collected included basic demographics, fracture personality and radiographic & clinical outcomes in those treated definitively with EF, compared to those who progressed to have ORIF. Results: 66 patients received EF, this was definitive management in 15.2% (mean age 68.3, 3:7 M:F ratio). Average FRAX<sup>™</sup> score (10 year probability of major osteoporotic fracture) 14.6%. Mean time to EF 2.5 days. Main complications of definitive EF compared to those who progressed to ORIF included: non-union (20% v 12.5%, respectively) and pin-site infection (30% v 19.6%, respectively). No patients managed definitively in EF experienced deep tissue infection. Mean improvement in medial clear space of 0.35mm and talar tilt of 1.16° post-operatively. Average admission time for definitive EF was 45.7 days (24.5 days for those who progressed to ORIF). Mean duration of definitive EF treatment was 51.9 days. Conclusion: Use of external fixation as definitive management of ankle fracture is associated with increased complications & protracted hospital stay, but may have a role when further surgery for ORIF carries increased risks, due to advanced age or comorbidities.
#### Abstract no.: 41928 GAP NON UNION OF TIBIA WITH SCARRING: HUNGTINGTONS PROCEDURE Gauray SANJAY

Introduction: Gap non-unions of tibia with infection and extensive scarring of leg were managed by the procedure of tibialization (medialisation) of fibula in 22 patients. Majority of these patients had failures of other procedures to restore the continuity of tibia before this treatment. All the patients had intact or united fibula, preserved sensation in sole and adequate vascularity. Method material: The procedure was two staged in seven patients and single staged in rest of the cases where lateral part of the leg was relatively supple. In two staged procedure, the distal tibiofibular synostosis was performed six to eight weeks after the proximal procedure. The weight bearing (protected) was started in long leg cast after 6-8 weeks of the second stage. Protected weight bearing was continued till six to eight months. The fibula started showing signs of hypertrophy within first year of the procedure and it was more than double in four years period. Results: This procedure is safe simple and a salvage procedure for treating difficult infected non-unions of tibia. Radiographically, hypertrophy of the grafted fibula was observed in all the patients At final follow up, ten patients were very satisfied, seven satisfied, and five fairly satisfied. One patient had non-union at proximal synostotic site even after grafting and refixation. Conclusion: Huntington's procedure provides substantially better outcome than amputation and wearing a lifelong prosthesis. It can be concluded that in patients with large tibial bone defects combined with infection, fibular centralisation is an simple, cheap, useful and reliable method

#### Abstract no.: 41559 EARLY BI-COLUMN FIXATION FOR LOW VELOCITY SHATZKER V & VI TIBIAL CONDYLE FRACTURES: RESULTS AND CONCERNS IN A CASE SERIES R THUKRAL

Background: Schatzker V & VI tibial condyle fractures are associated with high morbidity. The risk of compartment syndrome is high and must be operated immediately or once the swelling subsides. We present our retrospective analysis of early ORIF of 23 such fractures in 22 patients. Methods: Between Nov 2010 and Oct 2013, 22 consecutive patients (mean age, 38 years) presenting to us with low velocity Schatzker type V (15) and VI (8) tibial condyle fractures were treated with bi-column fixation within 48 hours. Clinicoradiological parameters were regularly recorded & the findings analyzed. Results: All fractures united at a mean of 4.5months (range, 3-6months). We had no instance of compartment syndrome or wound dehiscence. 2 patients had superficial infection that settled with antibiotics. At an average 24 months follow-up, average range of motion was 100° of flexion, with average residual deformity of 3° valgus (range, 8° varus to 7° valgus). Conclusions: Low velocity injuries are at low risk of infection, wound dehiscence and residual deformity. Early ORIF (within 48 hours of the injury) may actually decompress the compartment; and can be accomplished with good results.

#### Abstract no.: 41368 LIGAMENTOTAXIS BY ILIZAROV FIXATOR FOR COMPLEX TIBIAL PLATEAU FRACTURES

Satya Ranjan PATRA, Dibya Singha DAS, Naresh PANIGRAHI

Introduction: Due to increased incidences of high energy traumatic events, complex and comminuted fractures of the tibial plateau are on the rise. They are often complicated with serious soft-tissue damage and neuro-vascular compromises, making them limb threatening injuries. Internal fixation methods are plagued with skin breakdown, wound complications and osteomyelitis. External fixations often prove inadequate and multiple surgeries may be needed subsequently. The Ilizarov ring fixator construct holds promise to minimize the problems and to provide a single stage solutions for these fractures. Methods: Four rings construct was used with one ring above the knee joint. Ligamentotaxis principle was applied across the knee joint for indirect reduction of the articular fragments. Between 2009 and 2014, this method was used in 29 patients of tibial plateau fractures belonging to Schatzker types IV to type VI. Mean duration of union was 8.3 weeks, mean duration of fixator removal was 16.2 weeks. Femoral ring removal and knee mobilization was done at a mean of 6.1 weeks. Results: The mean functional score was excellent in 14 patients, good in 9 patients and fair or poor in 6 patients. Most common complication was pin-tract infection and pain. There was no incidence of deep infection, wound dehiscence or osteomyelitis. Conclusion: Ligamentotaxis by Ilizarov technique is an excellent method to minimize the soft-tissue complications associated with high-energy tibial plateau fractures with promising functional results. However it has a long learning curve to gain expertise with the technique.

#### Abstract no.: 41570 ROLE OF COMPOSITE BONE GRAFT VERSUS AUTOGRAFT FOR BRIDGING BONE DEFECT Yuvraj HIRA

Introduction: Bone is second most transplanted tissue after blood. Composite bone grafting consists of combination of osteoconductive matrix and bio- active agents that provides osteoinductive and osteogenic properties. Thus the osteoconductive substrates becomes a delivery system for bioactive agents, requiring less chemotaxis and less migration of osteoblasts progenitor cells to graft site. Aims and objectives: To study the result of composite bone graft application in cases like Bone tumors, Non union, Spinal fusion, Pathological fractures and Periprosthetic fractures. Materials and method: In this prospective study, result of composite bone graft and autograft application was studied in 20 patients. Out of the total 20 patients in 10 patients composite bone grafting and in other 10 patient autograft from the patient was used. All the cases were treated in Dr. D. Y. Patil medical college and research centre, Pune during the period of July 2013-Nov 2014. The method used was the use of composite bone graft or autograft with or without internal or external fixation in cases of non union, malunion, pathological fractures, osteotomies, comminuted fractures, bone tumors, congenital cysts and arthrodesis. Results: 95% confidence interval for difference -6.185 to 2.025 t= -1.065 with 18 degree of freedom p= 0.301 there is no significant difference between the two procedure as per time required for joining of bone is concerned. Conclusion: Composite bone grafts play important role in the armamentarium for surgical treatment of pathological fractures, traumatic bone loss and in cases were fusion is required.

#### Abstract no.: 39171 OPERATIVE TREATMENT OF THE EXTRA-ARTICULAR FRACTURES OF THE SCAPULA

Asen BALTOV, Dian ENCHEV, Mihail RASHKOV, Tabet AL SADEK

Introduction: Scapular fractures are an increasingly common occurrence at large trauma centers. Objectives: To present our results with operative treatment of the extra-articular scapular fractures. Methods: For a period of 6 years, 25 patients with have been treated operatively and followed up. 20 fractures were result of direct high-energy trauma -8MVA, 7 motorcycle accidents and 5 falls from height. According to Goss classification, fracture spread was: 15 with translation, 9 with an angular dislocation and 1 with a bony "Goss ring" disruption). 15 (60%) patients were diagnosed with a floating shoulder -9(36%) clavicle fractures, 5(20%) proximal humerus fractures, 2 (8%) acromio-clavicular joint dislocation. 22(88%) patients were treated for chest trauma, there were 16 (64%) lung contusions, 14(56%) cases of pneumothorax, and same side rib fractures in 20 (80%) of the cases. In 22 patients dorsal approaches to the scapula according to Judet were used. 3 were operated through a limited posterior. Results: All fractures healed. There were 12(48%) excellent, 11(44%) good, 2(8%) fair results according to Constance. The complications: in 2 (8%) cases screws penetrated glenohumeral joint and were removed. Humeral head impingement due to a prominent plate was found in 2 (8%) patients and 3(12%) AVN of the humeral head. Conclusions: In cases with polytrauma, floating shoulder and associated upper extremity fracture ORIF of extra-articular scapular fractures may be achieve better functional results.

### Abstract no.: 40410 CLINICAL EFFECTS OF LOCKING COMPRESSION PLATE FOR NEER IB FRACTURES OF THE DISTAL CLAVICLE

Dan JIN, Zhen-Lv ZOU

To investigate the clinical and radiographs outcomes for the distal clavicle fractures (Neer

total of fifteen patients with distal clavicle fracture were used the distal clavicle LCP treatment. There were nine men and six women, mean age 42.1 years (range from 22~64 years). The left shoulder was involved in 5 patients and the right in 10 patients. Using transverse incision above the clavicle, the plate was place on superior of the distal clavicle

after fracture reduction , using locking screw fixed the plate, after fixation the acromioclavicular joint is still unstable, anchors wire repairs the coracoclavicular ligament. Plain radiographs of clavicles were used to assess bony union, constant scoring system was used to assess postoperative shoulder function. SF-36 scale evaluate the entire body function. All the patients were followed up for 14 to 26 months (mean 20.5 months). Solid bony union was eventually achieved in all patients at postoperative six months. The average healing time was 4.5months. According to constant score system, the results

were excellent in 11 cases, good in 4 cases, the excellent and good rate was 100%. At the

latest follow-up, no wound infections, no implant related fracture, fixation failure and rotator cuff injury occurred. Surgical fixation of Neer type IIb lateral clavicle fractures using distal clavicle locking compression plate results in a predictable outcome, preserving excellent shoulder function while maintaining a low complication. It is a reliable and promising technique.

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#### Abstract no.: 41096 A RETROSPECTIVE STUDY OF LATERAL END CLAVICULER FIXATION WITH HOOK PLATE

Waleed AMRHASSAEN, Mohammad Salah ABDELAAL

We retrospectively studied unstable fractures of the lateral end of the clavicle (Neer type 2) stabilised in EL HELAL HOSPITAL between 2005 and 2011 by the use of a hook plate. Patients with Neer type 2 injuries with more than a 6-month follow-up after surgery were included. We excluded patients with ACJ dislocations, X-rays to assess union; shoulder function was assessed using the Constant score, patient satisfaction rating with the shoulder and VAS pain score. Results There were 21 patients with Neer type 2 fractures; 14 were men, and the average follow-up was 26 (range 6-48) months. Average age was 41 (range 22-62) years. all patients had acute fractures. There were two non-unions: one due to a deep infection requiring removal of the plate progressed to a painful non-union; one patient had a fracture of the clavicle four months post-operatively following a second injury at the proximal end of the plate, which was treated conservatively. Five patients demonstrated asymptomatic acromial osteolysis on X-rays The plates were removed in 17 patients at an average of five months Fifteen patients (84%) were evaluated in a research clinic. The average Constant shoulder score achieved in the fractured side was 88.5 as compared with an average of 100 in the uninjured side. The average pain in the shoulder at rest was 1 (range 0-4), and the average pain on abduction was 2.2 (range 0-5)Conclusions: we can conclude that hook plate fixation is a useful method with High union rates and good shoulder function.

#### Abstract no.: 41286 INTRINSIC AND EXTRINSIC RISK FACTORS FOR NONUNION AFTER NONOPERATIVE TREATMENT OF MIDSHAFT CLAVICULAR FRACTURES

Dan XING, Xinlong MA, Yang CHEN

Objective: Not every midshaft clavicular fractures shares the same risk of developing nonunion after nonoperative treatment. The present study was performed to identify the intrinsic and extrinsic independent factors that are independently predictive of nonunion in patients with midshaft clavicular fractures after nonoperative treatment. Material and methods: We performed a retrospective study of a series of 804 patients (391 men and 413 women with a median age of 51.3 years) with a radiographically confirmed fracture of the midshaft clavicle, which was treated nonoperatively. There were 96 patients underwent nonunion. Putative intrinsic (patient-related) and extrinsic (injured-related) risk factors associated with nonunion were determined with use of bivariate and multivariate statistical analyses. Results: By bivariate analysis, the risk of nonunion was significantly increased by several intrinsic risk factors including age, sex, and smoking and extrinsic risk factors including displacement of the fracture and the presence of comminution (p < 0.05 for all). On multivariate analysis, smoking (OR = 4.16, 95% CI: 1.01, 14.16), fracture displacement (OR = 7.81, 95% CI: 2.27, 25.38) and comminution of fracture (OR = 3.86, 95% CI: 1.16, 13.46) were identified as independent predictive factors. Conclusion: The risk factors for nonunion after nonoperative treatment in midshaft clavicular fractures are multifactorial. Smoking, fracture displacement and comminution of fracture are independently predictions for an individual likelihood of nonunion. Further studies are still required to evaluate these factors in the future.

#### Abstract no.: 39162 OPERATIVE FIXATION OF DISPLACED CLAVICLE FRACTURE WITH SUPERIOR RECONSTRUCTION PLATE OSTEOSYNTHESIS

Terin Thomas Cherian THOMAS, Sagar SAGAR, Neelanagowda V Police Patil NEELANAGOWDA

Introduction: Clavicle fracture accounts for 10% of all fractures.80% of these fractures are in the middle third of the bone. Clavicle fractures have been traditionally treated nonoperatively. Although many methods of closed reduction have been described, it is recognized that reduction is practically impossible to maintain and a certain amount of deformity and disability is expected in adults. Objectives of study: 1. To study surgical management of displaced fractures of clavicle. 2. To study speed of union, complications associated with clavicle fracture and their management 3. To evaluate functional outcome using the CONSTANT AND MURLEY score. Materials and methods: The study is a hospital based prospective study on management and treatment of fracture clavicle fracture. It was conducted in M.M.C.R.I from July 2013 to July 2014. Sample size of 25 cases of clavicle fracture will be operated with recon plate and followed up for a duration of months. Results: fracture union achieved minimum 6 in average of 10 months, complications like one case of plate breakage, 5 cases of plate prominence, 2 cases of delayed union. Constant murley score was on average 95/100. Conclusion: Operative fixation of a displaced fracture of the clavicular shaft results in improved functional outcome and a lower rate of mal union and nonunion compared with nonoperative treatment.

#### Abstract no.: 40591 HEMIARTHROPLASTY FOR COMMINUTED PROXIMAL HUMERAL FRACTURES: COMPARISON BETWEEN CLINICAL OUTCOMES AND RADIOLOGICAL EVALUATION

Hiroshi HASHIGUCHI, Satoshi IWASHITA, Atsushi OHKUBO, Shinro TAKAI

Purpose: The purpose of this study was to evaluate clinical and radiological outcomes of hemiarthroplasty for proximal humerus fractures. Methods: Thirty-eight patients (36 females and 2 males), average age at the time of surgery of 75.1 (range 64-92) years, underwent hemiarthroplasty for proximal humerus fracture or fracture-dislocation of the shoulder were enrolled in this study. Constant score was used for clinical evaluation of outcomes, and X-rays were performed after a minimum follow-up period of 12 months postoperatively. Parameters for radiological evaluation were as follows: value of acromiohumeral interval (AHI), humeral offset, medial and lateral projection, and the existence of subacromial spur, a radiolucent zone around humeral stem and an osteolytic change of the greater tuberosity. Results: The average follow-up after surgery was 43.1 (range 12-114) months. The average postoperative Constant score was 76.5 (range 53-96) points. The mean values of AHI and humeral offset were 8.4 mm and 28.3 mm, respectively. A subacromial spur was observed in ten patients, and an osteolytic change of the greater tuberosity in seven patients. There was a significant correlation between Constant score and values of AHI or humeral offset. Constant score in patients with a subacromial spur or radiolucent zone around humeral stem was markedly lower than that in patients without them. Conclusion: Clinical outcomes of hemiarthroplasty was influenced by factors reflecting function and conditions of the rotator cuff. Anatomical reconstruction and bone union of the tuberosities need to ensure clinical success in hemiarthroplasty.

#### Abstract no.: 40593 FUNCTIONAL OUTCOME OF CLOSED PROXIMAL **HUMERUS** FRACTURE IN RHIRD WORLD COUNTRIES TREATED BY PERCUTANEOUS THREADED K-WIRES. A STUDY IN 47 CASES Ashok Kumar DAS

Introduction: Proximal humeral fracture accounts for 4-5% of all fractures, mostly in elderly osteoporotic bones. Out of multi-modalities of treatment, this method is selected, as there is practically no blood loss, less tissue trauma, less surgical and anaesthesia time, avoids Avascular necrosis, economical. Material and method: 47 patients, 18 male 29 female of age group 24-69 years, neers part-2 and part-3 fractures were treated by closed percutaneous k-wires under GA in supine position. A sand bag is put behind scapula. Closed reduction done under C-arm control. Multiple threaded k-wires 2.5 mm in diameter, introduced and the tips were kept diversant for rotational stability which just pierced the opposite cortex. Arm-sling support for 3 weeks. Pts evaluated for pain, motion, strength, anatomic restoration, infection and loosening, radiologic union, at 3 weeks, 6 weeks, 12 weeks and one year. Result analysis: Union occurs in 45 pts average at about 8 weeks. 11 pts had pin-tract infection treated by frequent pin care and ½ strength hydrogen peroxide solution united, one pulled out. ROM almost full at 16 weeks except 4 who had abduction below 90. Radiological union occurs in all cases at 12-16 weeks. Pain assessed by VAS. 8 pts developed painful shoulder, 2 from 2 part fracture and 6 from 3 part fracture. There is no avascular necrosis nor nerve injury. Conclusion: This surgical technique is very acceptable modality in 2-part, 3-part fracture proximal humerus. It is economical, technically easy with less surgical trauma and offers excellent functional outcome.

#### Abstract no.: 42391 TREATMENT OF METASTATIC HUMERAL FRACTURE WITH A LOCKED INTRAMEDULLARY NAIL Peng GAO

Objective To assess the use of a new humeral nail to treat metastatic fractures of the humerus. Methods 11 patients received 11 locked intramedullary nails from Jan. 2005 to Dec. 2007: 7 for pathological fractures and 4 for impending fractures. All the nails inserted anterograde and cement augmentation was applied in all patients. Results The mean age was 57 years (range 29~75 years). Lesion located in proximal third in 5 patients, and middle third in 6 patients. The mean operation time was 121 minutes(range 85~177 minutes). The mean blood loss was 650 ml (range 400~1200 ml), 4 patients received blood transfusion (mean 2.3 U of RBC). 10 cases were followed-up 6 months after operation and 80% patients got excellent or good results. 2 patients complain shoulder stiffness. Conclusions Locked intramedullary nail can be used in treating pathological fractures of humerus, which provide stable fixation and allow early movement of arm. Cement augmentation is a useful method in treating segmental bone defect.

#### Abstract no.: 42390 TIPS AND TRICKS IN HELICAL PLATING OF PROXIMAL METAPHYSEAL-DIAPHYSEAL HUMERAL SHAFT FRACTURES WITH LONG PHILOS PLATE PERCUTANOUSLY: BASED ON A CADAVERIC STUDY

Lei WANG

Several recent reports have described the helical plating of proximal metaphysealdiaphyseal humeral shaft fractures with long PHILOS plate percutanously. The purpose of this study is to identify the safe zone and danger zone for locking screw placement to avoid the neurovascular injury. The 10-hole long PHILOS plate was twisted 90° and precontoured on the synbone of humerus before the operation, lying on the lateral aspect of the greater tuberosity proximally and anterior humeral shaft distally. Six arms of fresh cadavers were then fixed with helical plates percutanously. The distance between the screws and axillary nerve, radial nerve and musculocutaneous nerve were measured respectively. The average humeral length was 29.31cm. The proximal four locking screws were in the safe zone, while the average distance between C hole and the axillary nerve was 0.41cm. The average distance between the plate and the point where radial nerve was passing through the lateral intermuscular septum was 1.09cm. The tip of the 6th locking screw was in the posterior side of the humerus, and the average distance with the radial nerve in the posterior groove was 0.82cm. The musculocutaneous passed across the distal plate on 8.34cm in average from the lateral epicondylar, which might be danger just during the screw insertion at the distal 8th hole. Based on this cadaveric study, we performed this technique with some tips and tricks in fifteen cases from February 2011 to February 2013. There was no iatrogenic nerve injuried postoperatively, and the clinical outcome were all satisfied.

#### Abstract no.: 42389 A FIXATION TECHNIQUE FOR UNSTABLE NEER TYPE II DISTAL CLAVICLE FRACTURE BY USING DUAL MINI-PLATES Hairong TAO

Objective: Neer type II distal clavicle fractures is considered to be unstable and its surgical treatment remains controversial. We present a technique to immobilize the fracture fragments resort to two small plates called dual mini-plates.Methods: Eleven patients with unstable Neer type II distal clavicle fractures were treated with the above technique dual mini-plates'technique. All the patients were followed up regularly and the functional recovery of the shoulder joint was assessed by the American Shoulder and Elbow Surgeons (ASES) rating scale score. Results: All fractures demonstrated radiographic union at 5.4 (4–6) months with a mean follow-up of 14.3 (12–16) months. No complication of implant related fracture, implant failure, malunion, nonunion, or post-traumatic arthritis occurred during follow-up. The mean ASES score was 96.32 (94.2-100) at last follow-up point. Conclusion: The treatment of Neer type II distal clavicle fractures with dual miniplates'technique could achieve good bony union rate. It is a simple and reproducible technique. It not only provides rigid fixation but also avoids the interference of acromioclavicular joint and shoulder joint activities.

#### Abstract no.: 42372 PRE-OPERATIVE ESTIMATION OF THE RADIAL HEAD SAFE ZONE BY COMPUTER TOMOGRAPHY Yu ZHAN

Purpose: The aim of our study was to introduce a pre-operative method to locate the "safe zone" of the radial head based on computed tomography (CT), thus enable surgeon to perform CT-assisted pre-operative planning. Method: CT scanning was applied to 11 intact upper extremity cadavers from 11 different corpses in full pronation and supination respectively. Its Dicom format raw data was then re-sliced into transverse, coronal and sagittal planes in Mimics 17.0 (Materialise, Belgium). Above all, data set was standardized. To display radial head, a smallest circle fitting to cover the entire radial head was created. A circled shape the radial head was, so a landmark was needed to deduce the "safe zone" location. Then landmark line (LL) was depicted based on droplet-shaped interosseous border's tip direction (transverse view). Radial head and LL's relative position would not change, regardless of the radius position. Originating from the fitting circle center (FCC) to the most front point of proximal radioulnar joint (PRJ) in full pronation data set, a pronation anterior line (PAL) was created to define the anterior border of "safe zone". Similarly, a supination posterior line (SPL) was drawn from the FCC to the most posterior point of PRJ in full supination data set to mark the posterior border of the "safe zone". The angle between LL and PAL and that of LL and SPL was gauged and , thus allowing us to calculate the boundary of "safe zone" by the LL in clinical practice. Besides, LL's direction stability was estimated by measuring the direction in different transverse plane. Result: The 'safe zone' was measured as 116.41°±11.96. The LL's direction is of stable in its half upper course. Doctor could turn the LL inversely to get one

#### Abstract no.: 42351 USING 70° ARTHROSCOPY FROM POSTERIOR PORTAL FOR FIXING ACUTE ACROMIO-CLAVICULAR DISLOCATION OR DISTAL PART OF CLAVICLE FRACTURE WITH DUBBLE CORTICAL BUTTONS Yu DANG

Purpose: To prove using 70° arthroscopy from regular posterior portal without additional lateral portal can be fix acute acromio-clavicular dislocation or distal part of clavicle fracture with dubble cortical buttons. Method: 8 patients (6 male and 2 female) diagnosed acute acromio-clavicular dislocation or distal part of clavicle fracture were treated with fixation of dubble cortical buttons under 70° arthroscopy. In the operation, the inferior aspect of the coracoid could be clearly observed by the 70° arthroscopy through poterior portal. Only 2 portals were needed during the operation. Result: There were no significant diffrences in operating time and clinical outcomes with the 30° arthroscopy from additional lateral portal. Conclusion: 70° arthroscopy can be used in fixing acute acromio-clavicular dislocation or distal part of clavicle fracture with dubble cortical buttons from regular posterior portal without additional lateral portal, the function recovery and the operating time had not siganificant diffrence.

#### Abstract no.: 42347 ARTHROSCOPY-ASSISTED RECONSTRUCTION OF CORACO-CLAVICULAR LIGAMENT BY ENDOBUTTON FIXATION FOR TREATMENT OF ACROMIOCLAVICULAR JOINT DISLOCATION Zhaoxun PAN

Objective: To evaluate the clinical outcomes of arthroscopy-assisted reconstruction of the coracoclavicular (CC) ligament using Endobutton for treating acromioclavicular (AC) joint dislocation. Methods: From March 2012 to May 2013, a total of 23 patients with fresh AC joint dislocation (Rockwood type III-V) were treated with arthroscopy-assisted Endobutton reconstruction of the CC ligament. Regular follow-up postoperation. Shoulder joint function was assessed with Constant-Murley scores. Postoperative efficacy of the surgery was evaluated using the Karlsson criterion. Results: The 23 patients were followed postoperatively for an average of 11 months (3-18 months). Among them, 21 patients achieved good functional recovery with no pain. Two patients had slight pain in the acromion during shoulder joint motion with limited abduction at 3 months, both of whom had recovered at 6 months. Radiography confirmed anatomical reduction of the AC joint in all patients. At 3 months, the Constant-Murley scores were 91.4 ± 3.1 points on the injured side versus 94.7 ± 2.8 points on the uninjured side. The difference did not reach statistical significance (P > 0.05). Postoperative Karlsson evaluation ranked 21 patients (91.3%) as grade A and 2 as grade B (8.7%) at the 3-month follow-up. All patients had become grade A at 6 months. None of the patients had brachial plexus or peripheral vascular injuries. Conclusion: Arthroscopy-assisted reconstruction of the coracoclavicular ligament by Endobutton fixation is a safe, easy method for treating AC joint dislocation. It provides reliable fixation, causes little trauma, and has a fast recovery.

# Abstract no.: 42342CLAVICLE AND CORACOID PROCESS DRILLING TECHNIQUE FORTRULYANATOMICCORACOCLAVICULARLIGAMENTRECONSTRUCTIONJiahu FANG

Background: High-grade acromioclavicular (AC) joint separations require surgical treatment, as conservative treatment may result in functional decline or persistent pain. Although many surgical techniques have been described in the literature, there is still no non-controversial gold standard procedure for AC joint dislocation. The different orientation of the two components of the coracoclavicular (CC) ligaments has been proven to account for different functions. However, the majority of the techniques reconstruct the CC ligaments with a single structure. The purposes of this study were to assess the feasibility of truly anatomic coracoclavicular ligament reconstruction (TACCR) and to determine the corresponding drilling parameter. Methods: We constructed virtual three-dimensional (3D) models of 105 shoulders from computed tomography (CT) scan data by using SuperImage software. For each model, the attachment sites and footprint dimensions of the conoid and trapezoid ligaments were defined and adjusted according to previously defined anatomic parameters and individual measurement results. Virtual drilling and 3D measurement were carried out in each model separately. Guided by the drilling parameter, we performed TACCR on 24 shoulders from 12 whole cadavers after transecting the AC and CC ligaments. Results: The collinear drilling technique was noted to breach the bone cortex of the clavicle and/or the coracoid process in 95 of 105 virtual models (90.5%). No cortical breach was observed using a non-collinear drilling technique. The anteversion angulation of the conoid-coracoid tunnel ranged from 108 to 158 (mean value 12.48). The extraversion angulation of the conoid-coracoid tunnel varied from 58 to 108 (mean value 6.88). The anteversion angulation of the trapezoid-coracoid tunnel ranged from 208 to 308 (mean value 25.28). There were no failures when performing the non-collinear drilling technique on cadaver models. Conclusions: The collinear drilling technique is not technically feasible for TACCR.

#### Abstract no.: 41033 MORPHOLOGIC OF ACROMIAL SPUR: CORRELATION BETWEEN ROCKWOOD TILT VIEW AND ARTHROSCOPIC FINDING Pinkawas KONGMALAI, Bancha CHERNCHUJIT

Acromion spur is reported to be the extrinsic factor for subacromial impingement syndrome and rotator cuff tear. Thorough understanding of the morphologic characteristics of acromial spurs before the operation could provide useful guidance regarding the diagnosis and treatment of rotator cuff tears. The Rockwood tilt view can be used to evaluate prominence of the anterior acromion. In order to find the correlation of morphologic of the spur between Rockwood tilt view and arthroscopic finding, we developed the arthroscopic classification of acromion spur as type 1 flat spur, type 2 bump spur, type 3 heel spur, type 4 keel spur and type 5 irregular. Two fellowship-trained shoulder surgeon classified the type of spur from arthroscopic finding and Rockwood tilt view separately in random pattern. Correlation was high especially for heel, keel and irregular spur. The heel spur was the most common and detected in 85% of rotator cuff tear patient. These data suggest that Rockwood tilt view can be used to evaluate the shape of acromion spur especially the heel, keel and irregular spur that highly correlate with rotator cuff tear. Although the correlation of the flat and bump spur are low, these types were detected only 23% of rotator cuff tear patient. The arthroscopic classification of acromion spur will also be useful tool to improve communication between the surgeon and the guide for appropriate treatment in rotator cuff tear patient when encounter to the heel, keel and irregular spur.

#### Abstract no.: 42348 ULTRASONOGRAPHIC AND MAGNETIC RESONANCE IMAGING OF ROTATOR CUFF TEARS COMPARED WITH ARTHROSCOPY FINDINGS Yaonan ZHANG

Objective: To compare the accuracy of ultrasound (US) and magnetic resonance imaging (MRI) for the detection and measurement of the size of rotator cuff tears (RCT) and to evaluate the clinical value of US and MRI. Methods: There are 210 patients with suspected RCT undergoing arthroscopy surgery. 202 of them had MRI exam, and 130 of them had US exam preoperatively. The RCT existence status, RCT pattern, and size of RCT, were recorded. We compared the preoperative exam results with the finding of arthroscopic procedure. Results: Ultrasound correctly identified 71 (93%) of the 76 full-thickness tears, and 35(87.5%) of the 40 partial-thickness tears. MRI correctly identified 93 (90%) of the 103 full-thickness tears, and 68(86%) of the 79 partial-thickness tears. The overall accuracy for US and MRI were 91% and 88%, respectively. US correctly detected the degree of retraction of 73% and the width of 67.6% of the full-thickness tears. MRI correctly detected the degree of retraction of 74% and the width of 66% of the full-thickness tears. There were no statistic difference between the performance of US and MRI (p=0.846 > 0.05). Conclusions: Ultrasound and magnetic resonance imaging had comparably high accuracy for detecting and measuring the size of partial-thickness and

full-thickness tears. The ultrasound imaging of the shoulder performed by a sufficientlytrained orthopaedic surgeon or a radiologist is a reliable, time-saving and cost-effective practice to identify rotator-cuff tears.

#### Abstract no.: 42346 SINGLE-ROW VERSUS DOUBLE-ROW ARTHROSCOPIC REPAIR IN THE TREATMENT OF ROTATOR CUFF TEARS Chengmin CHEN

Purpose: The purpose of this study was to compare arthroscopic rotator cuff repair with single-row and double-row techniques. Methods: A total of52 patients with a full-thickness rotator cuff tear underwent arthroscopic repair with suture anchors. They were divide into two groups of 52 patients according to the repair technique: single-row (group 1) and double-row (group 2). Results were evaluated by use of the University of California, Los Angeles (UCLA), and range of motion. Follow-up time was two years. Magnetic resonance imaging (MRI) studies were performed on each shoulder preoperatively and two years after repair. Results: All the patients were followed up. All measurements showed significant improvement in group 2. In over 30-mm tears UCLA showed significant differences. Range of motion showed significant improvement in internal and external rotation. Conclusions: At two years follow-up the double-row repair technique showed a significant difference in clinical outcome compared with single-row repair and this was even more significative in over 30-mm tears. No MRI differences were observed.

#### Abstract no.: 42345 ARTHROSCOPIC TREATMENT OF INTRATENDINOUS PARTIAL-THICKNESS ROTATOR CUFF TEARS Jian XIAO

Objective: To evaluate the clinical and structural outcomes after arthroscopic repair of intratendinous partial-thickness rotator cuff tears. Methods: From 2008 to 2012, 33 consecutive patients with intratendinous PTRCTs underwent arthroscopic repair. All of them were retrospectively evaluated. The University of California at Los Angeles(UCLA) and Constant scores were evaluated before operation and at the final follow-up. Postoperative cuff integrity was determined using MRI according to Sugaya's classification. Results: At the 2-year follow-up, the average UCLA score increased from 16.7±1.9 to 32.5±3.5, and the Constant score increased from 66.2±10.5 to 92.4±6.9 (P<.001). 27 patients received follow-up MRI examinations at an average of 15.2 months after surgery. Of these 27 patients, 22 (81.5%) had a healed tendon and five patients had partial tears. There was no association between functional and anatomic results. Conclusions: For intratendinous PTRCT, clinical outcomes and tendon healing showed good results at a minimum 2 years after arthroscopic repair.

#### Abstract no.: 42343 ARTHROSCOPIC TREATMENT FOR BANKART REPAIR COMBINED WITH FRACTURE OF ANTERIOR GLENOID IN RECURRENT ANTERIOR DISLOCATION OF SHOULDER Hui YAN

A series of rare cases with Bankart lesion combined with fracture of anterior glenoid in recurrent anterior dislocation of shoulder are described. The diagnostic arthroscopy was performed to confirm the presence of the Bankart lesion and bony fragments of anterior glenoid at surgery, we can see several bony fragments, and mostly they are connected with the glenoid by soft tissue, so it is not difficult to reduce it to the bone bed. Four 3.5mm anchors were inserted, two in medial row and two in lateral row. We used Double pulley technique for fixation of the bony fragments. A thorough anterior capsule release was carried out for the Bankart repair. So the appropriate site for the Bankart repair is discussed. We choose the position where the cartilage surface anchors (lateral row) inserted. These anchors are 3.5mm anchor with double-loaded sutures. One suture is used for bony fragment fixation, and the other suture is used for Bankart repair. Postoperative CT scans showed a good reduction and fixation of the bony fragments. This arthroscopic technique provides a firm fixation for both fractures and Bankart lesion that is minimally invasive.

#### Abstract no.: 42344 THE NEW CONCEPTS OF SHOULDER INSTABILITY: NOT ONLY FROM THE GLENOID, ALSO FROM THE HUMERAL HEAD Binghua ZHOU

Background: The antero-inferior instability of shoulder is very common in the clinic. Their etiology research will help us diagnose and treat them. Most surgeons turn onto the soft tissue repair, Bankart lesion repair, and so on. However, their failure rate was very high. This situation let us recognize whether their true pathogeny comes from the bone. This study focused on assessing the relationship between anterior-inferior glenohumeral instability and bony adapbility of glenohumeral joint. Methods: Both shoulders in 24 patients with unilateral anterior-inferior glenohumeral instability were scanned with muhiplanar spiral CT scanner. The parameters of humerus and glenoid ane the conformity index were messured. The conformity index at coronal view and axial view, constraint index at coronal view and axial view were calculated. Results: There was significant difference between the instability side and the normal side of the antero-inferior instability group in the antero-posterior radius of glenoid curvature, retroversion angle in the 4th plane, the antero-posterior containment angle of glenoid curvature, the conformity index at axial view, the constraint index at axial view by paired-samples t test. Conclusion: Based on this study, we concluded the antero-inferior instability of shoulder is related with the bony adapbility of glenohumeral joint: not only from the glenoid, also from the humeral head.

#### Abstract no.: 39962 LIPOSOMAL BUPIVACAINE VS. INTERSCALENE NERVE BLOCK FOR PAIN CONTROL AFTER SHOULDER ARTHROPLASTY: A RETROSPECTIVE COHORT ANALYSIS

Uma SRIKUMARAN, Catherine HANNAN, Matthew ALBRECHT, Edward MCFARLAND, Bashir ZIKRIA, Steve PETERSEN

Introduction: Recent literature has shown that the local infiltration analgesia (LIA) liposomal bupivacaine (Exparel ®) provides better pain control, shortens hospital stays, and decreases costs for knee and hip arthroplasties compared to traditional nerve block methods. This study compares LIA and the interscalene nerve block (INB) in terms of postoperative pain control, medication use, and length of stay after shoulder arthroplasty. Methods: We conducted a retrospective cohort analysis of 59 shoulder arthroplasties by a single surgeon. We measured length of stay (LOS) and visual analog pain (VAS) at three time intervals after surgery. Results: There were 22 patients in the INB group and 37 patients in the LIA group. Baseline demographic data for age, sex, BMI, and American Society of Anesthesiologists score did not differ. Pain was the same in both groups immediately after surgery and 8-14 hours after surgery, but the LIA group had significantly lower pain scores than the INB group at 18-24 hours (p<0.001) and 27-36 hours (p=0.021) after surgery. There was no difference in IV or PO acetaminophen consumption but the LIA group received less narcotic pain medication. The average LOS for the LIA group was 45.8 hours and 64.3 hours for the INB group (p=0.012). 9.1% of the nerve block group left on the first postop day, while 43.2% of liposomal bupivacaine group left on the first postop day (p<0.01). Conclusion: Liposomal bupivacaine provides better pain control 18-36 hours after surgery and shortens hospital stays after shoulder arthroplasty compared to interscalene nerve blocks.

#### Abstract no.: 39697 THE CLINICAL OUTCOMES OF CORRECTIVE SURGERY IN CONGENITAL SCOLIOSIS PATIENTS WITH TYPE I SPLIT SPINAL CORD MALFORMATION

Fan FENG, Jianxiong SHEN

Objective: To investigate the clinical outcomes of surgical treatment in congenital scoliosis patients associated with type I split cord malformation. Methods: A total of 89 patients with type I SCM were operated on at our centre between March 2000 and February 2014. All patients were divided into prophylactic group (9 cases) and no prophylactic group (82 cases). In no prophylactic group, patients underwent prophylactic surgery (bony spur resection) before the scoliosis correction. In no prophylactic group, all other 81 cases underwent spinal correction without dealing with the intraspinal abnormalities. Results: There were no significantly differences in preoperative characteristics between two groups (P<0.05). In the prophylactic group, the major coronal curve Cobb angle was corrected from 69.0°±42.4 ° to 37.9°±29.7° postoperatively with a correction rate of 45.1% ± 14.3%, and 40.1% ± 29.8% at the final follow-up. For patients in no prophylactic group, the major coronal curve Cobb angle was corrected from 73.6°±28.1 ° to 37.6°±24.2° postoperatively with a correction rate of  $50.3\% \pm 21.9\%$ , and  $39.4\% \pm 22.2\%$  at the final follow-up. However, when comparing prophylactic surgery group with no prophylactic group, there were no statistically differences in operation time, blood loss, correction rate and postoperative complication rate (P>0.05). Conclusions: For the congenital scoliosis patients with type I split spinal cord malformation, resection of bone spur may not be necessary before the scoliosis correction. It is safe and efficient to treat the CS associated with SCM by corrective surgery without increasing the risk of neurological complications postoperatively.

#### Abstract no.: 40407 RISK FACTORS FOR INSTRUMENT-RELATED COMPLICATIONS FOLLOWING PRIMARY POSTERIOR HEMIVERTEBRA RESECTION: 135 CASES WITH MORE THAN 2 YEARS' AVERAGE FOLLOW-UP Jianguo ZHANG, Jianwei GUO, Shengru WANG, Hai WANG

Introduction: Posterior hemivertebra resection has been applied successfully for congenital scoliosis with hemivertebra. Most complications are associated with the instruments. No publications about their risk factors have been reported so far. Methods: 135 congenital scoliosis cases with hemivertebra (male: female=67:68), who accepted primary posterior hemivertebra resection from January 2003 to January 2012, were retrospectively evaluated in this study. The mean age for the initial surgery was 10.8 years/old (range, 2-45y/o), the mean follow-up period was 25 months (range, 3–119months), and the average fusion level was 5.1 segments (2-11 segments). All instrument-related or non-instrumentrelated complications were recorded in the follow-up. The potential risk factors were collected from medical records. All these variables were compared by Chi-square tests. Results: There were 8 instrument-related complications and 5 non-instrument-related complications observed during the perioperative and the follow-up. Most of them (61.54%) were associated with the instruments. In the initial surgery cases, there were more instrument-related complications in early-onset scoliosis patients (EOS, <5 y/o) than the other patients (12.82% vs 3.13%, RR=4.10, P=0.045<0.05). Patients with short segmental fusion are more likely to have instrumentation failures (14.63%vs 2.13%, RR=6.87, P=0.010<0.05). There was no signicant relationship between other risk factors and instrument-related complication rate. Conclusions: EOS patients and short segmental fusion patients are more likely to have instrument-related complication, and for those patients with risk factors, more accurate preoperative planning, more delicate surgical procedure, more strict brace wear and closer follow-up should be given.

#### Abstract no.: 40915 PULMONARY FUNCTION IN CHILDREN WITH CONGENITAL SCOLIOSIS AND RIB DEFORMITIES: A RETROSPECTIVE STUDY OF 203 PATIENTS Nanfang XU, Jun CAO, David ROYE, Hiroko MATSUMOTO, Lin SUN, Xuejun ZHANG

Introduction: Congenital scoliosis is caused by developmental vertebral anomalies and often results in a restrictive pattern of pulmonary function impairment. Concurrent rib deformity is frequent and may lead to worse pulmonary function. Methods: Records of 219 children with congenital scoliosis seen at a single institute between 2003 and 2010 were reviewed for demographics, pulmonary function, spinal curve characteristics, and rib deformities. 16 had only lumbar scoliosis and were excluded. Pulmonary function in patients with spinal and/or rib deformities was statistically compared. Results: 112 of the 203 children studied had patterns of restrictive lung disease. There was a significant negative correlation between pulmonary function and the Cobb angle of the major curve. Furthermore, thoracic curves were associated with worse pulmonary function than thoracolumbar curves of the same Cobb angle (VCmax% 70.5% vs. 86.3%, p<0.01). 94 of the 203 patients had rib deformities: 27 had rib absence, 44 had rib fusion, and 23 had both. Patients with rib deformities had lower VCmax% than patients with scoliosis only (p=0.546) and those with the fusion-only type deformity had significantly worse lung function than the absence-only type. Deformities involving at least 3 consecutive ribs occurred in 45 patients, and their pulmonary function was lower compared to patients with other types of rib deformities (VCmax% 52.6% vs. 74.6%, p<0.01). Conclusion: Nearly half of the patients with congenital scoliosis also had some form of concurrent rib deformity. Magnitude of the major curve, location of the curve apex, and type of rib deformity all affected the pulmonary function.

#### Abstract no.: 40844 CONGENITAL CERVICAL SCOLIOSIS: TREATMENT STRATEGY AND TIMING OF SURGERY

Nanfang XU, Miao YU, Zhongjun LIU, Shengfa PAN, Yu SUN

Introduction: Congenital cervical scoliosis is an unusual spinal deformity often resulting from multiple vertebral anomalies. Surgical correction is required to prevent deformity progression and development of secondary craniofacial asymmetry, which may lead to more severe cosmetic concerns than the actual cervical curve. Methods: Records of a consecutive cohort of patients who underwent surgical correction of congenital cervical scoliosis between 2010 and 2013 were reviewed. Surgery was performed using an anterior-posterior-anterior approach. Cobb angle on the coronal plane, head tilt (defined as the deviation of the nasal septum-mandibular central incisor line from the plumb line), and mandible incline (defined as the deviation of the mandibular angle line from the horizon) were compared before surgery and at the latest follow-up. Results: 15 patients were included and the minimum follow-up period was 24 months. Their mean age was 10 years. Average Cobb angle was 27° before surgery and 6° at the latest follow-up. Head tilt and mandible incline improved from 14° and 13° to 4.4° and 3° at the most recent follow-up, respectively, and in both cases, early surgical intervention was associated with better outcomes. Bony fusion was achieved in all cases. 4 patients (27%) had symptoms of postoperative nerve root injury which all subsequently ameliorated. Conclusion: This report represents the largest cohort of patients undergoing surgical correction of congenital cervical scoliosis. Our study suggests that the anterior-posterior-anterior approach is a safe procedure with relatively few complications and a good correction of the local deformity can lead to improvement on craniofacial asymmetry in children with significant growth potential.

#### Abstract no.: 41800 PRIMARY STUDY OF CONGENITAL SPINAL DEFORMITY MANAGEMENT

Tanvi SURYAWANSHI, Raviraj SHINDE, Ajit SHINDE, Neelima SHINDE

Introduction: Association of congenital scoliosis/kyphosis and kyphoscoliosis with spinal dysraphism is well established in literature. Primary study has been done regarding incidence, types and problems during management. Material and methods: 121 no of cases were encountered from 2007 to till today during school health program conducted by institute. Syndromic cases were excluded. Study included clinical / radiological examination to know etiopathology and plan of management considering spinal dysraphism. Result: Failure of formation (Type-1) was the most common vertebral abnormality (66%). Abnormal neurological examination was present in 13.6% of cases. Intraspinal abnormalities on MRI were found in 35% which is more in kyphosis cases. Along with congenital vertebral anomalies. Diastematomyelia was the commonest intraspinal anomaly. Average angle of scoliosis 520. Patients with failure of segmentation (Type-II) had highest association intraspinal abnormality. Conclusion: 1) Presence of abnormal neurological examination is a poor indicator of spinal dysraphism. Disparity in incidence of abnormal neurology (13.6%) and positive MRI (35%) indicates that MRI is essential tool to diagnose spinal dysraphism. Authors recommend MRI spine for all cases of congenital kyphosis because of its frequent association with spinal dysraphism. 2) While planning for correction two stage procedures planned 1st stage Spinal anomalies management and then in second stage correction of deformities surgically for indicated cases as conservative treatment limited indication.

#### Abstract no.: 40647 POSTERIOR REDUCTION AND MONOSEGMENTAL FUSION WITH INTRAOPERATIVE 3-DIMENSIONAL NAVIGATION SYSTEM IN THE TREATMENT OF HIGH-GRADE DEVELOPMENTAL SPONDYLOLISTHESIS

Xiaoguang HAN, Wei TIAN

To investigate the efficacy of the posterior reduction and monosegemtnal fusion assisted by intraoperative 3-dimensional navigation system in managing the high-grade developmental spondylolisthesis (HGDS). 13 consecutive HGDS patients were treated with posterior decompression, reduction and monosegmental fusion of L5/S1, assisted by intraoperative 3D navigation system. The clinical and radiographic outcomes were carried out, with a minimum follow-up of 2 years. The differences between the pre- and postoperative measures were statistically analyzed using a two-tailed, paired t test. At most recent follow-up, 12 patients were pain free. Only 1 patient had moderate pain. There were no permanent neurological complications nor pseudarthrosis. The MRI showed that there were on obviously disc degeneration in adjacent segment. All radiographic parameters improved. Mean slippage improved from 63.2% before surgery to 12.2% after surgery and 11.0% at latest follow-up. Lumbar lordosis (LL) changed from preoperative 34.9±13.3° to 50.4±9.9° postoperatively and 49.3±7.8° at last follow-up. L5 incidence (L5-I) improved from 71± 11.3° to 54.0 ± 11.9° and did not change significantly at the last followup 53.1 ±15.4°. While pelvic incidence (PI) remained unchanged, sacral slip (SS) significantly decreased from pre-operative 32.7± 12.5° to postoperative 42.6± 9.8° and remained constant to the last follow-up 44.4± 6.9°. Pelvic tilt (PT) significantly from 38.4 ± 12.5° to 30.9± 8.1° and remained unchanged to the last follow up 28.1± 11.2°.Posterior reduction and monosegmental fusion of L5/S1 assisted by intraoperative 3D navigation is an effective technique for managing high-grade dysplastic spondylolisthesis.

#### Abstract no.: 39575 THE RIB CONSTRUCT (RC) HAS PROVIDED SECURE PROXIMAL FIXATION FOR MANAGEMENT OF PATIENTS WITH EOS AND SEVERE THORACIC HYPERKYPHOSIS

## Alaaeldin AHMAD, Loai AKER, Yehia HANBALI, Aesha SBAIH, Richard GROSS

Introduction: Thoracic hyperkyphosis, described as greater than 50 degrees of maximum total kyphosis, has been associated with poor outcomes when treating EOS. We address this uncertainty by reporting our results of rib based fixation in patients with EOS and thoracic hyperkyphosis. We chose a minimum of 70 degrees of kyphosis between T5-12 for inclusion, rather than 50, to focus further on the management of severe hyperkyphosis. Methods: Ongoing data collection of surgical management of 13 children with EOS and greater than 20 degrees of kyphosis between T1-5 and/or 70 degrees between T5-12, and at least 24 months of followup was compiled. The (RC) was used for proximal fixation in all cases. Etiology; 5 syndromic,5 congenital/structural, 1 idiopathic. 9 had prior spine surgery. Average age at initial surgery 84 months; followup averaged 47 months (24-77). 5 had T1-5 kyphosis, average 29 degrees, postop 26. 9 had T5-12 kyphosis , average 96 degrees, postop 56. Average preop thoracic scoliosis 68 postop 44; preop lumbar scoliosis 39, postop 38. Average preop spine length 22.9 cm, postop 29.2. Average preop coronal balance 11.3 cms, postop 13.1. Average preop sagittal balance 39, postop 27. Complications included 3 proximal hook dislodgments, 5 distal anchors, 1 delayed deep wound infection with removal and subsequent replacement of instrumentation, 3 rod failures, 1 PJK. As a group, there were 63 subsequent planned procedures, and 18 unplanned. Conclusions: The RC provides reliable proximal fixation for EOS patients with severe thoracic hyperkyphosis, especially for those with hyperkyphosis from T5-12.

#### Abstract no.: 40458 EFFECTIVENESS OF TREATING CHILDREN WITH EARLY ONSET SCOLIOSIS (EOS) WITH SERIAL DEROTATIONAL CASTING David ROYE, Anny HSU, Hiroko MATSUMOTO, Mark SULLIVAN, Evan TRUPIA, Benjamin ROYE, Vitale MICHAEL

Introduction: Serial Mehta derotational casting has emerged as a potentially curative technique for EOS patients. This study examines the effectiveness of scoliosis casting and identifies factors that affect the efficacy of casting treatment for children with EOS. Methods: We retrospectively reviewed patients who underwent serial Mehta/Cotrel derotational casting for EOS at a single institution from 2009 to 2014. Inclusion criteria are age 1-5 years old, EOS diagnosis (including etiologies of idiopathic, congenital/structural, syndromic), and radiographic evaluation between casting. Patients with prior spine casting or pertinent surgical interventions were excluded. Diagnosis, time in cast, Cobb angles, and number of casts were recorded. Results: Of the 16 patients in this study, the mean age at initial casting was 2.4 years old (range of 1 - 5yo) with mean major curvature of 50.30 (range of 32 - 81°). Patients had an average of 4.4 casts (range of 3-8). At final casting, 50% (8/16) had  $\geq$  10% of curvature improvement, 31% (5/16) maintained their curve, and 19% (3/16) had significant progression (>10%). Patients with an initial curvature < 50° or < 20 months of age at initial casting were each five times more likely to have at least 10% curvature improvement after the final cast. Conclusion: In conclusion, 50% of patients undergoing serial derotational casting demonstrated curvature improvement; another 31% did not progress. Children younger than 20 months or with major curvature < 50° are more responsive to scoliosis casting treatment.

Abstract no.: 42384

#### THE COMPARISONS BETWEEN THE SHORT-TERM CLINICAL OUTCOMES OF PRECISE DECOMPRESSION WITH NONFUSION OPERATION AND TRADITIONAL FUSION OPERATION FOR SINGLE-SEGMENTAL SPINAL STENOSIS IN THE AGED Wu JI

Objective :The aim of this study was to evaluate the short-term clinical outcomes of lumbar spinal canal precise decompression and Wallis interspinous dynamic stabilization for single-segmental lumbar spinal stenosis in the aged,compared with the traditional decompression and fusion operation.Method: Retrospective data review of the 46 aged patients who suffered from the degenerative spinal stenosis of L4-5 and received the surgical treatment in the Air Force Methods : 25 patients received spinal canal precise decompression and Wallis interspinous dynamic stabilization operationin General Hospital during January 2008 to December 2010,and the 21 ones received the traditional decompression and fusion operation.Measured the height of intervertebral spaces and intervertebral foraminas of the operative segment (L4-5) and the adjacent segment (L3-

4 and L5-S1 ) in the radiograph images of every patient in the precise decompression and

nonfusion group.Recorded the ODI scores and VAS scores of all patients preoperatively,

at 3 days, 1 months and 6 months postoperatively; the length of incision, the duration of

surgery , the intraoperative blood loss and the time to leave a sickbed of all patients and compared between the groups.Recorded all the intraoperative and postoperative complications Result:The Wallis systems were all successfully implanted after spinal canal precise decompression in total 25 cases in the precise decompression and nonfusion group.No operation-relatived complications happened.Every patient got a relief after the operation , with significant difference between the ODI/VAS scores preoperation and the data in 3 days , 1 months and 6 months postoperation.The difference has remarkable statistics meaning ( P < 0.01 ) .There was a similar relief-rate between the two groups ( P > 0.05 ) .And there was no statistical difference in the height of intervertebral spaces and intervertebral foraminas of the adjacent segment ( L3-4 and L5-S1 ) between the data in

Date: 2015-09-18 Session: Free Papers Cervical Spine Time: 10:30 - 12:00 Room: Shantou Hall

#### Abstract no.: 39686 ANTERIOR RETROPHARYNGEAL REDUCTION AND SEQUENTIAL POSTERIOR FUSION FOR ATLANTOAXIAL ROTATORY FIXATION WITH C1-2 LATERAL FACET LOCKED Qi CHEN, Yueming SONG

Objective. To propose a new type of atlantoaxial rotatory fixation with C1-2 lateral facet locked and its therapeutic strategy. Methods. Eight patients of chronic AARF with unilateral C1-2 lateral facet locked were referred to our clinic. Reduction was failed to obtain by traction for three to four weeks. Subsequently, after open release and reduction with the anterior retropharyngeal approach, the patients were performed posterior C1-2 transpedicular screw fixation with autologous iliac bone graft for stage one or two. Results. The anterior retropharyngeal approach provided direct access to the C1-2 locked lateral facet. The patient in an overall severe condition underwent posterior C1-2 arthrodesis for stage two. Rest of the patients underwent stage one posterior C1-2 arthrodesis. All patients were followed up for an average of 14.8 months (5-37 months). 3D CT revealed C1-2 arthrodesis bone graft fusion for an average of 3.1 months(2-4 months). There was no recurrence of symptoms, dislocation, internal fixation devices loose or breakage in any case. Conclusions. AARF with C1-2 lateral facet locked is a new type which can't be classified with Fielding and Hawkins Classification. The anterior retropharyngeal approach for the release and reduction of AARF with the posterior C1-2 arthrodesis is an effective therapeutic strategy for AARF with C1-2 lateral facet locked.

Date: 2015-09-18 Session: Free Papers Cervical Spine Time: 10:30 - 12:00 Room: Shantou Hall

#### Abstract no.: 39762 A NOVEL CLIVUS PLATE FIXATION FOR RECONSTRUCTION OF VENTRAL DEFECT OF THE CRANIOVERTEBRAL JUNCTION Qingan ZHU, Wei JI, Jie TONG, Zhiping HUANG

Purpose : to develop an innovative clivus plate integrated with clinical anatomy of craniovertebral junction (CVJ), and evaluate the stability of the clivus plate fixation (CPF) stand-alone or combined with posterior fixation (PF). Methods : The CPF was composed of the clivus plate and a titanium mesh cage. The clivus plate was anchored to the clivus, atlas and C3 body, and connected to the mesh cage. Six fresh cadaveric specimens (Oc-C4) were used. A pure moment of 1.5 Nm was applied to each specimen with intact, CPF alone, and CPF plus PF. The CPF was implanted to the specimen following resection of the C1 anterior arch, C2 vertebral body, C2-C3 disc and atlantoaxial ligaments. The PF was applied with screws anchoring at the occiput, C1, C3 and C4. The range of motion (ROM) and neutral zone (NZ) from the occiput to C3 were calculated. Results: The plates were successfully applied to all specimens without loosening or mismatch. The CPF reduced ROMs to 3.9° in flexion, 2.8° in extension, 4.2° in lateral bending and 6.8° in axial rotation, while the CPF plus PF within 0.6° in all directions. NZs after the CPF range from 1.0° to 2.2°, while were within 0.2° in all directions after the CPF plus PF. Conclusion: This study developed an innovative clivus plate fixation with clinical relevant screw purchase in the adult clivus to reconstruct an extensive ventral defect in the CVJ. The clivus plate fixation combined a posterior instrumentation ensured reliable upper cervical stability.
# Abstract no.: 39332 DIFFUSION TENSOR IMAGING IN CERVICAL SYRINGOMYELIA SECONDARY TO CHIARI I MALFORMATION: PRELIMINARY RESULTS Weiguo ZHU

Background Syringomyelia(SM) is a common finding in patients with Chiari I malformation(CMI). The purpose of this study was to perform a quantitative analysis of SM secondary to CMI using diffusion tensor imaging (DTI) and to further analyze the correlations between DTI parameters and the severity of syringomyelia. Methods Twenty CMI patients suffering from syringomyelia were prospectively enrolled in this study. Sensitivity encoding single-shot echo-planar imaging (EPI) was used for the sagittal DTI. Average Fractional anisotropy (FA) values in the spinal cord were compared between the vertebral levels at the syrinx and the levels surrounding the visible syrinx cavity on T2weighted images. Results Compared to the normal controls, The FA values were significantly decreased within the syrinx, while no significant decreased FA value was measured in the area surrounding the visible syrinx. Concerning CMI patients with different size of the syrinx, significantly decreased FA values within the syrinx were observed in patients with a non-distended-syrinx in comparison to those with a distended-syrinx. Moreover, the FA value within the syrinx was both significantly decreased in the symptomatic and non-symptomatic groups when compared with the control groups and there was also a significant difference between the two CMI-S groups.CONCLUSIONS: Decreased FA values within and caudal to the area of syringomyelia may provide evidence of increased microstructural damage within the spinal cord at these sites. FA values are significantly related to syrinx size and neurological signs/symptoms.

# Abstract no.: 39273 REMODELING OF THE CERVICAL SPINAL CANAL IN PATIENTS WITH CHIARI I MALFORMATION AFTER POSTERIOR FOSSA DECOMPRESSION Xu SUN

Background and purpose: Previous study reported steeper taper ratios of cervical spinal canals in Chiari I malformation patients with nondistended syringes, indicating a reciprocal interaction between the cervical spine anatomy and the syrinx. The purpose of this study is to determine whether the cervical spinal canal remodels in patients with Chiari I malformation after posterior fossa decompression (PFD).Materials and methods: 39 patients with Chiari I malformation-associated syringomyelia were divided into two groups: 30 with improved syringomyelia after PFD and 9 with unimproved syringomyelia after PFD. On a midline T2-weighted MR image, the anteroposterior diameter of the spinal canal was measured at C2-7 cervical level, and a trend line was fit by least squares regression. The slope of this line was recorded as the taper ratio. Taper ratios were compared between pre- and post-operative settings and between the 2 groups.Results: In the syringomyelia improved group (SMI), the average diameter of the spinal canal at C2, C3, C4 and C7 level significantly decreased after surgery (p=0.001, 0.011, 0.028, and 0.045 respectively). Meanwhile, the taper ratios for C2-4 became milder after surgery from -1.38±0.78 to -1.13±0.95 (p=0.024). In contrast, neither the diameters nor the taper ratios changed significantly after PFD in the syringomyelia unimproved group (SMU). Conclusions: Cervical spinal canals become narrower and more steeply tapering in Chiari I malformation patients with improved syringomyelia after PFD.

# Abstract no.: 40786 COMPARISON OF STAND-ALONE CERVICAL CAGES WITH ANTERIOR CERVICAL PLATES IN THE TREATMENT OF CERVICAL SPONDYLOSIS Yanping ZHENG

Objective: Evaluate the outcomes of anterior cervical discectomy and fusion (ACDF) on cervical spondylosis using stand-alone polyetheretherketone (PEEK) cages and autogenous iliac crest grafts with the anterior cervical plating system. Methods: A total of 219 patients with a diagnosis of cervical spondylosis underwent ACDF from June 2005 to June 2013. Among them, 53 were cervical radiculopathy, and 166 were cervical spondylotic myelopathy (CSM). Fifty-seven patients underwent ACDF with stand-alone cages, 162 patients underwent ACDF with anterior cervical plate fixation. Among them, 54 cases underwent single level surgery, 101 cases underwent double level surgery, 49 cases underwent triple level surgery, and 15 cases underwent four levels surgery. Results: Patients were followed up for an averaged of 5.8  $\pm$  5.2 years (range, 1 to 11 years). Improvement rate of postoperative Japanese Orthopaedic Association (JOA) scores had no statistical differences between the two groups. Three cases of dysphagia occurred in plate group; instrumental loosening occurred in 6 cases, 2 were in cage group and 4 in plate group; cervical kyphosis occurred in 3 cases, 2 were from the cage group and 1 was from the plate group. Adjacent segment disease (ASD) occurred in 6 cases, only one was from the cage, the other 5 cases were from the plate group. Conclusion: Stand-alone cage in single level would lead to less dysphagia and ASD compared with the plate group, however, stand-alone cage in multiple levels may lead to more non-fusion and subsequent cervical kyphosis or instrumental failure.

# Abstract no.: 40570 INCIDENCE OF DYSPHAGIA AFTER ANTERIOR CERVICAL DECOMPRESSION AND FUSION WITH THE ZERO-PROFILE IMPLANT SYSTEM: A META-ANALYSIS BASED ON 25 OBSERVATIONAL STUDIES.

Yi YANG, Hao LIU

Purpose:Dysphagia is a well- knowncomplication after anterior cervical surgery. It was claimed that the Zero-profile Implant System can avoid or decrease the incidence of dysphagia. However, dysphagia after anterior cervical decompression and fusion (ACDF) with the Zero-profile Implant System remains controversial, and the previous studies have generally been small-sized. The objective of this study is to determine the incidence of dysphagia after ACDF with the Zero-profile Implant System. Methods: The literatures were collected from PubMed, EMBASE, Cochrane library and China Knowledge Resource Integrated Database by using keywords as "(Zero-profile OR Zero-p) AND (dysphagia OR [swallowing dysfunction])". The software STATA (Version 13.0) was used for statistical analysis.Statistical heterogeneity across the various trials, tests of publication bias and sensitivity analysis were performed.Results:A total of 25 studies, 898 patients were included in this meta-analysis. The occurrence of postoperative transient dysphagia ranged from 2.3% to 76% while the pooled incidence was 20.6% (95% CI, [13.6%, 27.7%]).Twenty-fourof the total 25 studies reported none persistent dysphagia existed.Conclusion:In summary, the present study observed a lower incidence of bothtransient and persistentdysphagiaafter ACDF with the Zero-profile Implant System. Future randomized controlled multicenter studies and studies focusing on the mechanisms of dysphagia and methods to reduce the incidence of dysphagia are needed.

#### Abstract no.: 40030 RISK FACTORS ASSOCIATED WITH ROD FRACTURE AFTER OSTEOTOMY FOR ADULT SPINAL DEFORMITY Cameron BARTON, Andriv NOSHCHENKO, Vikas PATEL, Christopher

CAIN, Christopher KLECK, Evalina BURGER

Introduction: Osteotomies including pedicle subtraction (PSO) and Smith-Peterson (SPO) are widely used to facilitate correction in the treatment of adult spinal deformity (ASD), but are associated with complications including instrumentation failure and rod fracture (RF). Methods: Retrospective review of ASD database (COMIRB #14-1258) vielded 80 consecutive ASD patients (54F, average age 59) treated with osteotomy that met strict inclusion/exclusion criteria and follow-up of at least 1 year. Data was extracted including patient variables (e.g. age, gender), surgical variables (e.g. levels fused, osteotomy type and location), instrumentation variables (e.g. rod and screw characteristics), and postoperative variables (e.g. spinopelvic parameters). Patients were divided into two groups (RF or non-RF) and odds ratios were calculated to assess risk factors for RF. Results: Incidence of RF was 6.3% (5/80) in total population, 9.3% (4/43) for PSO group vs 2.7% (1/37) for SPO only group (OR=3.44, P=.49). Risk factors for RF included sagittal rod contour >60 degrees (OR=10.67, P=.05), presence of pelvic fixation (OR=14.85, P=.02), presence of dominos/cross connectors (OR=9.17, P=.04), and pseudarthrosis in follow-up period (OR=84.00, P=.0005). Conclusions: Current study shows RF incidence trends higher in PSO vs. SPO. Trends in risk factors between non-RF and RF subjects support biomechanical risk factors proposed in current literature including: pseudarthrosis and increased construct strain (fusion across mobile spine junctions with association of pelvic fixation), excessive contouring (sagittal rod contour >60 degrees and evidence of repeated bending), and notch effect (fracture at current or prior connectors).

#### Abstract no.: 40283 **RISK FACTORS** FOR NON-NEUROLOGICAL COMPLICATIONS IN COMPLEX ADULT SPINAL DEFORMITY SURGERY: AN INTERNATIONAL. LARGE-SCALE, PROSPECTIVE **MULTI-CENTER STUDY**

Cora BOW, Kenneth Man-Chee CHEUNG, Dino SAMARTZIS, Mark DEKUTOSKI, Frank SCHWAB, Oheneba BOACHIE-ADJEI, Khaled KEBAISH, Christopher AMES, Yong QIU, Yukihiro MATSUYAMA, Benny DAHL, Hossein MEHDIAN, Ferran PELLISÉ-URQUIZA, Leah CARREON, Christopher SHAFFREY, Michael FEHLINGS, Lawrence LENKE

INTRODUCTION: A high-risk of complications had been noted in complex adult spine deformity surgery in previous retrospective studies. The objectives of this study were to establish the prevalence and risk factors for non-neurological complications within the first 6 months of surgery. METHOD: This is an international prospective multi-center study involving 15 sites from North America, Europe, and Asia. Adult patients with severe spinal deformity were followed for 6 months post-operatively. RESULTS: A total of 269 subjects (68% women: 32% men) were included (mean age: 57.8 years). Overall, 60.6% of subjects had at least one complication. The prevalence of intra-operative event, major and minor post-operative complications were 29.4%, 21.6% and 42% respectively. 37% of the patients had multiple complications. Dural tear was the most common intra-operative complication (53%). 32% of major complications were respiratory-related, and 25% were loss of correction and implant failure. Urinary tract infection accounts for 15% of minor complications. 9% of subjects reported new onset or worsening back or leg pain after surgery, accounting for 12% of all minor complications. Previous spine surgery was associated with higher risk of intra-operative events (OR 3.6) and minor complications (OR 3.8), while diabetes (OR 3.8) and lung diseases (OR 3.1) increased the risk of major complications. CONCLUSION: This is the first and the largest prospective study in the world to systematically address non-neurological complications of spine deformity surgery in adults. Our findings contribute to a complete "risk profile" of such patients.

#### Abstract no.: 40277

# THE EFFECT OF POST-OPERATIVE COMPLICATIONS IN COMPLEX ADULT SPINAL DEFORMITY SURGERY ON SURGICAL OUTCOMES: AN INTERNATIONAL, LARGE-SCALE, PROSPECTIVE MULTI-CENTER STUDY

Cora BOW, Kenneth Man-Chee CHEUNG, Dino SAMARTZIS, Kenny KWAN, Mark DEKUTOSKI, Frank SCHWAB, Oheneba BOACHIE-ADJEI, Khaled KEBAISH, Christopher AMES, Yong QIU, Yukihiro MATSUYAMA, Benny DAHL, Hossein MEHDIAN, Ferran PELLISÉ-URQUIZA, Leah CARREON, Christopher SHAFFREY, Michael FEHLINGS, Lawrence LENKE

OBJECTIVE: This large-scale study aimed to determine the effect of non-neurological complex adult spine deformity complications in surgery upon post-operative functional/disability profiles. METHODS: This is an international prospective multi-center study involving 15 sites from North America, Europe, and Asia. Adult patients with severe spinal deformity were assessed at 6 weeks and 6 months post-operatively. Nonneurological complications were recorded and grouped into intraoperative events, minor and major complications. Post-operative functional/disability outcomes were evaluated by Oswestry Disability Index (ODI) and SRS-22 pre-operatively and at each follow-up. RESULTS: 269 subjects were included (68% women and 32% men; mean age: 57.8 years). There were no significant differences in pre-operative ODI and SRS-22 scores between patients with and without major complication. At 6 weeks and 6 months after surgery, patients with major complications had significantly worse ODI and SRS-22 scores compared to patients without major complications (p<0.005). Both groups with and without major complications showed statistically significant functional improvement 6 months after surgery (p<0.0001). Improvement in functional scores were similar in patients with and without intra-operative events and/or minor complications (p>0.05). CONCLUSION: Based on the largest, multi-center study addressing complex adult spine deformity patients, worse post-operative functional/disability profiles were noted up until 6 months follow-up in patients who experienced major complications than those that did not. Similar functional/disability profiles were noted in patients who experienced intra-operative or minor complications. This study further broadens the understanding of postoperative surgical outcomes, risk profiles, and clinical/patient expectations following such deformity surgeries.

# Abstract no.: 42349 CLINICAL ANALYSIS OF COMPLICATIONS OF THREE DIMENSIONAL CORRECTION FOR SCOLIOSIS Hongqi ZHANG

Objective: To analyze the complications of three dimensional correction for scoliosis surgery and evaluate its treatment and prevention strategy. Methods: From December 2004 to June 2011, 727 cases of scoliosis were treated by three dimensional correction system. There were 245 males and 482 females with an average age of 18.2 years (range from 3 to 62 years). Coronal Cobb angles rangedfrom 32° to 142° (mean 87.6°). Sagittal Cobb angles ranged from -10° to 75° (mean 45°). Results: All the patients were followed up for 12 to 90 months (mean 62.5 months). All patients underwent surgery safely. The coronal correction rate was 55%-98% with average of 85.2%, sagittal correction rate was 35%-67% with an average of 47.5%; There were no major complications such as death, neurological injury, but occurrence of other minor complications were 113 times in 102 cases. Complications related to instrumentation were 26 cases with five cases of loosening of pedicle, five cases of broken screw, eight cases of broken rod, 14 cases of them (five cases of loosening of pedicle, four cases of broken screw, five cases of broken rod) occurred in early correction for adult scoliosis. Three cases of hook loosening, four cases of pedicle fracture; Correction related complications 65 cases, 36 cases of junctional kyphosis (21 cases of proximal junctional kyphosis, which occurred in 11 cases neuromuscular scoliosis; 15 cases of distal junctional kyphosis, which occurred in 4 cases Marfan syndrome with scoliosis and 6 cases neuromuscular scoliosis, 22 cases of addingon phenomenon, 7 cases of flat back; internal medicine related complications: 6 cases of superior mesenteric artery syndrome (SMAS), 7 cases of pulmonary complications; Operation related complications: 4 cases of pressure sore, 5 cases of wound infection. Conclusion: For correction, surgery complications can be prevented through careful preparation

# Abstract no.: 40266 SAGITTAL PLANE CORRECTION IS CORRELATED WITH QUALITY OF LIFE AT EARLY FOLLOW-UP IN ADULT DEFORMITY PATIENTS Evalina BURGER, Andriy NOSHCHENKO, Cameron BARTON, Sean MOLLOY, Michael CHANG, Vincent FIERE

Introduction: Adult spinal deformity (ASD) is a debilitating condition associated with decreased quality of life (QOL). The purpose of the study is to evaluate the correlation between sagittal plane correction and QOL. Methods: A multicenter prospective study was conducted on 62 consecutive patients after exclusion (48 female, mean age 60.6) who underwent multilevel (4-18) posterior correction for degenerative scoliosis and/or kyphosis. Patient QOL questionnaires (SRS22 and ODI) and radiographic parameters (e.g. sagittal vertical axis (SVA)) were collected preoperatively and at 6-months follow-up. Questionnaire scores were compared to parameters to determine correlation and treatment effect (TE), defined as mean pre to post difference (MD). Standardized mean difference (SMD) was defined as the ratio of MD to preoperative standard deviation. Results: Fifty-three patients were available at 6-month follow-up: compared to preoperative status, the ODI MD was -14 (St.D, 8.2), SMD=-0.94, p<0.001; the SVA MD was -15.3mm (St.D,51.4), SMD=-0.28, p=0.005; the rate of sagittal imbalance decreased to 24% [95%CI:12.2; 35.8]. The SVA TE had significant correlation with preoperative SVA (r=0.78, p=0.005) and postop status: SRS Function (r=0.423, p=0.002) and SRS Total (r=0.314, p=0.026). Correlation between SVA and ODI/SRS TE in the whole cohort did not meet significance (Spearman's correlation=0.24, p=0.1). Power analysis suggests that increasing enrolled subjects to 100-120 would make these results statistically significant. Conclusions: Multilevel posterior instrumentation allows successful restoration of sagittal alignment in ASD patients. At 6-months follow-up, SVA correction corresponded with improvement of QOL. However, the correlation between TEs were weak, and other confounding factors should be studied.

# Abstract no.: 39992 COMPARISON OF POSTERIOR RELEASE AND INTERNAL DISTRACTION AND FINAL SPINAL FUSION VERSUS ONE-STAGE POSTERIOR VERTEBRAL COLUMN RESECTION FOR SEVERE AND RIGID CONGENITAL SCOLIOSIS

Shichang LIU, Yueming SONG

Purpose To compare efficacy, safety and costs between posterior release and internal distraction and final spinal fusion with one-stage posterior vertebral column resection (PVCR) in treating severe and rigid congenital scoliosis. Methods: 41 patients with severe and rigid congenital scoliosis treated between years 2009 and 2012 were included. Group A included 24 patients who underwent one-stage posterior vertebral column. Group B included 17 patients who underwent posterior release with temporary internal distraction, followed by final posterior fusion and instrumentation. Minimum follow-up was 2 years(2-3.5 years). Radiographic and clinical outcomes between the 2 groups were analyzed. Results: A comparison of posterior release and internal distraction and final spinal fusion versus one-stage posterior vertebral column resection in treating severe and rigid congenital scoliosis did not show significant differences in preoperative and postoperative coronal and sagittal imbalance, thoracic kyphosis correction, and lumbar lordosis. However, significant differences were found in curve correction, T1S1 height, length of stay, patient cost of hospitalization between 2 groups. There were no neurologic complications. Conclusion: Posterior release and internal distraction and final spinal fusion produces better corrective effects in curve correction than one-stage posterior VCR in treating severe rigid congenital scoliosis, though hospital stay and costs are greater.

#### Abstract no.: 42350 SURGICAL TREATMENT OF THORACOLUMBAR KYPHOSIS IN ELDERLY PATIENTS WITH OLD OSTEOPOROTIC COMPRESSION FRACTURES Changtai SUN

Objects: Investigation of feasibility and outcome of osteotomy in elderly patients with thoracolumbar kyphosis secondary to old osteoporotic compression fractures. Materials and Methods: There were 22 patients treated for thoracolumbar kyphosis caused by old osteoporotic compression fractures in our department from January of 2008 to December of 2012. Ages of the patients ranged from 70 to 88 years, with an average of 78.8 years. Time of treatment was from 3 months to 2 years after fracture (11 months on average). The fracture was at T12 level in 10 cases and L1 level in 12 cases. All patients were screened for contraindications and underwent transpedicle osteotomy with pedicle screw fixation and interbody fusion. The average follow-up was 18 months (12-36 months). Outcome was assessed based on the improvement in Cobb angle on sagittal plane, the ODI and the VAS scale of pain after surgery and during follow-up. The rate of utilization of bone cement augmented pedicle screw and screw pull-out during follow-up, and the complications during perioperative period were also counted for assessment. Results: All 22 patients presented with progressive thoracolumbar kyphosis, pain and weakness in the thoracolumbar or lumbar region that unable them to stand or sit as desired. The Cobb angle was corrected from 26±6.7° before surgery to 5.5±2.0° at weeks after surgery. The correction rate was 78.8%. During follow-up, the Cobb angle bounced back to 6.1±1.9°, as such the correction rate dropped slightly to 76.5%. ODI and VAS scale decreased respectively from 78.1±20.4 and 8.0±1.1 before surgery to 20.4±5.53 and 1.8±0.92 at the latest follow-up. The overall improvement rate of pain was 77.5%. Fixation was extended over 6 segments in 21/22 cases.

# Abstract no.: 39335 FLEXIBILITY IN ADOLESCENT IDIOPATHIC SCOLIOSIS: MODIFIED ADAM'S FORWARD BENDING TEST

Keith LUK, Alpaslan SENKOYLU, Mustafa ILHAN, Necdet ALTUN, Dino SAMARTZIS

Introduction: This study evaluated the diagnostic utility of the modified Adam's Forward Bending Test (mAFBT), which is a new physical examination method assessing rotational flexibility in adolescent idiopathic scoliosis (AIS) patients. Method: This is a prospective cohort study of 40 AIS patients. In the mAFBT, without coming up to an erect position, subjects were asked to bend to the convex side of the curve in the axial plane. Evaluation of the rib/loin hump flexibility was performed during this maneuver. Scoliometric measurements were done during the AFBT and mAFBT. Results: Significant correlations were noted between the Cobb angle and AFBT (p=0.005), fulcrum bending and the mAFBT (p=0.0001), side-bending and mAFBT (p=0,0001), and the postoperative Cobb angles and AFBT (p=0.003). There were significant positive correlations between curve flexibility as based on the fulcrum bend to that of the CFI (r=0.347, p=0.036) and sidebending technique (r=0.416, p=0.008). Based on ROC analyses (AUC range=0.71-0.78), the mAFBT demonstrated high specificity and sensitivity rates for flexible and rigid curves, respectively. Conclusion: This is the first study to report the mAFBT and the CFI for evaluation of AIS. The mAFBT was found to be a reliable test for clinical assessment of rotational flexibility in AIS patients.

#### Abstract no.: 39908

# USE OF ULTRASOUND TO MONITOR DISTRACTIONS BY MAGNETICALLY CONTROLLED GROWING RODS: A LONGITUDINAL CORRELATION STUDY

Cora BOW, Jason Pui Yin CHEUNG, Dino SAMARTZIS, Kenny KWAN, Kenneth Man-Chee CHEUNG

INTRODUCTION: Growing rods are commonly used for surgical treatment of skeletally immature patients with scoliosis. Magnetically-controlled growing rods (MCGR) allows for more frequent distractions to mimic normal growth. However, such frequent distractions equate to more frequent radiographs for monitoring distraction; thereby, increasing ionizing radiation exposure to the developing child. The use of ultrasound, which emits no radiation, has been found in cross-sectional studies to be reliable in measuring MCGR distractions. As such, the following study aimed to address the longitudinal clinical utility of ultrasound compared to x-ray use for MCGR distractions. METHODS: This is a prospective case series with minimum two-year follow-up of patients treated with MCGR. Out-patient distractions were performed at monthly intervals, targeting 2mm of distraction on each occasion. Assessment of distraction length was monitored by ultrasound at each visit, X-rays were taken every six months and compared with ultrasound measurements. RESULTS: 8 patients (6 females, 2 males) with mean 23 distractions (SD: ±11.9) were recruited. The mean follow-up was 45.7 months (SD: ±12.8). A total of 22 sets of x-rays were taken. The mean distracted length was 5.3 mm(SD: ±3.7mm) on x-rays and 4.7mm (SD:±3.7mm) on ultrasound, with excellent correlation noted between the two imaging modalities (r=0.930; p<0.0001). CONCLUSIONS: This is the first longitudinal study to note that ultrasound assessment of MCGR distraction lengths was highly comparable to that of x-rays. Ultrasound can be a reliable alternative to plain radiographs; thereby, avoiding radiation exposure and its detrimental sequelae in the developing child.

#### Abstract no.: 40527 PROXIMAL RIB VS PROXIMAL SPINE ANCHORS IN GROWING RODS: A MULTICENTER PROSPECTIVE COHORT STUDY

David ROYE, Michael VITALE, Hiroko MATSUMOTO, Mark SULLIVAN, Evan TRUPIA, Julie YOSHIMACHI, Diana LEE, Sumeet GARG, John FLYNN, Peter STURM, Paul SPONSELLER, Francisco SANCHEZ PEREZ-GRUESO, David SKAGGS, Children'S Spine STUDY GROUP, Growing Spine STUDY GROUP

Background: Currently, there is significant equipoise regarding the selection and placement of instrumentation when treating patients with early onset scoliosis (EOS). This study examined proximal device migration, curve correction and health-related guality of life (HRQoL) of patients receiving rib-based versus spine-based proximal anchors as a part of posterior growing instrumentation in the management of EOS. The effect of anchor density was also examined. Methods: This is an ongoing multicenter, prospective cohort study. 97 patients ages 3-9 years with EOS and scoliosis of >40° were enrolled in this study funded by SRS, and supported by both the CSSG and GSSG. 71 (73%) patients received rib-based proximal anchors and 26 (27%) received spine-based proximal anchors. Details regarding proximal anchors, curve correction, HRQoL measured by Early Onset Scoliosis Questionnaire (EOSQ-24), and proximal device migration were prospectively collected at one year after index surgery. Results: No significant difference in curve correction (33% vs 40% correction) or change in EOSQ score (7% vs. -6% change) was noted between spine and rib anchor groups. 11% (8/71) of patients receiving ribbased proximal anchors and 4% (1/26) of patients receiving spine-based proximal anchors experienced proximal device migration, a trend which did not reach statistical significance. There was no proximal device migration in either group in patients who received more than 4 anchors, a result which was highly significant. Conclusion: Having 5 or more proximal anchors was protective against proximal device migration, a finding which may have implications in planning future surgical constructs in this population.

#### Abstract no.: 39189 MANAGING EARLY ONSET SCOLIOSIS WITH MAGNETICALLY-CONTROLLED GROWING RODS FOR MANAGING SCOLIOSIS: DOES THE LAW OF DIMINISHING RETURNS APPLY?

Jason Pui Yin CHEUNG, Cora BOW, Dino SAMARTZIS, Kenny KWAN, Kenneth Man Chee CHEUNG

Introduction: The law of diminishing returns has been proposed to occur in patients that are treated by traditional growing rods. Reduced gains in spinal length occurs with repeated distractions and may be contributed by autofusion of the spine or progressive stiffness. With the magnetically controlled growing rod (MCGR), distractions can be more frequent and less forceful. The objective of study is to assess spinal length gains with MCGR distractions. Methods: This is a prospective case series of early onset scoliosis patients treated with MCGR with minimum follow-up of 2 years. Out-patient distractions were performed at monthly intervals and aiming to achieve 2mm of distraction on each occasion. Increase in length was monitored by radiographs. Parameters collected include Cobb angles, T1-S1, and the achieved distraction lengths. Change in the parameters were analyzed at 6 monthly intervals. Results: Seven patients (3 males, 4 females) with mean follow-up of 3.8yrs (±SD 1.1) were recruited. The mean total number of distractions was 31 (±SD 13). There was no significant reduction in ability to distract over the period of study. Consistent gains in T1-S1 and achieved distraction lengths were obtained with distractions and the pattern was not consistent with the "law of diminishing return". Conclusions: This study suggests that frequent and small amounts of distraction will not lead to reduction in length gain over time. Limitation of this study includes the small number of subjects. However, this study serves to focus attention on the distraction frequency and its potential effect on spine length and growth.

# Abstract no.: 39656 DUAL GROWING ROD TREATMENT IN EARLY ONSET SCOLIOSIS: THE EFFECT OF REPEATED LENGTHENING SURGERIES ON THORACIC GROWTH AND DIMENSIONS Zhijian SUN

Purpose: To investigate changes in thoracic dimensions (TDs) following repeated lengthening surgeries after dual growing rod treatment of early onset scoliosis and thereby its effect on thoracic growth. Methods: All EOS patients treated with dual growing rod technique in our hospital from June 2004 to June 2014 were retrospectively reviewed. Thoracic spine height (T1-T12), total spine height (T1-S1), maximal coronal chest width and pelvic inlet width (PIW) were measured on the posteroanterior X-ray images after initial growing rod insertion surgery and after each lengthening surgery. Absolute TDs measurements were normalized by PIW. Changes of absolute and normalized TDs measurements with age and number of lengthening surgeries were analyzed. Results: Radiographs of 229 surgeries of 53 EOS patients were measured, including 49 images after initial growing rod insertion surgery and 180 images of lengthening surgeries. Significant positive correlations between age and all three absolute TDs were found (P < 0.01) whereas significant negative correlations between age and all three normalized TDs (P < 0.01) were identified. Similarly, negative correlations were also identified between number of lengthening surgeries and the three normalized TDs(P < 0.01). Significant differences of normalized TDs were identified between initial surgery and the first lengthening through covariance analysis (P < 0.01). Yet, such differences were seldom seen between every two adjacent lengthening surgeries. Conclusions: Growing rod technique could maintain TDs growth through repeated lengthening procedures but the growth rate was compromised as the number of lengthening procedures increased.

Abstract no.: 39188

# RANDOMIZED DOUBLE-BLINDED CLINICAL TRIAL TO EVALUATE THE SAFETY AND EFFICACY OF SUPER-ELASTIC MEMORY ALLOY SPINAL ROD VERSUS STANDARD TITANIUM SPINAL ROD IN PATIENTS WITH ADOLESCENT IDIOPATHIC SCOLIOSIS: FIVE-YEAR FOLLOW-UP RESULTS

Jason Pui Yin CHEUNG, Kelvin YEUNG, Dino SAMARTZIS, Michael TO, Kenny KWAN, Keith Dip Kei LUK, Kenneth Man Chee CHEUNG

Introduction: The current trend in spinal instrumentation is to utilize stiffer spinal rods but are at risk of pedicle screw pull-out or neurologic problems from aggressive correction. The authors have manufactured a nickel-titanium rod (NTR) with super-elastic properties to allow gradual correction. The objective of this randomized controlled trial is to evaluate the safety and efficacy of NTR as compared to traditional rods (TRs). Methods: Patients with adolescent idiopathic scoliosis (AIS) and Lenke 1 curves were randomized (1:1) at surgery to receive either the NTR or TR. Anteroposterior and lateral standing radiographs were obtained preoperative, postoperative day 1 and 7, week 4, 12 and 24, year 1, 2 and 5. Parameters assessed include primary and secondary Cobb angles, kyphosis, rib hump, truncal shift, listing, shoulder height, clavicle angle and T1 tilt. Sagittal profiles were subcategorized into Types A (<25°), B (25-35°) and C (>35°). SRS-30 scores, nickel serum levels and any adverse effects or complications were noted. Results: Twenty-four patients with AIS (mean age: 15 years) were recruited with minimum 5 years follow-up. All radiographic parameters were similar between the two groups. Unlike TR, the NTR group had 33% of subjects with preoperative A profiles become B or C at 5-year follow-up. Nickel levels remained normal, there were no allergic reactions, wound complications, loss of balance, implant breakages or non-union. Conclusions: This randomized pilot trial showed that the NTR has potential to gradually correct the spinal curve over time, result in comparable correction to TR and may improve sagittal correction.

# Abstract no.: 41805 CURVE FLEXIBILITY AND MAINTENANCE OF CURVE CORRECTION IN ALTERNATE LEVEL PEDICLE SCREW FIXATION IN ADOLESCENT IDIOPATHIC THORACIC SCOLIOSIS

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INTRODUCTION: Flexibility is an important factor in preoperative planning for adolescent idiopathic scoliosis (AIS). It's unknown if preoperative flexibility affects maintenance of correction in alternative level screw strategy (ALSS) until biologic stability. METHODS: A prospective study of 49 thoracic AIS-ALSS patients (mean age: 14.5-years; 86% females) was preformed. Radiographic parameters were noted on Fulcum Bending Radiograph (FBR) and standing coronal/sagittal films preoperatively, immediate postoperative and at two-year follow-up. Flexibility, curve correction rate, and fulcrum bending correction index (FBCI) were calculated. RESULTS: The mean preoperative coronal Cobb's angles were 58.3° on standing x-ray and 21.9° on FBR (mean FBR flexibility 63.2%). The mean curve correction was 15.2° at immediate postoperative (correction rate: 74.1%; FBCI: 123.4%), and maintained at 18.3° at 2-year follow-up (correction rate: 68.4%; FBCI: 112.5%). 61% of the patients had insignificant change ( $<5^\circ$ ) in coronal alignment (mean change: 1.1°), while the remaining had a mean change of 6.8°. The trunk list did not change significantly (p=0.368), whereas trunk shift improved on last follow-up (p<0.0001). No clinically significant changes were noted in the sagittal profile. While curve flexibility did not predict loss of correction, skeletally mature patients had a 6-fold higher risk of losing curve correction (95% CI:1.3-27.3). CONCLUSION: This study demonstrated satisfactory maintenance of curve correction by low implant density constructs, such as the ALSS. However, skeletal maturity seemed to affect the correction attained. This could be due to a longer standing deformity and less elastic tissue in a mature patient, needing stronger and possibly more fixation points.

#### Abstract no.: 40271 A PROSPECTIVE COMPARISON OF SURGICAL OUTCOMES OF TWO DIFFERENT SURGICAL TECHNIQUES IN CORRECTING THORACIC ADOLESCENT IDIOPATHIC SCOLIOSIS

Keith LUK, Boon-Beng TAN, Darren HUI, Hideki SHIGEMATSU, Cora BOW, Yat-Wa WONG, Kenneth Man-Chee CHEUNG, Dino SAMARTZIS

INTRODUCTION: The "X-Factor Index" (i.e. extraneous factors that may affect curve correction) has recently been introduced to complement the Fulcrum Bending Correction Index (FBCI) in reflecting the true corrective ability for adolescent idiopathic scoliosis (AIS) surgery. Our study assessed the outcome of two surgical techniques and to determine the contribution of surgical technique to the X-Factor Index. METHODS: Fifty-four patients (85% females; mean age: 12 years) with thoracic AIS underwent posterior spinal fusion with instrumentation using two different techniques, by two different surgeons, without direct apical derotation but similar pedicle screw fixation strategy, were prospectively assessed. In technique A (n=25), after locking only the distal most pedicle screw on the concave side, curve correction was achieved from the convex side using the differential rod contouring technique. In technique B (n=29), the deformity correction was achieved from the concave side. The FBCI was used to compare the correction achieved. RESULTS: The median FBCI for groups A and B were 112.1 and 128.3, but did not significantly differ (p=0.278). When curve flexibility was overall greater than 50%, individuals in Group B (median, 123.8) had more curve correction than Group A (median, 109.4) (p=0.030) but this finding was not noted in individuals with higher flexibilities (e.g. 60 % and greater). CONCLUSION: The corrective ability of thoracic AIS depends to a degree on the inherent flexibility of the curve. Although there were suggestions that surgical technique may improve curve correction, statistical significance was not noted. However, larger studies are needed for further validation.

# Abstract no.: 42352 TOUCH VERTEBRA - A NEW STANDARD FOR THE CHOICE OF LOWEST INSTRUMENTED VERTEBRA IN SELECTIVE POSTERIOR THORACOLUMBAR OR LUMBAR FUSION FOR ADOLESCENT IDIOPATHIC SCOLIOSIS

Shengru WANG

Purpose: To define a new standard for the choice of lowest instrumented vertebra(LIV) in selective posterior thoracolumbar or lumbar fusion for adolescent idiopathic scoliosis and evaluate its clinical outcomes. Methods: Forty four patients(M/4, F/40) averaged 14.9(12-19) years with Lenke 5C idiopathic scoliosis were included in the study. All were treated with selective posterior TL/L fusion. We chose Touch Vertebra as the LIV in all patients. The standards of Touch Vertebra were as follows: it could be touched by the center sacral vertical line(CSVL) on the standing anteroposterior X ray, its rotation < II and the CSVL could cross between the medial walls of the two pedicles of the vertebra on the supine convex bending film. Standing anteroposterior and lateral radiographs were obtained in the post-operation and follow-up. Radiographic measurements were taken to evaluate the results of correction. Results: All patients were followed at least for 2 years. The averaged fused segments was 6.2(4-9). Averaged 0.2 (-1 to 1) below the lower-ended vertebra(LEV) and averaged 1.6(1 to 2) above the stable vertebra were fused. The mean preoperative Cobb angle of the lumbar curve was 48.0° and that of the thoracic curve was 26.3°. The mean flexibility of the lumbar and thoracic curve was 80.9% and 73.1%. The lumbar and thoracic curves were corrected to 6.5° and 13.3° postoperatively and measured 9.0° and 14.3°, respectively, at the last follow-up. The minor thoracic curves didn't progress after the surgery. Regarding the overall coronal and sagittal balance, there was no significant difference between preoperative, early, and late postoperative measurements (p</span>> 0.05). The preoperative LIVDA (lowest instrumented vertebra caudal disc angulation) was -1.9°, and measured 2.5° postoperatively, 4.

#### Abstract no.: 39394 COMPARISON OF TWO DIFFERENT NEEDLES USED AS KNIFE ON KNEE ARTHROSCOPIC PORTALS SCALPEL PROCEDURES. Fabio Ferraz Do Amaral RAVAGLIA, Rodrigo Sbeghen PASCOALINO

Background: It is common, safer and precise arthroscopic technique to use a needle before a cutting knife to help targeting the correct entry point. It avoids damaging healthy structures. latrogenic arthroscopic entry portals damages are an undesired and evitable complication. It may be not a minor complication. It is a bad result, affecting the patient's quality of life. It can lead to traumatic iatrogenic osteoarthris. It is time to a develop a safer surgical instrument. Using one instrument instead two can be more cost effective and environment friendly. Objective: Can a needle be used as knife in knee arthroscopies' portals procedures? Method: 500 consecutive knees arthroscopies, performed by the same surgeon and team. 250 knees arthroscopies' medial portal incision were used an 18 gauge needle to scalpel and 250 cases a 14 gauge needle were used. The follow up wound assessment in 1,8,15 and 60 days regarding bleeding, discharging, healing time and, infection. Discussion: A needle used as a knife is possible to precise more the entry portals, avoid soft tissue damage and avoid cutaneous nerve damage. As it is two instruments in one, time and cost are saving by this method. There was no difference in complications between both systems. The thicker one is easier to handles stated by the surgeons. Conclusion: There were no difference between the two types o needle. This is a safe, cost effective and efficient method. We think that a needle knife arthroscopic surgical device would be beneficial as a surgical option tool.

#### Abstract no.: 42127 THE TREATMENT OF KIENBOCK'S DISEASE WITH RADIAL SHORTENING AND WRIST ARTHROSCOPY DECOMPRESSION Jun HU, Longhai QIU, Yinfeng XU

Objective: To study the curative effects of the treatment of Kienbock's disease, which were ulnar varience treated by radial shortening and wrist arthroscopy decompression. Methods: After literature reviewing from 2011.5 to 2014.6, 3 years follow-up of 1 patient who received radial shortening and wrist arthroscopy decompression were performed by our group. Results: Document literature suggested that the lunate collapse were progressive and the early diagnosis and early treatment were pivotal. The radioulnar joint corresponds in a good position and the revascularization of lunar could be observed. The wrist height as well as the Cooney's scrore was significantly improved, compared with preoperation. Conclusion: The treatment of Kienbock's disease which were ulnar varience could achieve satisfactory clinical effects. Kienbock's disease, radial shortening, arthroscope, decompression

# Abstract no.: 41775 COLOUR AIDED ARTHROSCOPIC RESECTION OF DORSAL WRIST GANGLION

Awkash Kumar AWKSAH KUMAR

Introduction: Ganglia are benign masses, commonly encountered in wrist, various treatment methods are described. osterman and raphael 1st described arthroscopic resection of dorsal wrist ganglion (DWG), we propose to identify incidences of various sites and extent of DWG and to delineate the stalk arthroscopically with percutaneously administered dye and to diagnose concomitant pathologies of the wrist joint. material and methods: interventional study done on 30 patients between 15-50 years of age. pain, grip strength, range of motion and location assessed pre and post operatively. surgery carried out on standard operating table in supine position under general anaesthesia using torniquet and finger traps. the radiocarpal joint insuflated with normal saline, the standard portals 6R, 3-4 and mid carpal portal were used for the study. methylene blue dye injected percutaneously into the ganglia. stalk & joint pathology noted and excision of the ganglia was done. return to work, patient satisfaction using "mayo wrist score" and recurrence were assessed post-operatively. final evaluation analysed at the end of 6 months. results: radiocarpal location was present in 73.33% cases, majority of the patients were female(76.6%), range of motion improved significantly, pain relief on vas was 2.26. 27 patients(90%) scored 100%, while 3 patients (10%) had mayo wrist score of 75%. 2 recurrences were noted and 1 case of extensor tendon injury was encountered. conclusions: identification of stalk is an uncommon finding, instillation of dye was not helpful, synovial hypertrophy was the most characteristic finding (100%), others include-S/L tuft (4/30), asymptomatic TFCC tear(5/30), lax SLIL (1/30).

#### Abstract no.: 39626 A RARE CASE OF INTRA-ARTICULAR DISPLACEMENT OF ENDOBUTTON FOLLOWING ACL RECONSTRUCTION Sean HO, Keng Thiam LEE

The EndoButton with continuous loop is a commonly used device for femoral fixation of anterior cruciate ligament (ACL) grafts. Complications from its usage remain rare. These include soft tissue interposition, incomplete passage of the Endobutton as well as displacement into the knee joint. Anterior placement of the femoral tunnel may lead to an intra-articular placement of the EndoButton within the suprapatellar pouch. This can lead to disruption of graft incorporation due to synovial fluid infiltration into the femoral bone tunnel, irritation of the patellofemoral articulation, and displacement of the Endobutton should the loop or graft fail. We present a case of anterior femoral tunnel placement resulting in intra-articular displacement of the EndoButton after loop failure. A 24-year old man with a history of ACL reconstruction 4 years prior presented with acute onset of knee instability. Radiographs and MRI revealed ACL graft rupture with intra-articular displacement of the EndoButton to the posterolateral tibial plateau .Arthroscopic revision ACL reconstruction and removal of the Endobutton was performed. Intra-operatively, it was noted that the femoral tunnel exit was within the supra-patellar pouch, with rupture of the continuous loop being the cause of Endobutton migration. Intra-articular displacement of the EndoButton is a rare complication and has only been reported twice in the literature. Anterior placement of the femoral tunnel may predispose patients to this complication. We recommend routine arthroscopic screening of the suprapatellar pouch in every patient after femoral tunnel drilling to ensure that the tunnel does not exit within the suprapatellar pouch.

# Abstract no.: 42131 EVALUATION OF COMPUTER ASSISTED PREOPERATIVE PLANNING SYSTEM IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION Yanlin LI

Objective To investigate the biomechanical mechanism and report preliminary clinical efficacy of eccentric rotational acetabular osteotomy (ERAO) when treating developmental dysplasia of the hip (DDH). Methods Biomechanical model of the hip joint was established on six female cadaveric hips embalmed by formalin and ERAO was then performed on the model. Vertical force was loaded on the cadaveric spine from 0 N to 500 N and strain value on femoral head was measured preoperatively and postoperatively when loading force on spine reached the point of 100, 200, 300, 400, 500N. Stress value were then calculated base on the measurements. Besides, we reported postoperative follow-up cases that underwent ERAO to treat DDH in our hospital between July 2007 to October 2014. A total of 25 patients (26 hips) were reported, including 6 males and 19 females. Age varies from 11 to 57 years old, mean age was 31 years old. Postoperative hip function was evaluated by Harris hip score and anteroposterior X-ray of pelvic was taken preoperatively and postoperatively to measure the AHI (Acetabular-head index), CE angle (Center-edge angle) and Sharp angle. Results Preoperative stress increased when load on spine became larger, but postoperative stress changed its increasing trend into decreasing when the load was greater than 300 N (turning point), showed a parabolic trend. Postoperative stress was not statistically significant compared with the preoperative stress under different load varying from 100N to 500N. Meanwhile, by the end of follow-up. 18 patients (19 hips) were followed form 7 to 85 months. The average follow-up time was 40months and the follow-up rate was 72%. Harris hip score improved from preoperative (64.3±7.2) points to (85.6±5.3) points; postoperative AHI increased an average of 36.5%, CE angle increased an average of 33.1° and sharp angle reduced an average

#### Abstract no.: 42130 GAIT MODIFICATION STRATEGIES IN TRUNK-OVER-RIGHT STANCE PHASE IN PATIENTS WITH RIGHT ANTERIOR CRUCIATE LIGAMENT DEFICIENCY Wenhui ZHU

Purpose:To investigate gait modification strategies of trunk-over-right stance phase in patients with right anterior cruciate ligament deficiency (ACL-D). Methods:Thirty-six patients with right chronic ACL-D and 36 controls were recruited. A 3D optical video motion capture system was used to record coordinate data from reflective markers positioned on subjects as they walked, and on a custom-built staircase. Kinematic variables of the trunk were calculated.Results: Patients with chronic right ACL-D exhibited many significant abnormalities compared with controls. Trunk posterior rotation over right stance phase was lower at all the five motion patterns as described in our article(P<0.05). When walking, trunk anterior rotation over right stance phase was higher ( $5.54\pm0.6$ ). When ascending stairs, trunk lateral flexion to the left was higher ( $1.92\pm0.2$ ).When descending stairs , trunk lateral flexion to left over right stance phase was higher ( $3.88\pm0.3$ ). From

Stairs descent to walking, either trunk posterior lean(-1.51±0.4) or lateral flexion to right (-

1.47±0.3) over right stance phase was higher. Conclusions:These findings suggested that gait modification strategies of trunk were apparent in patients with right ACL-D. Results supply more insights with respect to improving the diagnosis and rehabilitation of chronic ACL-D. This information may also be helpful for a better use of walk and stair tasks as part of a rehabilitation program, and to provide a safe guideline for the patients. anterior cruciate ligament deficiency; trunk; kinematics; gait modification strategy

#### Abstract no.: 41667 SUBTALAR ARTHROSCOPY FOR VARIOUS INDICATIONS, SHOULD IT BE A GOLD STANDARD? A SINGLE SURGEON EXPERIENCE Abhishek ABHISHEK, Rajan MAHESHWARI, Madhavan PAPANNA, Sanjeev MADAN

Introduction: Subtalar arthroscopy is a relatively new and evolving technique. Aim of this study was to present indications and results of subtalar arthroscopy performed by a single surgeon over 3 years. Methods: Patient demographics, indications, associated pathology, operative findings and results were reviewed for 18 feet in 15 consecutive patients. Foot and Ankle Outcome Score (FAOS) and Manchester-Oxford Foot Questionnaires (MOXFQ) were used. Results: Mean age was 45.7 years. Mean follow-up 15.8 months. Mean FAOS score improved from 28.3 to 57.8. and MOXFQ score from 59 to 20. Complications included one superficial infection and one patient requiring a re operation due to stiffness and capsular contracture. Excellent to good results were observed in 13 patients (16 feet) (86.7%), one was considered satisfactory and one poor. Conclusions: We conclude that subtalar arthroscopy can be performed as a safe and effective technique for various indications and should be considered as a gold standard for commonly performed procedures like subtalar fusion. Careful patient selection and thorough knowledge of anatomy are essential.

# Abstract no.: 41448 SHORT-TERM OUTCOME OF ARTHROSCOPIC MODIFIED BROSTRÖM REPAIR FOR CHRONIC LATERAL ANKLE INSTABILITY.

Tomohiro MATSUI, Tsukasa KUMAI, Yasushi SHINOHARA, Ichiro HIGASHIYAMA, Yasuhito TANAKA

Arthroscopic Broström repair has been recently developed for lateral ankle instability. The purpose of this study is to evaluate the short-term outcome of arthroscopic modified Broström procedure in comparison to the conventional open procedure we had previously performed. The subjects were the patients with chronic lateral ankle instability who have failed to conservative treatment. The arthroscopic group was comprised of 29 patients aged 28.2 years on average, and the open group comprised of 49 patients aged 29.8 years. The instability including anterior drawer distance and talar tilt angle on stress radiographs, and AOFAS ankle-hindfoot score before surgery and at the final follow-up were evaluated. The mean durations of follow-up were 11 and 26 months in the arthroscopic and open groups, respectively. The mean anterior drawer distance improved 6.7mm to 4.2mm in the arthroscopic group (p<0.05), and 6.7mm to 3.5mm in the open group (p<0.05). The mean talar tilt angle also improved from 13.1° to 4.0° and 13.3° to 4.7° in the arthroscopic and open groups, respectively (p<0.05). The AOFAS anklehindfoot scale improved in all cases in the arthroscopic group, achieving favorable outcomes (Ave. 66.2 to 94.6, p<0.05), similarly to those of open group (Ave. 73.1 to 94.1, p<0.05). Ninety percent of the patients had additional arthroscopic procedures for the associated intra-articular pathologies in the arthroscopic group. Based on the results in this study, arthroscopic Broström repair is comparable with open procedure in terms of both restoration of ankle stability and improvement of symptoms, and effective in preserving arthroscopic advantages.

#### Abstract no.: 42128 ARTHROSCOPIC INTEROSSEOUS TALOCALCANEAL LIGAMENT RECONSTRUCTION Chen JIAO

[Objective]To study the technology of interosseous talocalcaneal ligament reconstruction under arthroscopy and its clinical effect. [Method] Ten consecutive patients with interosseous talocalcaneal ligament rupture underwent arthroscopic reconstruction from August, 2007 to May, 2010. There were nine males and one female with an average age of 30.5 years (range, 15~50 years). The mean time from injury to surgery was 23.2 months (range, 2.5~120 months). The average follow-up time was 19.2 months (range, 13~46 months). All patients had a history of inversion injury and symptoms of instability and pain on the hindfoot. The tenderness on sinus tarsi and anterior drawer test on subtalar joint were all positive. We also designed calcaneal transverse slide test and calcaneal tilt test for diagnosis of subtalar instability with one hand fixing the talus while the other hand pulled the calcaneus transversely to feel for a slide and with inversion of the calcaneus to feel for any gapping of the lateral subtalar joint. The two tests were positive in 5 patients. All patients were treated with arthroscopic exploration and reconstruction of interosseous talocalcaneal ligament using hamstring. One case combined with calcaneofibular ligament rupture underwent repair simultaneously. Calcaneal transverse slide test and calcaneal tilt test were more obvious under arthroscopy. Surgical technique was designed that two tunnels 4.5 mmin diameter were made in the talus and the calcaneus with the talar tunnel located at the anterolateral edge of the posterior facet on the foot print of the ITCL and drilled toward the superomedial corner of the talar neck and the calcaneal tunnel located at the remnant of the calcaneal root of the ITCL at the sulcus anterolateral to the posterior subtalar facet of the calcaneus and drilled toward the lateral side of the calcaneus. The graft was passed through

#### Abstract no.: 40140 ASSESSMENT OF ARTHROSCOPIC MOTOR SKILLS AND ESTABLISHING BENCHMARKS FOR TRAINING USING SAWBONES 'FAST' ARTHROSCOPY WORKSTATION

# Hatem SAID, Goyal SAUMITRA, Mohamed ABDEL RADY, Karamallah RAMADAN

Arthroscopic skills training outside the operative room may decrease risks and errors by trainee surgeons. Thus, there is a need of simple objective method for evaluating proficiency and skill of arthroscopy trainees. The aim of this study is to correlate motor task performance to level of prior arthroscopic experience and establish benchmarks for training modules. Twenty orthopedic surgeons performed set of tasks to assess a. arthroscopic triangulation, b. navigation, c. object handling and d. meniscus trimming using SAWBONES 'FAST' arthroscopy skills workstation. Time to completion and the errors were computed. The subjects were divided into 4 levels; 'Novice', 'Beginner', 'Intermediate' and 'Expert' based on previous arthroscopy experience, for analyses of performance. The median time to completion for each task improved as the level of experience increased and this was found to be statistically significant (p<.05) eg. time for maze navigation (novice - 166s, beginner - 135.5s, intermediate - 100s, expert - 97.5s) and the similar results for all tasks. The performance under clear versus opaque dome showed no difference in expert and intermediate group (p=0.197), whereas, the less experienced groups were found to have difficulty in simultaneous image tracking and instrument handling, bimanual dexterity. Majority (>85%) of subjects across all the levels reported improvement in performance with sequential tasks. The significant difference in arthroscopic skills of surgeons based on experience and can be used as surrogate for technical skill training. This assessment will also allow us to set proficiency benchmarks based on which a training program can be developed.

# Abstract no.: 39957 CLINICAL EPIDEMIOLOGICAL ANALYSIS ON POSTERIOR CRUCIATE LIGAMENT INJURIES Gang CHEN

Objective: To investigate clinical characteristics of posterior cruciate ligament (PCL) injuries. Methods: To review all 326 cases with PCL injuries from January 2006 to June 2013 retrospectively, which were grouped by injury patterns. The survey included the gender, age, sides, time from injury to surgery, cause of injury and combined injuries. Compare the patient-specific factors between two groups. Results : Male patients were the majority of PCL injuries (73%), and 30-50 years old patients accounted for 59%. 62.6% of all patients went for a doctor within one month after trauma. Traffic accidents were the main cause of PCL injuries (59%), which mostly occurred in motorcycle accidents (74.3%). Anterior cruciate ligament (ACL) injuries were the most common combined injuries (46.9%), followed by medial collateral ligament (MCL) (29.8%) and posterolateral corner (PLC) (26.1%). The meniscal tears accounted for 30.4% of total cases. The in-substance PCL injuries (71.5%) were far more than avulsion fractures (28.5%), and the former had more combined injuries than the later (P < 0.05). The causes of injuries were statistically different between two groups (P < 0.05). The prevalence of isolated avulsions was higher than isolated in-substance injuries (P < 0.05). Conclusion : In the general population, insubstance PCL tears were dominant in PCL injuries. The prevalence of combined injuries was quite high, among which ACL injuries were the most common. Insertion avulsion fractures emerged mainly at the tibial side, which had less combined injuries than those sufferd in-substance PCL injuries. The incidence of isolated insertion avulsion fractures was higher than isolated in-substance injuries.

#### Abstract no.: 41678 OUTCOMES IN PCL RECONSTRUCTION - 5 YEARS FOLLOW-UP Ivan GEROV, Vladimir RUSIMOV, Bojko ANGELOV

Introduction: The PCL repair is a challenging procedure despite the improved guiding arms and soft tissue protection. The mechanical instability defines the pain and is the major reason for surgery. Depending on the injury pattern, most PCI injuries are associated with concomitant lateral meniscus and lateral collateral ligament injuries. Methods: In 8 years period we had operated 8 PCL in7 patients, out of 1895 patients with ACL and/or PCL rupture. One case had a complete knee dislocation and needed an open reconstruction, in association with the complex proximal tibial plateau fracture. Another one had bilateral rupture of the PCL addressed in a two separate occasions. In 5 other cases it was an isolated PCL rupture, combined with lateral meniscal injury. Conventional arthroscopic anterior and posteromedial approaches for the tibial insertion were used. SemiT autografts and resorbable interference screws for the tibial and femoral locking were used. The mean operative time was 80 min(72 to 94 min). The rehabilitation protocol was early weight bearing - on day 2 and passive extension to 0 degrees and flexion to 60 deg for the first week, followed by full flexion to 100 deg in the next 2 weeks. Hinged braces were used in 4 patients.Results: In three patients no pain or discomfort were reported 5 years after the reconstruction and return to normal sport activities. 2 patients had discomfort, but not pain and were able to walk and weight bear without support. 2 patients had significant discomfort and pain on weight bearing.

# Abstract no.: 39958 CLINICAL STUDY ON FACTORS ASSOCIATED WITH MENISCUS AND CARTILAGE INJURIES ACCOMPANYING ISOLATED RUPTURE OF POSTERIOR CRUCIATE LIGAMENT Gang CHEN

Objective To investigate the factors associated with meniscus and cartilage lesions accompanying isolated rupture of posterior cruciate ligament (PCL). Methods One hundred forty-seven consecutive young patients with rupture of PCL from January 2005 to June 2013 were retrospectively studied up on the relationship of distribution, severity and incidence of meniscal tears and cartilage injuries with gender, age, sides, duration, body mass index, cause and degree of instability. Results Gender, age, sides, duration and degree of instability were found to be the risk factors associated with meniscal injuries (P<0.05). Gender, age, duration and degree of instability were found to be the risk factors were found to be independent risk factors associated with chondral injuries (P<0.05). No factors were found to be independent risk factors associated with meniscal and chondral injuries. Chondral lesions were concentrated in medial tibiofemoral compartment and patellofemoral compartment. Conclusions Severe cartilage lesions and less meniscal tears can be induced by the rupture of PCL. Medical treatment should be performed to restore stability and reduce chondral injuries.

#### Abstract no.: 41158 ARTHROSCOPIC POSTERIOR CRUCIATE LIGAMENT RECONSTRUCTION IN PATIENTS WITH OPEN PHYSES: A NEW PHYSEAL SPARING TECHNIQUE WITH CASE REPORT Chaowen LIN, Sheng ZHANG, Xiaoreng FENG, Bin CHEN, Jintao FANG

Tears of the posterior cruciate ligament (PCL) in pediatric patients, especially intrasubstance injuries, are extremely rare. However, with an increasing incidence of ligamentous injuries of the knee in skeletally immature patients, orthopaedic surgeons will more frequently need to decide the best management of the PCL injury in children with open physes.A 12-year-old boy sustained a complete torn of the PCL intrasubstance of his left knee in a car accident reconstructed by an modified arthroscopic physeal sparing technique who has failed for conservative treatment. This successful arthroscopic physeal sparing reconstruction was accomplished using the femoral tunnel technique in combination with a modified method of tibial tunnel placement which was below the tibial physeal. A posteromedial arthrotomy was performed to protect the neurovascular structures and avoid physeal injury when drilling the tibial tunnel. At 6 months follow-up, the patient was asymptomatic and his range of motion ranging from 0° of extension to 120° of flexion. Clinical examination demonstrated both legs of equal length, no varus or valgus deformity, and a normal posterior drawer examination. The use of the modified arthroscopic tibial tunnel technique under the fluoroscopy and posteromedial arthrotomy prevented transphyseal drilling. It allows early mobilization and return of function, and avoids physeal injury which can be considered as a viable treatment for PCL reconstruction in the skeletally immature patient.

#### Abstract no.: 41639 ARTHROSCOPIC TREATMENT OF ACUTE TIBIAL AVULSION FRACTURE OF THE PCL WITH SUTURE BRIDGE FIXATION TECHNIQUE Jefferson GEORGE

INTRODUCTION: PCL avulsion fractures are rare and their treatment still remains difficult. Open surgery has its own risk and complications and can be safely fixed under arthroscopic guidance. METHODS: Diagnosis was based on clinical examination, plain Xray and MRI. We treated 8 cases of acute PCL tibial avulsion fractures through double posteromedial portals, from 2013 to 2015. No.2 fibre wire suture (orthocord) was tied at the osteoligamentous junction, which were pulled out through two 4.5 mm bone tunnels and tied over anterior bone bridge or suture disc. Patients were followed up monthly till fracture healed and then 6 monthly thereafter. They were evaluated by the International Knee Documentation Committee and Lysholm rating scales. RESULTS: 7 were males and 1 was female. Mean follow up was 18 months. No flexion deformity limitation was seen. Good reduction was achieved in all patients, confirmed with postoperative Xrays. All patients had negative posterior drawer tests. The Lysholm score was 92 to 100, with an average of 96.5. CONCLUSION: The described technique with Suture bridge fixation can restore the stability and function of the joint in most patients. Visualisation through dual portals is convenient and fixation is secure and safe. The advantages are faster healing, rehabilitation and less pain and trauma with the operative procedure. A readily performed arthroscopic procedure prevents knee joint instability and development of arthritis.

# Abstract no.: 40228 STAGED APPROACH FOR TREATMENT OF ACL / MCL INJURIES. A CASE SERIES

Paul Ross MIDDLETON

Introduction: Combined ACL / MCL injuries are serious knee injuries. Our institute has developed a staged surgery method of treating these serious injuries. Treatment included an MRI scan to confirm the diagnosis and early open MCL repair. The patients then undergo 6 months of focused physiotherapy. At this point, if required, we reconstructed the ACL using hamstring tendon graft. Methods: 20 patients suffered combined ACL / MCL injuries over a 4 year period. All patients were treated with a consistent technique. We looked at the outcomes and any complications from the surgery. Results: All 20 patients underwent open MCL repair. 85% of patients went on to have ACL reconstruction. The other 15% were found to have a stable knee after targeted physiotherapy and was felt they did not require ACL reconstruction. Of the 17 patients undergoing both procedures all had full extension and all had flexion greater than 120 degrees at 9 months post ACL reconstruction. 16 had a stable knee. 1 patient suffered ACL graft failure. This was successfully revised and at 1 year post revision had a stable knee. MRI scan was performed on all 20 patients. In 7 patients a meniscal injury was reported yet on arthroscopy 3 of these patients did not have a meniscal injury. Conclusion: A staged method of MCL repair, focused physiotherapy, followed by ACL reconstruction, seems to give a good knee function in the patients we studied. It was interesting to note the apparent over reporting on MRI of meniscal injuries.
# Abstract no.: 40972 SIMULTANEOUS ACL RECONSTRUCTION AND HIGH TIBIAL OSTEOTOMY

Walid REDA, Ashraf MOHARRAM, Ahmed NOKEETY

This prospective study carried out from march 2012 to January 2015 included 20 patients. The age ranged between 18-40 years. All were males suffering from chronic Acl insufficiency with varus knee deformity. Patients underwent simultaneous arthroscopic Acl reconstruction and medial opening wedge high tibial osteotomy using locked plate and synthetic bone graft. Patients were followed for at least 20 months. Outcomes were assessed using the IKDC score, Lysholm knee score and KT 1000 arthrometer. The standing hip knee ankle (HKA) angle and the posterior tibial slope and degree of joint opening was assessed both preoperatively and postoperatively. All clinical scores improved significantly after surgery; the mean subjective IKDC improved from 42.9 to 79.2, also the final IKDC ligament evaluation showed marked improvement where 85% of patients were classified as normal or near normal. 75% of patients had excellent knee function and 25% had good knee function according to the Lysholm score. 90% of patients were considered normal or near normal according to the KT 1000 arthrometer. Varus deformity also improved after surgery as the mean HKA angle improved from 10.65 varus to 0.6 varus. the posterior tibial slope increased from 6.06 to 6.32. 80% of patient returned to their preinjury level of activity. Post operative complications were few and mild and were easily managed. It could be concluded that performing simultaneous arthroscopic ACL reconstruction and medial opening wedge high tibial osteotomy is effective for obtaining a satisfactory correction angle, good clinical outcomes and low complication rate.

#### Abstract no.: 39233 EFFECT OF RETAINED POSTERIOR HORN OF MEDIAL MENISCUS ON FUNCTIONAL OUTCOME OF ACL RECONSTRUCTED KNEES Kevin SYAM, Mandeep Singh DHILLON, Devendra Kumar CHOUHAN

Introduction: The posterior horn of medial meniscus (PHMM) is a secondary stabilizer against anterior translation of tibia. Cadaveric studies have revealed increased strain on the ACL graft and greater laxity in Posterior horn deficient knees. However, functional outcomes in ACL reconstructed knee in the absence of Posterior horn are less discussed and ill-documented. This study evaluated functional and radiological outcomes in ACL reconstructed knees with preserved and sacrificed PHMM. Materials: Of the 457 patients who had ACL reconstruction, over a 6 year period, 77 cases with minimum follow up of 18 months were included after strict exclusion criteria. 41 patients with intact PHMM were compared with 36 patients with absent PHMM. Radiological and clinical instability tests were conducted and knees were evaluated using subjective International Knee Documentation Committee (IKDC) score and Orthopadische Arbeitsgruppe Knie score (OAK). Results: Cases with intact PHMM showed a trend towards significantly better overall OAK outcome (p value 0.082) and significantly better objective stability (p value 0.004) at average of 43.03 months. No significant differences were noted in the subjective IKDC score (p value 0.526) and functional OAK outcome (p value 0.363). More cases with absent PHMM had evidence of radiological OA (p value 0.022) even at mid-term follow-up. Conclusion: Even though the overall OAK and subjective IKDC scores did not show significant difference between the two subsets, the poorer outcomes in terms of objective stability and radiological OA in the absence of PHMM, indicates the importance of preserving this important part of the meniscus.

#### Abstract no.: 41460 AN ASSESSMENT OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING AUTO TRIFOLD SEMITENDINOSIS GRAFT BY ENDOBUTTON IN SOUTH INDIAN POPULATION Rohit BANSAL, Chitta Ranjan SAHU, Jagadesh GUDARU

Objectives: To evaluate the clinical and radiological outcomes of a prospective series of 74 ACL reconstructions using the autotrifold semitendinosis graft and EndoButton CL® for femur. Methods:74 patients, mean age 27.5 years had ACL reconstruction using the same technique by single surgeon.SemiT graft with a minimum folded width and length of 7mm were included. Trifold semitendinosis graft was prepared using auto fold technique and fixed to femur using endobutton and to tibia with screw. The results were assessed at 6weeks,3months, 6months and 1years. А mean follow-up of 18months.both clinically(IKDC,Lysholm) and radiologically for tunnel position and joint changes.An attempt to reproduce a force of 150N(using 15kg) applied to the knee through a pulley to check laxity and was graded radiologically.Results:No complications related tovtrifold graft.The EndoButton® gave adequate fixation.IKDC score,63 patients(60%) were gradeA,37 gradeB(35.3%), four gradeC(3.8%) and one gradeD(0.9%). Stress views with 15kg of weight showed a translation of 2mm with mean translation of 1.1mm(.6-2.2mm).Tibial tunnel enlargement was constant;Significant femoral tunnel enlargement(>2mm) seen in 25.6% of cases.Two failures revised with a patellar tendon graft.No endobutton cutout or loosening was observed.Conclusion: The results are comparable to other series. Indian population is not involved in contact sports as in recreational activities. It's reproducible and the chances of iatrogenic complications are narrowed as only one graft has to be harvested, less donor site morbidity. Endobutton provides adequate fixation without damaging the tendon and is less time consuming. The strength of the graft, is as good as guadruple hamstring graft. A longer follow up and KT1000 could provide more objective outcome.

#### Abstract no.: 39444 MPFL RECONSTRUCTION USING A QADRICEPS TENDON GRAFT Ion Bogdan CODOREAN, Florin DIACONU, Stefania TANASE, Eduard CERNAT

Introduction: This study aims to demonstrate that MPFL reconstruction using quadriceps tendon is an easily achieved procedure, with fewer complications than other MPFL reconstruction techniques and good clinical results, similar to those previously reported in the literature. This technique is not widely used, just few authors reported MPFL reconstruction using quadriceps graft in the past. Methods: This retrospective study included 62 patients with a mean age of 24 ± 5.1 years (range 14-38 years) from a single Orthopedic Department (between August 2011- September 2013), with MPFL reconstruction using quadriceps tendon graft. For 43 patients the only surgical intervention was MPFL reconstruction. The others needed multiple procedures. Mean follow-up was 18 months (range 7-32 months). All patients performed MRI and CT before surgery. Clinical evaluation after surgery began at 3 months postoperatively and continued every 3 months until the end of the follow-up period. Kujala scoring of patellofemoral disorders was used to evaluate subjective symptoms and functional limitation. Results: No patellar redislocation, medial patellofemoral osteoarthritis or other patellar complications (fractures) were found at the final follow-up. The mean Kujala score significantly improved postoperatively. Only 6 patients complained of nonspecific knee pain. For those patients repeated MRI showed good integration of reconstructed MPFL. 9 patients complained of the negative cosmetic appearance of the scars. Conclusions: MPFL reconstruction using a superficial quadriceps tendon graft is easily performed, without significant complications and with good clinical results.

### Abstract no.: 41911 ARTHROSCOPIC ASSISSTED TENSIONING TECHNIQUE IN MPFL RECONSTRUCTION

Tarek KHADRAWY, Ahmed WALY

MPFL acts as a bridle that restrains the patella to its right path at specific angle and at specific tension. The most debatable and crucial issue in MPFL reconstruction is the way and angle of its tensioning. Many studies discussed the problem of tensioning of the graft and its effects on patellofemoral cartilage and patellar tracking. This article presents a new concept of MPFL tensioning using Suprapatellar lateral portal 70o arthroscopy.We hypothesis that every patient has specific angle at which the MPFL restrains the patella to its normal tracking within its bony constraint. MPFL should be tensioned at the angle of engagement of the patella to the trochlear constraint. This angle is individualized and differ from patient to another .Methods: Forty knees with patellar instability underwent MPFL reconstruction with SemiT autograft between 2011 to 2013. The mean age was 26.7 years. Arthroscopy was done before reconstruction to determine angle of patellar engagement which represents the true and maximum tensioning of MPFL. Results: The average follow-up was 18 months (range, 14-23). No recurrent episodes of dislocation or subluxation were reported. In most of the patients (28 patients) the engagement occurs at 30o-45o flexion, in nine patients from 45o-60o flexion and all of them had patella alta, and 15o-30o flexion in three patients. The mean Kujala score improved significantly from 47 to 94 (P< 0.05). Conclusion: Tensioning angle is individualized for each patient and should never be fixed for all patients. Preoperative arthroscopy should be done to determine angle of patellar engagement

## Abstract no.: 40868 METHODS OF SURGICAL TREATMENT OF ENTHESIOPATHIES OF POPLITEUS TENDON OF THE KNEE

Mirkhakim AZIZOV, Bekpulat BAKIEV, Farrukh USMONOV

Introduction. Meniscectomy is based on the following principles: removal of all mobile meniscal fragments; leveling the remaining edge of the meniscus throughout; maximum preservation intact of the meniscus and the meniscus-capsular connection. The objective of the proposed method is to increase the effectiveness of treatment and reduction of postoperative complications. To solve the problems a method of treating damage to the posterior horn of the lateral meniscus of the knee. Methods. The arthroscope is introduced into the joint cavity through antromedialny and antrolateralny skin incision of 0.5 cm. In case of damage of the lateral meniscus posterior horn and enthesiopathies popliteus tendon synovectomy performed shell thigh muscle and partial meniscectomy degenerated part of the posterior horn of the lateral meniscus. Joint cavity was washed with physiological saline. This method of operation leads to rapid regeneration of the posterior horn of the lateral meniscus. These features make it possible to draw a conclusion about the novelty of technical solutions. The method allows to increase the effectiveness of treatment and reduce postoperative complications. The method can improve the blood circulation of the posterior horn of the lateral meniscus. The method used for operations in 117 patients with a diagnosis - damage to the lateral meniscus of the knee. Results. Clinical efficacy was 96% (n = 112). Thus, the proposed method is simple to use, available at low cost, the special conditions of operation, has a high clinical efficacy and has a novelty method is recommended for widespread use in trauma practice.

#### Abstract no.: 41598 A HUGE HETEROGENOUS MEDIAL PARAMENISCAL CYST OF THE KNEE JOINT: A RARE CASE REPORT Praveen Kumar BIRRU Bertran XAVIER MANUBENS Reddy SIDDARTH

Praveen Kumar BIRRU, Bertran XAVIER MANUBENS, Reddy SIDDARTH, Basha AKBAR

Medial parameniscal cysts are small cystic lesions which measures between 0.3 to 9mm in diameter.We describe a huge heterogenous cyst in a 33-year-old woman who is a HIV-positive patient.We beleive this to be the heterogenous medial parameniscal cyst reported in the literature.MRI showed a large heterogenous cyst (4.5x5.5cm)seen adjoining posterior horn of medial meniscus with tear in the body and posterior horn.We performed Arthroscopic partial menisectomy and open excision of the cyst through a medial incision. Intraoperatively we found a large swelling with gelatinous substance sitting on the small swelling which is firm in consistency.Histological examination confirmed a benign parameniscal cyst with meniscal tissue in the small swelling.postoperative period is uneventful and her knee range of motion was 0 degrees to 130 degrees.Open excision of cyst with simultaneous partial menisectomy or meniscal repair is advocated in such kind of cases.

### Abstract no.: 42332 SDF-1/CXCR4 PROMOTES F5M2 OSTEOSARCOMA CELL MIGRATION BY ACTIVATING THE WNT/β-CATENIN SIGNALING PATHWAY Yao LU

Osteosarcoma (OS), the most common primary malignant bone tumor in children and adolescents, lacks an effective therapy. Stromal cell-derived factor (SDF-1) and its receptor, CXCR4, play multiple roles in migration, proliferation, and survival of different tumor cells. This study aimed to investigate whether the functional SDF-1/CXCR4 signaling mediates chemotaxis in F5M2 OS cells as well as the underlying mechanisms. Immunohistochemistry and immunofluorescence microscopy were used. RNA expression was detected by real-time quantitative polymerase chain reaction, and protein expression was examined by Western blotting. Migration assays were carried out in F5M2 cells. The results showed that the expression of CXCR4 and  $\beta$ -catenin mRNA and protein was significantly higher in OS tissues compared to the surrounding non-neoplastic tissues. SDF-1 promoted F5M2 cell migration by activating the AKT and Wnt/ $\beta$ -catenin signaling pathway, which was abrogated by preincubation with AMD3100 and LY294002. In conclusion, SDF-1/CXCR4 axis-promoted F5M2 cell migration was regulated by the Wnt/ $\beta$ -catenin signaling pathway.

#### Abstract no.: 42330 SI-RNA MEDIATED SILENCING OF GPR137 INHIBITS GROWTH OF OSTEOSARCOMA CELLS Dongging ZUO

Background: Osteosarcoma is the most prevalent primary cancer in the bones. Osteosarcoma cells are highly metastatic and frequently develop resistance to chemotherapy making it harder to treat. This identifies an urgent need of novel therapeutic strategies to treat osteosarcoma. Methods: The expression of GPR137 was firstly detected in five human osteosarcoma cell lines. Stable GPR137 knockdown cell lines were established using an RNA interference lentivirus system. The effects of GPR137 depletion on cell growth in vitro were examined by MTT, colony formation and flow cytometry assays. Immunohistochemistry analysis was performed to verify the clinical significance of GPR137 in patients with osteosarcoma. Results: Lentivirus-mediated si-RNA targeting GPR137 successfully knocked down GPR137 expression in both Saos-2 and U2OS cell lines at mRNA and protein levels. In the absence of GPR137 cell viability and colony formation ability were seriously impaired. The cell cycle patterns were also altered in both cell lines. Moreover, the phosphorylation levels of AMPKalpha, PRAS40, and ERK1/2 were down-regulated in GPR137 knockdown cells. Furthermore, GPR137 expression was much stronger in osteosarcoma tissues than in adjacent bone tissues. The survival rate following surgery was significantly low in patients carrying GPR137. Conclusions: This study highlights the crucial role of GPR137 in promoting osteosarcoma cell growth in vitro and GPR137 could serve as a potential therapeutic target against osteosarcoma.

#### Abstract no.: 39067 OSTEOPONTIN (OPN) IS OVEREXPRESSED IN OSTEOSARCOMA AND ENHANCES PULMONARY METASTASIS: IN VIVO AND IN VITRO Min LI, Atik BADSHAH, Guofen CHEN, Zhanjun SHI, Jian WANG

OPN is known to result in a variety of cellular effects potentially leading to increased angiogenesis and metastasis. Here, we determined the cell types expressing OPN and examined its usefulness in the osteosarcoma and lung metastasis tissue. MAIN METHODS: Luc gene was transfected into osteosarcoma cell line K7M2. We injected the transfected K7M2 cells into 20 balb/c mice left tibias to build tumor model. Primary tumor and lung metastasis were observed with IVIS Lumina XRMS Series III imaging system. Immunohistochemica staining and western blot were used with anti-OPN antibody to investigate OPN expression in 20 mice's tibia osteosarcoma and lung metastasis tissues. Cell migration was performed to test the cells migration function after OPN expression was inhibited by siRNA. RESULTS: Transfection test revealed that K7M2 cell line expressed luc gene and could be tested with IVIS Lumina XRMS Series III imaging system. Immunohistochemistry revealed that lung metastasis tissues expressed higher OPN on the tumor cell plasma membranes compared with the primary tumor tissues. Western blot result confirmed the IHC result. The cells' migration function which were inhibited OPN was significantly less powerful than those of not inhibited. SIGNIFICANCE: These results strongly indicated that OPN was overexpressed in lung osteosarcoma tissues. The higher expression correlated closely to the lung metastasis of osteosarcoma. OPN is a novel diagnostic marker for osteosarcoma lung metastasis.

### Abstract no.: 42329 THE MECHANISM OF SHP IN WEAR PARTICLES STIMULATED MACROPHAGE INDUCED ASEPTIC JOINT LOOSENING Yue DING

Objective Aseptic joint loosening is a key factor that reduces the life span of artifitial joint. Up to date, revision surgery of the prosthesis is the only treatment for joint loosening. Small heterodimer partner (SHP) was recently identified as a negative regulator of toll-like receptors (TLRs) signaling pathway. It remains unknown whether SHP participates in the signaling pathway of aseptic joint loosening.Materials and Methods Titanium particles were filtered into three groups according to their diameters.The average diameter of the three groups were  $0.82\pm0.12\mu$ m (Ti-0.2), $3.75\pm1.08\mu$ m (Ti-1.2) and  $15.47\pm5.18\mu$ m (Ti-10), respectively.The murine macrophages (RAW264.7)were stimulated by titanium particles, and then performed real-time PCR to demonstrate the mRNA expression of target genes (TLR2, TLR4, SHP and TRAF6) and inflammatory cytokines, at different time points (0.5h)

, 1h, 3h, 6h, 12h). On the other hand, inhibitory effects of SHP-targeted small interfering RNA (siRNA) on particle-induced inflammatory cytokine expression were also detected. SHP-targeted siRNA was transfected prior to particle stimulation. Results Fluorescence microscopy showed that the efficiency of siRNA transfection were higher than 70%. Real-time PCR revealed mRNA expressions of TLR2, TLR4, TRAF6 and TNF- $\alpha$  in Ti-0.2 and Ti-1.2 group peaked at 3h, 6h, 0,5h and 1h,respectively. In contrast, mRNA expression of SHP down-regulated at 0.5 h and there was no significant difference in Ti-1.2 group at chosen time-points. TNF- $\alpha$  mRNA in the particle stimulation plus RNA interference (RNAi) groups were significantly higher compared with the particle stimulation-only groups (P</span>< 0.05). Correlation analysis showed TNF- $\alpha$  in Ti-0.2 and Ti-1.2 group was positively correlated withTLR2 and TRAF6 while negatively correlated with SHP.Conclusions SHP mRNA expression in macrophages was

#### Abstract no.: 39367 NEW RESORPTION PATHWAYS IN POLYCAPROLACTONE DEGRADATION; ROLES OF MONONUCLEAR AND MULTINUCLEATED GIANT CELLS

Halldor Bjarki EINARSSON, Morten Schallburg NIELSEN, Anders Frisk MORTENSEN, David Christian Evar KRAFT, Søren Roesgaard NIELSEN, Menglin CHEN, Jonas JENSEN, Cody Eric BÜNGER, Thomas VORUP-JENSEN

Introduction: our aim was to study target effects of multinucleated giant cells (MNGCs) on the polyester and the foreign body material polycaprolactone (PCL). Methods: in this study we used human mononuclear cells (PBMCs) from healthy donors (n=3). Monocytes and Tcells were isolated by negative selection, followed by cell-to-PCL seeding at fusiogenic density. Integrin-facilitated attachment and migration capabilities were analyzed by TRIFMA and confocal imaging. We prepared PCL constructs by mold design for dynamic mechanical analysis (DMA). Constructs were additionally produced by electrospinning, pure and with incorporated 1 µm fluorescent microspheres, to enable flow cytometry analysis. Parallel, we performed a paired cranial bone defect model study on female landrace pigs (n=3) to investigate for MNGC and T-cell recruitment at the site of PCLimplantation. Results: our in vivo data indicate formation of granulomas (<0.05), composed of TRAP-negative MNGCs and CD3-receptor positive cells, suggesting fusion of macrophages and T-cell recruitment. By our in vitro study we show an increased release of microspheres from the constructs after 7 days of MNGC culturing. This phenomenon is even further enhanced after addition of T-cells (<0.05). Moreover, we find significant increase in shedding of CD18 by the MNGCs when exposed to PCL. These results indicate the immunogenicity of PCL, in addition to the observed complement activation (sMAC). The results are in an alignment with our DMA data, which indicate increased material stiffness after 21 days of MNGC culturing due to secreted extracellular matrix components. Conclusion: degradation of PCL by hydrolysis is further directed by MNGC and T-cells.

#### Abstract no.: 40357 NOVEL BIODEGRADABLE CAMGZNSRYB HIGH ENTROPY BULK METALLIC GLASS FOR ORTHOPAEDIC APPLICATIONS Huafang LI, Yufeng ZHENG, Ling QIN, Weihua WANG

In order to enhance the corrosion resistance of the Ca65Mg15Zn20 bulk metallic glass which has a too fast degradation rate for biomedical application, we fabricated the Ca20Mg20Zn20Sr20Yb20 high entropy bulk metallic glass considering the unique properties of high entropy alloys. Our results showed that the mechanical properties and corrosion behavior were enhanced. The in vitro tests showed that the Ca20Mg20Zn20Sr20Yb20 high entropy bulk metallic glass could stimulate the proliferation and differentiation of cultured osteoblasts. The in vivo animal tests showed that the Ca20Mg20Zn20Sr20Yb20 high entropy bulk metallic glass didn't show obvious degradation after 4 weeks of implantation, and they can promote osteogenesis and new bone formation quickly after 2 weeks of implantation. The improved mechanical properties and corrosion behavior can be attributed to the different chemical composition as well as the formation of unique high entropy atomic structure with a maximum chaos and disorders.

### Abstract no.: 41687 EFFECT OF DISTAL INTERLOCKING SCREW DESIGN ON BIOMECHANICAL PERFORMANCE OF TWO DIFFERENT INTRAMEDULLARY NAILING SYSTEMS

Fatih KUCUKDURMAZ, Celil ALEMDAR, Teyfik DEMIR, Ibrahim AZBOY, Abdullah DEMIRTAS, Mehmet BULUT, Huseyin ASLAN

Background: Intramedullary nails are generally used with interlocking screws, which are inserted into the fixed limb proximally and distally. One of the common problems with intramedullary nails is distal screw fracture or loosening. This study was conducted to measure the biomechanical properties of two distal interlocking systems for intramedullary nailing. Method: Fourth generation 30 composite femur models which produced for biomechanical studies, were used for all tests. Torsion test, axial static compression test and fatigue under compression test were conducted. The only difference between these two systems was the distal locking mechanisms. One was traditional two distal interlocking screws used intramedullary bone fixation system and the other one was newly designed one stiff and higher diameter distal bolt screw used system. Findings: Under static loading conditions, traditional system showed 47% higher yield load and 16% higher stiffness than novel system. Distal screw fracture was seen in traditional system at 404.41 N and 303.31 N load values on fatigue tests. For novel system, only femoral head fracture occurred. When comparing torsional load results, traditional system had 27% higher torque value, 14.9% higher breaking angle value and 14.1% higher stiffness value than novel system. Conclusion: Although, the novel system was designed and produced to increase fixation strength, it caused femoral head fracture. No distal locking screw failure was detected during novel system's tests. It is true that, distal screw failure is a problem of the classical system, but novel system is not reliable enough to substitute the classical system.

#### Abstract no.: 39677 EXTRACELLULAR MATRIX FORMATION AND MENISCAL PHENOTYPE IN CO-CULTURES OF MENISCAL CELLS AND PERIPHERAL BLOOD MSC Weili FU

To establish 2D and 3D co-culture systems of MFC and peripheral blood MSC and test the effects of cell ratios on matrix formation and meniscal phenotype. MSC and MFC were labeled and co-cultured in various ratios. Conventional 2D monolayers and 3D micromass pellet co-cultures were prepared. Labeling and proportions of the two cell types during culture were assessed by fluorescence-activated cell sorting and confocal laser scanning microscopy. The phenotype of meniscal cells was analyzed based on expression of type I, II, III, and X collagen, GAG. In 2D monolayer cultures, adding MSC to MFC cultures maintained the MFC phenotype, it increased their matrix formation. Mixing the cells in equal parts (50:50) led to the highest expression of type I and III collagen; levels of sulphated GAG did not vary significantly with co-culture ratio. In 3D micromass pellet cultures, adding MSC to MFC monocultures reduced pellet size and GAG production: matrix formation positively correlated with the proportion of MFC in the co-culture. Adding MSC cells to MFC also changed the pattern of collagen expression. Co-cultures expressed lower levels of type II and III collagen than did MFC monocultures, though all co-cultures expressed these collagen types at much higher levels than type I. Only MSC monocultures expressed type X collagen. In 2D co-cultures of MFC and MSC, mixing the cells in a 50:50 ratio optimizes the meniscal phenotype and leads to good matrix formation. In 3D micromass pellet co-cultures, matrix production positively correlates with the proportion of MFC.

#### Abstract no.: 42328

#### THE NOVEL DECELLULARIZED MENISCAL EXTRACELLULAR MATRIX ENHANCES BOTH PROLIFERATION AND REDIFFERENTIATION OF PASSAGED MENISCAL FIBROCHONDROCYTES Weimin GUO

Objective: Functional restoration of the meniscal injury remains a substantial challenge, the aim of this study was to produce a novel decellularized meniscal extracellular matrix biomaterial (MECM), and further investigate the effect of MECM surface on passaged meniscal fibrochondrocytes in vitro. Method: The porcine meniscus was performed decellularized process to prepare MECM, and then MECM was assessed in comparison with native meniscus. The various biomimetic surfaces, including chondroitin sulfate (CS) surface, MECM surface, and MECM/CS surface (ratio of 5:1) were coated, and compare to the control group (TCP) which not coated; then cultured the passaged meniscal fibrochondrocytes on these various surfaces in vitro for 14 days and assayed the cell adherence, cell viability, proliferation, matrix production and gene expression. Results: The produced MECM can well preserve meniscal extracellular matrix (ECM) components, including collagens and sulfated glycosaminoglycans (sGAG) and totally remove DNA. MECM surface positively and significantly affected meniscal fibrochondrocytes viability, adherence, and proliferation, increased the expression levels of collagen type II (12-fold than TCP surface), proteoglycans and collagen production, and was better than the cells cultured on CS coated surface. The passaged meniscal fibrochondrocytes cultured on MECM coated surface could redifferentiate as convinced by histology. Conclusion: MECM biomaterial can preserve well native meniscal ECM, and totally remove DNA. MECM coated surface can enhance both the proliferation and redifferentiation capacity of passaged meniscal cells during monolayer culture, MECM may be a promising candidate component of scaffold for meniscal tissue engineering applications in advance. Meniscal engineering; ECM (extracellular matrix); Fibrochondrocytes; Proliferation: tissue Redifferentiation; Decellularization.

#### Abstract no.: 41181 BUILDING A DEMINERALIZED MENISCUS EXTRACELLULAR MATRIX (DMECM)/ DEMINERALIZED BONE MATRIX (DBM) DIPHASIC SCAFFOLD FOR MENISCUS TISSUE ENGINEERING Zhiguo YUAN, Quanyi GUO

Tissue engineering meniscus regeneration is a hopeful treatment strategy for meniscus lesion, however the meniscal scaffold material is a huge challenge. The key is to find one kind of scaffold material that can not only meet the requirements for biomechanics properties of meniscus, also has good biocompatibility. We utilize demineralized meniscus extracellular matrix (DMECM) nanomaterial and demineralized bone matrix (DBM) to construct three-dimensional porous meniscus scaffolds (DMECM scaffold, DBM scaffold and DMECM/ DBM diphasic scaffold), and then incubating meniscus cells in the scaffolds leads to formation of neotissues that resemble meniscus-like tissue. The scanning electron microscopy (SEM), confocal microscopy, and real-time PCR were used to monitor the viability, morphology and gene expression profiles of meniscus cells, respectively. Morphology and mechanical properties of the three scaffolds (with and without cells) were investigated via SEM and EnduraTEC ELF3200. Seeded scaffolds were used to produce meniscus-like constructs and were examined via histology and immunohistochemistry. Demineralized bone matrix (DBM) has the natural porous structure and collagenous fiber is not destroyed. Both the DBM scaffold and DMECM/DBM diphasic scaffold supported meniscus tissue formation with better biomechanics properties compare to the DMECM scaffold. Both the DMECM scaffold and DMECM/DBM diphasic scaffold supported meniscus tissue formation with increased COL

DMECM scaffold, yet no difference in gene expression between the two. Overall, DMECM/DBM diphasic scaffold, which possess mechanical strength of meniscus and can support neotissue formation, show potential for use in cell-based meniscus regeneration strategies.

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#### Abstract no.: 39382

#### LOW-INTENSITY PULSED ULTRASOUND ACTIVATES FAK, ERK-1/2, AKT AND IRS-1 OF INTACT RAT BONES: POSSIBLE INTERPLAY WITH HORMONAL SIGNALING PATHWAYS

Carlos Vinicius BUARQUE DE GUSMAO, Jose Rodrigo PAULI, Jose Marcos ALVES, Mario SAAD, William Dias BELANGERO

Background: Mechanical loading and hormones act synergistically to promote osteogenesis. Mechanical loading such as low-intensity pulsed ultrasound stimulation (LIPUS) modulates focal adhesion kinase (FAK) activity, while hormones modulate insulin receptor substrate-1 (IRS-1) activity. In contrast Akt and extracellular signal-regulated kinase-1/2 (ERK-1/2) activities are modulated by LIPUS and hormones. It is not known however the molecular pathways that are shared by mechanical and hormonal stimulation resulting in synergistic signaling for bone formation. Objective: To determine whether LIPUS modulates, not only FAK, Akt and ERK-1/2 activation; but also the activity of IRS-1 which plays a role in hormonal signaling pathways. Methods: Immunoblotting was performed to detect the activity of FAK, ERK-1/2, Akt and IRS-1 - from stimulated tibias and fibulas of rats - at 5, 30 and 60 minutes after the seventh exposure to LIPUS applied 20 minutes daily. Results: LIPUS increased the activity of FAK, ERK-1/2, Akt and IRS-1 at 5, 30 and 60 minutes suggesting a possible interplay between mechanical and hormonal signaling pathways. Sham LIPUS increased FAK and IRS-1 activity at 5 minutes indicating that muscular contraction triggers signals for bone cells proliferation. Conclusion: Lowintensity pulsed ultrasound provides proliferative and anti-apoptotic stimuli to intact bones of rats at one week of exposure through the activation of proteins that act in mechanical and hormonal signaling pathways.

#### Abstract no.: 42325 STUDY OF CHANGES OF BONE METABOLISM IN ELDERLY PEOPLE WITH SALMON CALCITONIN TO ANTI-OSTEOPOROSIS TREATMENT AFTER ORTHOPAEDIC OPERATION Yaonan ZHANG

Objective: To observe the changes of bone metabolism of elderly people during orthopaedic perioperative period, and the effect of anti-osteoporosis treatment to bone metabolism after the operation. Methods: 90 patients(21 males and 69 females, 60 ~ 89 years old) were selected into randomized clinically controlled trial. The treatment group(n=45) received salmon calcitonin, calcium carbonate and active vitamin Dto antiosteoporosis treatment; the control(n=45) group received calcium carbonate and active vitamin Donly. Osteocalcin (OC), C-terminal Telopeptides of Type I collagen( $\beta$ -CTX) in serum were measured by ECLIA in all patients before, 1 week after operation and 3 months after operation. Bone mineral density(BMD) were measured by dual-energy X-ray densitometer before and 3 months after operation. B-CTX, OC and BMD were compared before and after operation. Results 78 patients completed the study. **OT**Kelevel was increased 1 week postoperatively(P<0.001) and not changed significantly 3 months postoperatively(P>0.05) in control group; theβ-CTX level was increased 1 week postoperatively(P<0.001) but decreased significantly 3 months postoperatively(P<0.05) in andheoro Clevel w treatment group.

changed significantly 3 months postoperatively(P>0.05) in control group; the OC level was decreased 1 week postoperatively(P<0.001) and not changed significantly 3 months postoperatively(P>0.05) in treatment group.

the mean BMD in lumber and hip before and 3 months after operation in each group (P> 0.05). Conclusions The elderly had bone metabolism changes before and after orthopedic operation. In a relatively short time after operation (1 week), the postoperative $\beta$ -CTX was higher than preoperative, suggesting that bone absorption was increased after operation; the postoperative OC was lower than preoperative, suggesting that

#### Abstract no.: 42322 CHLOROGENIC ACID PREVENTS OSTEOPOROSIS BY SHP2/PI3K/AKT PATHWAY IN OVARIECTOMIZED RATS Li CHEN

Objective: To determine whether chlorogenic acid (CGA) can prevent estrogen deficiencyinduced osteoporosis and analysis its mechanism. Methods: Sixty female Sprague-Dawley rats were randomly assigned to a sham-operated group and five ovariectomy (OVX) plus treatment subgroups: OVX with saline vehicle, 17α-ethinylestradiol (E2), or CGA at 9, 27, or 45mg/kg/day. Femoral metaphyses of rats were evaluated by micro-computed tomography (µCT). Bone mesenchymal stem cells (BMSCs) were treated with CGA. MTT assay was used to assess the proliferation, with or without LY294002. Alkaline phosphatase (ALP) was measured to assess the osteoblast differentiation, with or without Shp2 interfering RNA (RNAi). Results: CGA at 27 and 45 mg/kg/day inhibited the OVXinduced decrease in femur bone mineral density (BMD) and significantly decreased levels of bone turnover markers, prevented decreases in the bone volume/tissue volume (BV/TV), connect density (Conn.D), trabecula number (Tb.N) and trabecula thickness (Tb.Th), and prevented increases in the trabecular separation (Tb.Sp) and structure model index (SMI). CGA at 1 or 10 µM enhanced BMSC proliferation in a dose-dependent manner. CGA at 0.1 to 10 µM increased phosphorylated Akt (p-Akt) and cyclin D1. These effects were reversed by LY294002. CGA at 1 or 10 µM increased BMSC differentiation to osteoblasts, Shp2 RNAi suppressed CGA-induced osteoblast differentiation by decreasing Shp2, p-Akt, and cyclin D1. Conclusion: CGA improved bone quality by modifying the BMD and trabecular micro-architecture. Therefore, CGA might be an effective alternative treatment for postmenopausal osteoporosis. CGA promoted proliferation of osteoblast precursors and osteoblastic differentiation of BMSCs via the Shp2/PI3K/Akt/cyclin D1 pathway.

#### Abstract no.: 42327 DOSE POSTOPERATIVE APPLICATIONS OF DIPHOSPHONATE MEDICINE AT AN EARLY STAGE HAVE INFLUENCE ON UNION OF FRACTURE Jia ZHANG

[Background] Surgical and conservative treatments are both crucial method to deal with osteoporotic fracture, anti-osteoporotic therapy is the most important among conservative treatments and diphosphonate medicine is the first-line choice. The pharmacological action of diphosphonate medicine is to inhibit the function of osteoclast, so there is no consensus if it will inhibit porosis and union of fracture. [Purpose] Our study is aim to find out the influence of diphosphonate medicine to osteoporotic distal radial fracture retrospectively. [Method] From February of 2011 to March of 2014, total 78 patients suffered from distal radial fracture whose age is 57.3±15.8 including 31 male patients and 47 female patients. Open reduction and internal fixation have been performed to all patients; the type of fracture and postoperative bone density both have been recorded. 26 cases used zoledronic acid at 3 days after operation are divided into group A, 16 cases used zoledronic acid at 3 months after operation are divided into group B, 24 cases used alendronate at 3 months after operation are divided into group C, and 10 cases used nothing are divided into group D. We evaluated the union of fracture according to clinical test and radiological data at 3 months and 6 months after operation, and we retest the bone density at 6 months after operation. We chose SPSS17.0 to compare the rate of union and bone density among these groups. [Result] Preoperative type of fracture and bone density have no significant difference among each group. As to union of fracture, the rates of union at 3months after operation are 21/26 (group A), 13/18(group B), 19/24(group C), 9/10(group D), no significant difference has been found. The rates of union at 6 months after operation are 24/26(

#### Abstract no.: 42326 LOSS OF β-CATENIN IN ADIPOCYTES CAUSED SKELETAL DEVELOPMENTAL DEFICIENCY IN MICE Wei LI

Objective: It was proved that loss of β-catenin in osteoblasts may shift preosteoblasts from osteoblasts to adipocytes, but the trans-differentiation mechanism remained uncertain. Hence, contrary to the previous study, our work aimed to observe how will cell fate shift, and its impact on skeletal development in mice, by knocking out  $\beta$ -catenin in adipocytes. Body weight of each mice were recorded weekly after birth. HE staining of femur and tibia and Alcian blue/Alzarin Red Skeletal staining were performed at 1d, 7d and 28d respectively. Sections of tibiae from neonates on day 1 were investigated. Results: βsignificantly smaller than WT mice catenincKO mice were in both length (4w:12.5cm±3.3cm VS 15.2cm±5.6cm) and weight (4w:9.1g±1.3g vs 14.6g±1.2g, 8w:14.3g±1.9g vs 20.6g±2.2g). Alcian blue/Alizarin Red Skeletal staining showed that cKO mice had a delayed bone formation than WT mice. In cKO mice, The diameter of long bones decreased dramatically and epiphysis were found asymmetrical. The chondrocytes in perichondral region of cKO mice were badly organized as compared to WT mice. Conclusion: For the first time we revealed that the loss of  $\beta$ -catenin in adipocytes, which can alter the development of long bones and perichondral cells, might be of potential value for further research.

#### Abstract no.: 42324 QUANTITATIVE T2 MAGNETIC RESONANCE IMAGING COMPARED TO MORPHOLOGICAL GRADING OF THE EARLY CERVICAL INTERVERTEBRAL DISC DEGENERATION AN EVALUATION APPROACH IN ASYMPTOMATIC YOUNG ADULTS Chen CHUN

Introduction: Quantitative MR measurements have been suggested to be more sensitive methods in imaging degenerative changes in discs. However, no previous studies have been evaluated changes in the cervical spine. Further work is required to identify early intervertebral disc (IVD) degeneration in asymptomatic young adults. Methods: Three hundred fifty IVDs from 70 asymptomatic young subjects (mean age, 22.80; range, 18-25 years) underwent 3.0-T MRI to obtain morphological data (one T1-fast spin echo (FSE) and three-plane T2-FSE, used to assign a Pfirrmann grade (I-V)) and for T2 mapping (multi-echo spin echo). Differences in T2 values between sexes and anatomic level were evaluated, and linear correlation analysis of T2 values versus degenerative grade was conducted. Results: Cervical IVDs of healthy young adults were commonly determined to be at Pfirrmann grades I and II. T2 values of NPs were signi54.60 ms). Conclusion: T2 quantitation provides a more sensitive and robust approach for detecting and characterizing the early stage of cervical IVD degeneration and to create a reliable quantitative in healthy young adults.

# Abstract no.: 42323 AN INITIAL STUDY OF TRACKING MOVEMENT OF NORMAL ACROMIOCLAVICULAR JOINT USING VOLUME SCAN ON SENSATION 320 CT

Yaonan ZHANG

Objective To pinpoint the tracking movement of normal acromioclavicular(AC)joint using volume scan on sensation 320 CT(Aquilion One, Toshiba). Method Data of dynamic scans of 21 shoulders was collected using the motor function of 320 CT and prospectively analyzed. The data of movement of the AC joint was obtained during shoulder forward flexion(from 0°-180°)by 320 CT from all volunteers. The 3D coordinate of moving AC joint was recorded by each 30° during shoulder flexion (0u,30r,60r,90r,120i,150i,180°) to investigate the dispose relation of the essential anatomical bony structures of the AC joint(acromion, clavicle, coracoid, head of humerus and glenoid cavity), thus pinpointing the tracking movement of normal AC joint. Result With the angle of shoulder forward flexion changed from 0°-120°, the joint space of AC joint decreased gradually, ranged from 2.3mm to 1.8mm; the joint space between head of humerus and glenoid cavity changed little, ranged from 1.7mm to 2.4mm; the joint space between acromion and head of humerus decreased with the major tubercle spin and shift up, ranged from 7.5mm to 3.1mm; the coracoclavicular joint space diminished a little, ranged from 6.6mm to 4.3mm. With the angle of shoulder raised from 120°-180°, those four joint spaces entered the plateau phase with little change. The AC joint tracking is irregular during the whole shoulder forward flexion. Conclusion The motor functional imaging of 320 CT can pinpoint the AC joint tracking in a fast painless way, thus evaluating the acromioclavicular motor rhythm and functional level.

#### Abstract no.: 41748 ROLE OF LOCKING PLATE WITH DYNAMIC HIP SCREW IN TROCHANTERIC FRACTURES IN ELDERLY PATIENTS Aartis DEWAN, Harjot Singh GURUDATTA

The present study was carried out in the department of Orthopaedics of Sri Guru Ram Das Institute of Medical Sciences and Research, Sri Amritsar, from July 2012 to May 2014; 30 elderly patients of stable intertrochanteric fractures were operated with Dynamic hip screw with locking side plate. Patients were followed up for an average period of six months and the results were analyzed by using the Harris hip scoring system. Average age of the patients in study was 64 years; minimum being 55 and maximum 80 with male preponderance. Union was achieved in all patients with delayed union noted in four cases; the average time to union being 12.2 weeks and no major complications with good functional outcome by Harris Hip score. Hence, Use of locking side plate with Dynamic hip screw was observed to prevent sliding, screw cut-out and side plate pull-out, which signifies the concept of fixed angle locking screws that makes a stronger implant bone construct as compared to a standard Dynamic hip screw and should be a better, versatile and more reliable option in management of Intertrochanteric fractures.

#### Abstract no.: 41747 TANGENTIAL SCREWS OF THE FEMORAL HEAD/NECK IN HIP FRACTURES Nenad SESIC

Introduction: Tangential screws (TS) support DHS, cervicomedullary or cannulated screws. Methods: 1. A new surgical technique description. 2. Percutaneous approaches to femoral head/neck safe zones. 3. Finite Element Analysis (Catia/Abaqus) of the load-stress propagation and clinical results. 4. Bone scintigraphy. Results: 1.2. TS are minimally invasive Cut-Out prevention/therapy. 3. Transversal position of TS to the hip resultant force direction increase implant load surface to cancellous and cortical bone. 4. Scintigraphy confirms femoral head osteogenic vitality. Conclusion: TS support other implants axially, and not radially as Poller screws. Indications: osteoporotic hip fractures, Cut-Out prevention/therapy in polytrauma, CVI, adiposity, demention, Mb. Parkinson, delirium..

### Abstract no.: 41128 ASSESSMENT OF THE GEOMETRY OF PROXIMAL FEMURS FOR ADEQUACY OF THE PLACEMENT OF PROXIMAL FEMORAL NAILS-TUDY IN DRY HUMAN FEMORA AND LIVING SUBJECTS Rehan UL HAQ, Devendra PATHROT

Background: Intramedullary devices are becoming popular methods for fixation of unstable intertrochanteric and subtrochanteric fractures. These implants have been designed for the use of in the Western population. This study was done to assess the geometry of proximal femur for adequacy of placement of proximal femoral nails in our population. Materials and Methods: The study was conducted in three groups; a. anthropometric assessment of 101 human dry femora b. Radiological assessment of the same femora and c. Radiological assessment of contralateral femur of 102 patients with pertrochanteric fractures. Important measurements like neck shaft angle, minimal neck width, trochanteric shaft angle, trochanteric offset, canal width etc. were measured. Parameters of commonly used cephalomedullary Indian and imported nails available for fixation of pertrochanteric fractures were also measured. Results: The mean measurements were: neck shaft angle 128.070±4.97, minimum neck width 28.7±2.73mm, neck width at 1300 30.12±2.86mm, neck width at 1350 30.66±3.02mm, trochanteric shaft angle 10.450±2.340, trochanteric offset 11±1.68, canal width at 10, 15, 20cm from tip of greater trochanter; 13.46±2.34mm, 11.40±2.27mm and 11.64±2.04mm respectively.Discussion: We did not find clinically important differences in the measurements in our study as compared to studies in other ethnic groups. However comparing our results with the available designs of PFNs we recommend the following modifications to better fit the anatomy of Indian population; two nails of 1250 and 1350; five distal width (9-13mm); two femoral neck screw placement (35mm and 45mm from tip of nail); medio-lateral angle at 65 mm from the tip of the nail.

### Abstract no.: 41580 SAFETY AND EFFICACY OF A NEW OSTEOSYNTHESIS DEVICE IN TREATMENT OF INTRA CAPSULAR HIP FRACTURE IN OCTOGENARIAN POPULATION

Sangam NAGRANI, Sandesh LAKKOL, Joel HUMPHREY, Rajan JANDOO, Alistair TINDALL, Sandesh LAKKOL

Introduction: Hip fractures are disease of elderly. Bone density decreases with age and presence of osteopenia in octogenarian population poses problem in osteosynthesis. The objective of this study was to analyse the results of a new Targon FN (B-Braun, Aesculap Inc, Germany) device in treating intracapsular hip fractures in elderly (octogenarian) population. Methods: This is a retrospective study performed at a Central London Trauma Unit. All patients undergoing fixation using Targon FN plate from 2008 to 2011 were included. Electronic patient records were used collect data. A brief telephone survey was used to evaluate pre and post-operative mobility, pain and function. Results: There were 14 patients and mean age at the time of surgery was 87 years (80 -97 years). There were 11(79%) females and 3 (21%) males. The median ASA grade was III. There were 12 ( 86%) undisplaced (Garden I and II) fractures and 2 (14%) displaced fractures. All patients were followed up for a period minimum of 24 month. All patients discharged at 26 days( 10-60 days). There was five deaths in study period. Those who survived had complete radiological union and did not have significant decrease in mobility status. There was no revision surgery in any of the patients. Conclusions: Biomechanically, Targon FN plate combines best gualities of multiple cannulated screw fixation and dynamic Hips screw fixation. Our study results show good clinical outcome mainly in octogenarian population. We strongly recommend that in osteoporotic intra capsular hip fractures, Targon FN plate fixation is safe and effective fixation device.

### Abstract no.: 41573 WHAT IS THE SIGNIFICANCE OF HEMIARTHROPLASTY IN THE MANAGEMENT OF UNDISPLACED INTRA CAPSULAR HIP FRACTURES?

Sangam NAGRANI, Pouya AKHBARI, Alister TINDALL, Sandesh LAKKOL, Sandesh LAKKOL

Introduction: A recent meta analysis comparing the complications of osteosynthesis in Garden I and II hip fractures have suggested higher rates of fixation failure (14.8%) and reoperation (15.4%). In addition, previous studies by other authors have highlighted the importance of hemiarthroplasty in such patients. Therefore, the aim of this study was to report the safety and efficacy of hemiarthroplasty as a treatment of choice for patients with Garden I and II fractures. Methods: This is a retrospective study performed at a Trauma Unit in a Central London Hospital. All patients with Garden I and II hip fractures undergoing hemiarthroplasty from July 2012 to June 2014 were included. Electronic patient records were used collect clinical data. The primary outcomes measures were mortality and re-operation rate. A brief telephone survey was used to evaluate pre and post-operative mobility, pain and function. Results: There were 32 patients, 9 (28%) male and 23 (72%) females. The average age at the time of injury was 82 years (51-98). All patients were followed up for a mean duration of 15 months (5 -28 months). In the same study period there 46 patients who underwent Osteosynthesis for similar fractures. None of the patients in the hemiarthroplasty group had major complication or revision surgery in comparison to patients who were treated with osteosynthesis. Conclusions: Our study supports other published work and we recommend hemiarthroplasty as a single stage effective treatment option in the management of elderly patients with an undisplaced intracapsular hip fracture.

### Abstract no.: 39839 REAMED INTRAMEDULLARY NAILING VERSUS UNREAMED INTRAMEDULLARY NAILING FOR SHAFT FRACTURE OF FEMUR: A SYSTEMATIC LITERATURE REVIEW Xin DUAN

Introduction: Fractures of femoral fracture are among the most common fractures encountered in orthopedic practice. Intramedullary nailing is the treatment choice for femoral shaft fractures in adults. The objective of this article is to determine the effects of reamed intramedullary nailing versus unreamed intramedullary nailing for fracture of femoral shaft in adults. Methods: Cochrane Central Register of Controlled Trials (October 2010), PubMed (October 2010) and EMBASE (October 2010) were searched. Randomized and guasirandomized controlled clinical trials were included. After independent study selection by two authors, data were collected and extracted independently. The methodological quality of the studies was assessed. Pooling of data was undertaken where appropriate. Results: Seven trials with 952 patients (965 fractures) were included. Compared with unreamed nailing, reamed nailing was significantly lower reoperation rate (RR 0.25, 95% CI 0.11-0.59, P = 0.002), lower non-union rate (RR 0.20, 95% CI 0.05-0.77, P = 0.02) and lower delay union rate(RR 0.30, 95% CI 0.14-0.64, P = 0.002). There was no significant difference when comparing reamed nailing with unreamed nailing for implant failure (RR 0.51, 95% CI 0.16-1.61, P = 0.25), mortality(RR 0.94, 95% CI 0.19-4.58, P = 0.94) and acute respiratory distress syndrome(RR 1.53, 95% CI 0.37-6.29, P = 0.55). Unreamed nailing was signiWcantly less blood loss (SMD 119.23, 95% CI 59.04–180.43, P = 0.0001). Conclusion Reamed intramedullary nailing has better treatment effects than unreamed intramedullary nailing for shaft fracture of femur in adults.

### Abstract no.: 42362 CORONAL MISMATCH OF FEMORAL LOCKING PLATES ON ASIAN FEMUR: AN INSIDIOUS TRAP LEADING VALGUS MALUNION OR NONUNION IN MID-DISTAL FEMORAL FRACTURES Jian LIN

Purpose: The purpose of this study was to detect the adverse impact of coronal mismatch of femoral locking plates on Asian femur in mid-distal femoral fractures. The hypothesis was that this mismatch was probably an insidious trap which could cause valgus malunion or nonunion. Method: From July 2008 to December 2013, 158 patients with unilateral middistal femoral fracture who were treated with femoral locking plates (longer than 10 holes) were enrolled in this study. There were 104 comminuted fractures and 54 non-comminuted fractures. Their radiological films on both operative side and intact side were evaluated and the unite time was followed. The coronal angles including Angle A (between proximal and distal anatomical axis), Angle B (between femoral anatomical axis and the joint line), and Angle C (between femoral anatomical and mechanical axis) were measured and compared with the opposite side. Result: 92 patients (58.2%) in this study had valgus malalignment compared with their intact side. 13 of these patients failed to achieve healing within 2 years, 3 of whom were comminuted fractures and 10 of whom were noncomminuted cases. Conclusion: Coronal mismatch of femoral locking plates on Asian femur is objective and quite common. Probably this is an insidious trap which may cause valgus malunion or nonunion in mid-distal femoral fractures. When trying to reduce the fracture, surgeons should be aware of this phenomenon and avoid simply fitting fragments to LISS plate for Asian patients.

#### Abstract no.: 41151 INFECTED GAP NON-UNIONS OF SHAFT FRACTURES TREATED WITH ILIZAROV COMPRESSION-DISTRACTION DEVICE Md Mofakhkharul BARI

Introduction: Most of the long bones fractures are treated effectively but unfortunately a few shaft fractures get infected and end up as infected gap non-unions. However when these occurs they can be treated effectively with Ilizarov compression-distraction device. Materials and Methods: In our study from 1990-2013, we have treated more than 800 patients of infected gap non-union of long bones at our NITOR and Bari-Ilizarov Orthopaedic Centre, a retrospective analysis was done and 750 patients were available for follow up. Mean follow up period was 10 years 700 of them were males and 50 were females, 70% of them were young males between 30-55 years. All long bones were treated with decreasing order of frequency tibia, femur, both bones forearm, humerus. Most common organism isolated was staphylococcus aureus. Ilizarov's concept for infected nonunion was used, "infection burns in the fire of regeneration." All patients were treated with Ilizarov compression-distraction device, implant removal, debridement, excision of infected non-union, corticotomy monofocal bifocal longitudinal compression controlled osteogenesis, filling of cavities by newly formed tissue intercalary bone lengthening. Results and Conclusion: Academician Prof. Ilizarov's methods or principles and the use of the compression-distraction device helps us to treat these difficult situations more boldly and with better results than by other conventional methods. Ilizarov helps in control of infection and union with .minimal complications and early extremity use. After treating more than 800 cases of infected non-union of long bones we also have prepared a protocol for treatment of infected gap non-union of long bones.

### Abstract no.: 39328 NAIL- MEDULLARY CANAL RATIO AFFECTS MECHANICAL AXIS DEVIATION DURING FEMORAL LENGTHENING WITH AN INTRAMEDULLARY DISTRACTOR

Nael HAWI, Christian KRETTEK, Timo STUEBIG, Mohamed KENAWEY, Emmanouil LIODAKIS

Introduction: Callus distraction of the femur using an intramedullary distractor has several advantages over the use of external fixators. However, difficulty controlling the mechanical axis during lengthening may cause deformities and knee osteoarthritis. We analyzed, if lengthening with an intramedullary device is associated with a medial or lateral shift of the mechanical axis. In addition we analyzed factors associated with varisation/valgisation of the mechanical during lengthening? Materials and methods: We analysed pre-treatment and post-treatment radiographs from 20 patients who underwent unilateral femorallengthening procedures using intramedullary distractors. Patients with acute correction of pre-existing deformities or combined ipsilateral femoral and tibial lengthening were excluded. Mechanical axis deviations, osteotomy level, and nail-medullary canal ratio were recorded. Results: Compared to the preoperative axis, the mechanical axis shifted medially in 7 patients (varisation group) and laterally in 13 patients (valgisation group). The groups did not significantly differ regarding preoperative leg length discrepancy, alignment, length discrepancy cause, or implants used. The nail-medullary canal ratio significantly differed between groups (p < 0.001), being <85% in the varisation group and >85% in the valgisation group. The distance between the lesser trochanter and the osteotomy site was significantly longer in the valgisation group (58.9  $\pm$  16.3 mm, middle third of the femur) compared to the varisation group (40.6  $\pm$  11.4 mm, proximal third of the femur; p = 0.02). Conclusion: The nail-medullary canal ratio should be considered during preoperative planning. A greater range of implant diameters should be available for patients with wider or narrower medullary canals.

Date: 2015-09-19 Session: Free Papers Trauma Proximal Femur Time: 10:30 - 12:00 Room: Dongguan Hall

## Abstract no.: 41893 USE AND INDICATION OF SHORT BARREL DHS PLATES

Abhishek ABHISHEK, Rajan MAHESHWARI, Tamer TADROSS, Bassam KUFFASH

Introduction: DHS fixation for proximal femoral fractures is a commonly performed procedure. Failure of the implant remains a serious and challenging complication. Traditionally, two different sized barrels (short -25mm, standard- 38mm) have been used. Sufficient literature on the use of Short Barrel screws is lacking. We report our experience with Short Barrel plates, indications and short term outcome. Methods: A Review of 41 patients from March 2005 onwards with Short Barrel screws for pertrochanteric fracture. Type of fracture, lag screw size, details of side plate and use of compression screw was noted. Age range was 22 to 97 years. Results: 15 were 2-part (stable) and 26 were 3 or 4 part (unstable) fractures. 4 of these were revisions for failed standard barrel plates. A 22 year old had a pathological fracture through a large bone cyst. 5 patients (2 revision and 3 unstable fractures) underwent Dimon Hughston medial displacement osteotomy. Lag screw length ranged from 60 to 95mm (33 were 85mm or less). Complications included 5 deaths (1 deep infection and 4 unrelated causes), 2 superficial infections, 1 AVN (at 1 year), 1 asymptomatic broken distal screw and 1 with screw-plate dissociation. Discussion: Evidence is lacking on the use of Short Barrel side plates. Our single most significant indication is lag hip screw less than 85mm. We also recommend its use when excessive collapse of an unstable fracture is expected and when Dimon Hughston osteotomy is performed. We also recommend use of the compression screw in these cases.

Date: 2015-09-19 Session: Free Papers Trauma Proximal Femur Time: 10:30 - 12:00 Room: Dongguan Hall

## Abstract no.: 40762 FLOATING HIP INJURIES: SEQUENCE OF FRACTURE FIXATION. A RETROSPECTIVE STUDY

Arul Jothi VAITHILINGAM, Vivek TRIKHA

Introduction: Floating Hip is defined as ipsilateral pelvic-acetabular fractures and femoral fracture. Management of these injuries is still controversial with no guidelines available. Objectives: The aim of this retrospective study was to evaluate the fracture pattern, treatment protocol, sequence of fracture fixation and functional outcome of patients with floating hip. Methods: Between Jan 2008-Jan 2013, 50 patients with floating injuries were included. The following parameters were recorded from the records: age, sex, mechanism, injury pattern, timing sequence of fixation, method of fixation and complications were analysed.Functional outcome was assessed with Merle d Aubigne score. Results: The average age was 33.06 years .Males predominantly injured. The mean time between injury and follow up was 25 months. All pelvi-acetabular fractures united by average 4.6 months. Sixty four percent [n=32] of patients underwent femoral fixation first followed by pelviacetabular fixation. Remaining 34 %[n=18] of patients underwent pelvi-acetabular fixation first followed by femoral fixation. Complications seen in this series included infections, knee stiffness, erectile dysfunction, femoral non-union, femoral delayed union, posttraumatic stress disorder, postoperative DVT, heterotopic ossification, implant loosening, limping. Patients with femoral fixation first had reduced operative time, less blood transfusions, early functional recovery, better clinical scores and less complications which are statistically significant [P<0.05] .Overall, the Average Merle d Aubigne score was 16.8 .Conclusions: Floating hip injuries are severe injuries caused due to high energy trauma. They can be effectively managed by stabilizing femur first either followed by acetabular or pelvis fracture fixation for better results

Date: 2015-09-19 Session: Free Papers Trauma Proximal Femur Time: 10:30 - 12:00 Room: Dongguan Hall

# Abstract no.: 40624 BIOMECHANICAL COMPARISON OF VARIOUS IMPLANT IN PAUWEL'S GRADE III FRACTURE NECK FEMUR

Satish Chandra GOEL, Birju MANJHI

Background: The mode of treatment of fracture neck femur depends on various factors like age of the patient, type of fracture pattern, quality of bone and other comorbidities. We tried to find out the stability of fixation in a cadaveric model of unstable fracture neck of femur (Pauwel's type 3) fixed with either- proximal femoral nail, dynamic hip screw, dynamic hip screw with an antirotation screw or cannulated cancellous screws. Method: This study was conducted on 24 cadaveric bones (6 in each group), in which unstable fracture neck of femur (Pauwel's type 3) was created by using standard technique. Fractures were fixed with proximal femoral nail, dynamic hip screw, dynamic hip screw with an antirotation screw or cannulated cancellous screws after creating a comparable group using DEXA scan. These were tested on a cyclic physiological loading machine at 2 cycles per second with a load of 200 kg. The test was observed for 10,000 loading cycles or till failure whichever occurred earlier. Result: Five out of six specimens in PFN group, 3 out of 6 specimen in DHS with ARS and DHS group completed 10,000 cycles while none out of six specimen in CCS group able to complete 10000cycles. Conclusion: PFN constructs were stronger than the DHS, DHS with ARS and CCS constructs. However these data must be interpreted as strictly biomechanical, representing only part of the scenario at work in fixation and healing of these injuries in vivo.
## Abstract no.: 39374 MISMATCH OF THE SHORT STRAIGHT CEPHALOMEDULLARY NAIL (PFNA-II) WITH THE ANTERIOR BOW OF THE FEMUR IN CHINESE POPULATION

Shi Min CHANG, Shi-Min CHANG

Introduction: To evaluate the morphologic discrepancies between the short straight proximal femoral nail antirotation-Asian version (PFNA-II) and the anterior bow of the femur in Chinese patients and to propose a further design modification. Methods: A consecutive 158 cases (35 men and 123 women with mean age of 77.2 years) with unstable per/intertrochanteric fractures (AO/OTA 31 A2 and A3) treated by PFNA-II were included in this study. The nail tip position was classified to a 5-grade scale on postoperative lateral radiographs of the femur. The distance between the nail axis and the canal axis at the tip level was measured. The degree of the theoretical bent curvature and its corresponding radius were calculated, assuming that the anterior protrusive nail tip was placed back to the central canal axis. Results: The distal tip of PFNA-II was located anterior to the femur canal central axis in 118 cases (74.7%), of which 55 cases abutted against the anterior cortex (contact between nail and internal cortex) (34.8%). With longer nails, the abutment occurred more often and was more prominent. For nail lengths of 170, 200, and 240 mm, the theoretical distance to replace the nail tip to the central canal axis was 1.42, 1.77, and 2.46 mm, respectively; the corresponding bent curvature radius was 1483, 2329, and 3710 mm, respectively. Conclusion: There is a mismatch between the current short straight PFNA-II and the anterior bow of the femur in the Chinese population. Further modifications with an anterior bow are proposed.

#### Abstract no.: 41577 SUB TROCHANTERIC FRACTURE TREATED WITH DHS& LONG PLATE& PRIMARY BONE GRAFTING(STUDY OF 50 CASES) Vijay Kumar KHARIWAL, Sadhna GARG

Sub tr.fracture remains controversial from treatment point of view from the beginning because of high rate of implant failure and non-union. Various modalities are PFN, DCS, condylar blade plate, etc.. But none is satisfactory which is attributed to deforming forces in this region. In this study a well technically done DHS with long plate & primary bone graft & proper post operative care by preventing early weight Bearing gives more than 99% success.in this study of 50 cases none had implant failure& fracture united on an average of 10 to 12 weeks .Pt. were made to put weight bearing after appearance of callus. Patient returned to original work & all had good satisfaction. The drawback is of major open surgery& blood loss & hospitalization which if compared with complication of other modalities is a small price to be paid because treating a failed case is much more difficult. we are following this method since last 10 years & are fully satisfied with the results. Done properly technically along with primary bone grafting& resricted wt. Bearing can be a simple solution to this problem. After 3 weeks callus start appearing in all cases. Taking graft during primary procedure does not add morbidity& cost, if one can bear with blood loss & open procedure this can give a permanent solution to this problem. If big fragments interfagmentory procedure can be added & if small fragments plate can act as bridge with little disturbance of blood supply

#### Abstract no.: 41618 OPTIONS OF FIXATOR-ASSISTED INTERNAL FIXATION IN PERIPROSTHETIC FRACTURES OF THE FEMUR Alexander CHELNOKOV, Igor PIVEN, Igor SHLYKOV, Konstantin PIASTOPULO, Igor SHUGOL

Introduction: Gaining of proper length and alignment in periprosthetic femoral fractures, nonunions and deformations can be problematic. Fixator-assisted technique can be helpful but its use in different periprosthetic fracture patterns have not yet been defined. Objectives: Aim of our study was to define optimal implementation of fixator-assisted internal fixation in femoral periprosthetic fractures. Methods: Fixator-assisted internal fixation was used in the treatment of 64 patients with periprosthetic fractures about total hip implants (52) with stable (20/52) and loose stems (Vancouver B2 and B3) - 32/52, in 19/32 with stem subsidence, and 12/64 fractures above total knee implants. Locked intramedullary nails with connection to the stem were used for definitive stabilization in fractures about total hips (52/64). In fractures above knee implants (Rorabeck-Lewis II) antegrade nailing was performed (10/12). Plating was used in 2/12 cases of interprosthetic fractures. Simplified Ilizarov frames were used to gain alignment and length. Results: Frame application allowed to restore length and alignment. In loose stems (B2 and B3) also reduction of subsided stems (19/19) acute femoral lengthening up to 3 cm was performed (8/32). Three frame types were defined depending on two factors: injury type according to Vancouver classification, and position of the stem tip inside or outside medullary canal. Conclusions: Fixator-assisted internal fixation provides easy control of length and alignment including reduction of displaced stem and lengthening of the femur in periprosthetic fractures. Position of the stem tip inside or outside medullary cavity and Vancouver classification appear to be key factors defining optimal frame configuration.

#### Abstract no.: 42387 ELECTROMAGNETIC NAVIGATION INTERLOCKING INTRAMEDULLARY NAIL TECHNOLOGY FOR TREATMENT OF DISTAL TIBIA SHAFT FRACTURES Xuedong ZHANG

Objective: To investigate the efficiency of electromagnetic navigation interlocking intramedullary nail in the treatment of distal tibia shaft fracture. Method: Between January 2014 and December 2014, 16 cases of distal tibia shaft fracture were treated. There were 10 males and 6 females, aged 31-52 years (mean, 39.3 years). According to AO/OTA classification, 7cases were rated as type 43A, 6cases as type43B, 3cases as type 43C, The time from injury to operation was 1-2 days (mean, 1.6 days). Distal interlocking intramedullary nail was implanted using electromagnetic navigation. Results: The distal locking nail operation with interlocking intramedullary nail was successfully finished under electromagnetic navigation; the one-time success rate of distal locking nail operation reached 100%; and the locking nail time was 7.0-10.5 minutes (mean 8.2 minutes). 16 cases were all followed up 6-12 months (mean 9.1 months). During the follow-up period, no broken nails, nail exit, infection, or re-fracture occurred. All fractures achieved clinical healing, and the healing time was 12-22 weeks (mean 16.5 weeks). the AO-FAS score was excellent in 11 cases, good in 3 cases, and fair in 2 case, with an excellent and good rate of 87.5%. Conclusion: Electromagnetic navigation system is safe and reliable, with the advantages of high positioning accuracy, short operation time, and no radiation, the clinical application of the system for distal locking nail operation can obtain excellent effects.

#### Abstract no.: 42386 THE ANTEROLATERAL AND ANTEROMEDIAL THIGH FLAP VASCULARIZED BY DESCENDING BRANCH OF LATERAL CIRCUMFLEX FEMORAL ARTERY Honghao CHEN

Objective: To develop a new twin-flap which is vascularized by descending branch of lateral circumflex femoral artery, and supply a new surgical techniques to repair large soft tissue defect and perforating injury in extremities. Methods: According to the local anatomy of descending branch of lateral circumflex femoral artery, the anterolateral and anteromedial thigh twin-flap vascularized by the same descending branch of lateral circumflex femoral artery was designed and harvested. From December 2009 to May 2014, this twin-flap was transferred in 5 male patients. The patients ranged in age from 23 to 45 years, mean 32.2 years. The defect position as follow: 2 cases of forearm, 1 wrist, 1 lower leg, 1 foot. Among them, 2 cases suffered from large soft tissue defect, the rest with extremities. defect perforating injury in The size was (6cm\*5m+7cm\*6cm)-(13cm\*7m+17cm\*8cm). Two patients were involved the bone defect. The donor site of thigh was resurfaced by thickness skin graft. Results: All transferring flaps were survival. Only 1 case accepted the twin-flap defatting in postoperative 3 months. In 4-10 months (mean 8 months) follow-up, the satisfactory cosmetic appearances and functions were gained. The donor thigh present little scar and contracture, the function of knees maintain normal. Conclusion: the twin-flap of thigh transfer based the descending branch of lateral circumflex femoral artery decreases the sum of vessel anastomosis and microsurgical risk. and presents a high rate of success. it is an optimal method for coverage of large areas of soft tissue defect and recontracture of perforating injuries in extremities.

#### Abstract no.: 42385 COMPLICATIONS OF INTERTROCHANTERIC FRACTURES OF FEMUR IN SENILE PATIENTS Peng GAO

Objective To analysis the complications of intertrochanteric fractures of femur treated by close reduction and internal fixation for patients over 75 years old. Methods 279 cases of intertrochanteric fractures over 75 years old treated with operative methods from Jan. 2002 to Jun. 2010 were reviewed in fracture types, preoperative complications, operative methods and postoperative complications. Results The mean age of patients was 78.6 years (75 ~ 96). The cases had different physical diseases included cardiovascular, cerebrovascular, respiratory, endocrine, digestive, urinary, periphery vascular system and others. 177 cases were fixed with DHS ( or plus trochanteric steady plate ) and 102 cases with intramedullary interlocking nail. The mean operation time was 77 minutes. 85 cases (30%) need blood transfusion. 220 cases were followed-up 6 months after operation and 89% patients got excellent or good results. 9 types of complications were mentioned. Conclusions Most senile intertrochanteric fracture patients complex medical problems. Delicate pre-operative evaluate, early operation, avoid general anesthesia, shorten the time of operation and rigid fixation can reduce complications and mortality rates. Pulmonary infection and DVT are common complications.

## Abstract no.: 42370 EVALUATION OF PERIOPERATIVE RISK FACTORS OF GERIATRIC PATIENTS WITH HIP FRACTURE

Yaonan ZHANG, Zi-Long YIN, Qing-Yun XUE

Objective : To evaluate the relationship between pre-operative risk factors and postoperative complication and mortality. Methods:224 geriatric patients with hip fracture were retrospectively analyzed about prevalence of the postoperative complications and mortality. ,140 geriatric patients with femoral neck fracture(74.5 years old, 60-93 years old, including 40 males and 100 females);84 geriatric patients with femoral intertrochanteric fracture, (76.7 years old, 60-100 years old, including 23 males and 61 females ). Evaluate the relationship between sex, preoperative period, preoperative comorbidity and postoperative complication and mortality. We analysed the data using the software spss of version 13.0. Results: For the patients with femoral neck fracture, the prevalence of postoperative deep vein thrombosis is correlated with preoperative delayed days, intraoperative blood loss. Encephalosis is correlated with pneumonia and digestive complication . Hypertension , operative duration encephalosis is correlated with postoperative delirium ; Age is correlated with postoperative heart failure. For the patients with femoral intertrochanteric fracture, postoperative deep vein thrombosis is correlated with renal dysfunction; Postoperative heart failure was correlated with coronary artery disease, romote myocardial infarction, history of heart failure. Conclusions: Encephalosis, preoperative days, intraoperative blood loss, operative time, hypertension, cardiac arrhythmia, age, renal dysfunction, coronary artery disease old myocardial infarction, history of heart failure are risk factors of postoperative complication after operation of hip fracture.

#### Abstract no.: 42369 CONTRALATERAL HIP FRACTURE AFTER FEMORAL INTERTROCHANTERIC FRACTURE OPERATION: RISK FACTORS ANALYSIS Huang YANG

Objective To analyze the risk factors for contralateral hip fracture after operation on the intertrochanteric fracture. Methods Clinical data base of the patients with intertrochanteric fracture between Dec.2008 and Feb.2014 in our hospital was set up and these patients were divided into two groups. Group A: with contralateral hip fracture, Group B: without contralateral hip fracture. SPSS 18.0 was utilized for analyzing Singh index, Harris score, Strength of iliopsoas and Trendelenburg sign of the two groups. Results 274 patients were enrolled and 88.0% (241/274) followed up. Fifteen cases presented contralateral hip fracture(5.47%), in which showed 11 contralateral intertrochanteric fractures and 4 femoral neck fractures. All the contralateral hip fractures happened in 3 to 36 months after operation. Singh index and Strength of iliopsoas showed statistical difference with Mann-Whitney U test and logistic regression. However, Harris score between A and B groups showed no statistical difference, as well as Trendelenburg sign. Conclusion Osteoporosis is the pathologic basis for intertrochanteric fracture in older population. The main cause of second fall after operation of intertrochanteric fracture is the weakness of muscle around the hip, especially the weakness of the strength of iliopsoas. Therefore, anti-osteoporosis is essential of treating contralateral hip fracture, but at the mean time, takes the strength of iliopsoas into consideration and gain the full recovery of hip function in the first place.

#### Abstract no.: 40585 A LONG-TERM FUNCTIONAL FOLLOW-UP ON 47 FOREARM REPLANTATION CASES Yong-Jun RUI

Introduction: Replantation of an amputation, even though avulsion and crush injuries constitute extensive damage of vessels and nerves, is no longer a difficult technical problem to hand surgeons nowadays. However, what we want is a functional hand. This led us to follow-up our case series of 47 forearm replantations to make good understanding on replanted hands through objective and subjective evaluating. Methods: Forty-seven patients with traumatic forearm amputation were enrolled in our study. Objective evaluation, including range of motion, grip strength, sensory recovery and Jebsen hand function test, were measured. The Disability of Arm, Shoulder and Hand (DASH) questionnaire survey was done as subjective perception of overall hand function recovery. Results: There were 31 male and 16 female in our research, 35 patients injuried on the dominated side and 12 on the un-dominated side. The mean grip strength, two finger pinch and lateral pinch were 8.89  $\pm$  11.35, 2.63  $\pm$  3.51 and 5.71  $\pm$  5.07 kg respectively. The total active motion (TAM) and the motion of wrist, forearm rotation were 154.8± 58.6, 60.7± 26.3 and 108.5 ± 41.3 degrees. There were 43 patients regained protective sensation (pain and temperature sensory), among which eight patients' twopoint discrimination recovered. There were 43 out of 47 patients complained of cold intolerance. The Jebsen hand function test results revealed that most patients could fulfill daily living tasks using their involved hand, however, they consumed more time than uninvolved hand. The average DASH score was 29.22±19.04 (ranged from 1.67 to 52.50).

#### Abstract no.: 41015 AN EXPLORATORY STUDY OF SCHOOL INJURIES: ANALYSIS OF 2956 MEDICAL ENTRIES

Amith SHETTY, Sourabh KULKARNI, Nikhil SHETTY, Vijay SHETTY

Background: Injuries in school are, by far, a common occurance. However, there is very limited information in the literature on the epidemiology of injuries in schools. In this study, we examined the medical records of a suburban school, in India, over a period of five months to understand the pattern of injuries in school children. Methods: We examined all medical entries made between June 2012 and October 2012 (both months inclusive). The entries included names of the individuals seeking medical attention for any medical condition including injuries sustained. Results: There were a total of 2956 entries, made in the registry, during the above period. Of the 2956 entries, 1776 entries (60.1%) were related to injuries sustained by school children. 1701 entries out of 1776 entries (95.8%) injuries were outdoor injuries. 1369 entries out of 1776 entries indicated that open injuries (77.1%). Conclusions: Our study indicates that almost one in ten children (an average 8% of children) attend medical room with various medical conditions, approximately half of which are due to injuries. This is an important observation and can help in planning prevention of avoidable injuries in a school atmosphere.

## Abstract no.: 41746 LOCAL STRESS RATIO = YINYANG IN BONE HEALING AGAINST AO "STABILITY"

Nenad SESIC, Nenad SESIC

Introduction: Mechanical stimulus which evokes bone healing is internal "stress", and not external AO "stability" (interfragmentary immobility)! Mechanical stress is continuum from a "Stress Full (SF) to "Stress Empty" (SE) space. A "stress ratio" SF/SE=YINYANG is general/local stress balance measure. The aim is biological significance of local SF/SE compare against AO stability. Methods: 1. According to natural law action = reaction: Load (external forces) = Stress (internal forces). 2. Bone stress propagation geometry researched using Finite Element Analysis (Catia/Abagus). 3. FEA results compared with X-ray signs of healing in conservative treatments and osteosynthesis. 4. Perren's experiments (basis of AO theory) explained using SF/SE. Results: 1,2,3. Physiological SF/SE in tissue is locally diminished in conservative treatment due to bone axial deformation, and in osteosynthesis due to differences between modulus E of the bone and implant. Proves are nonunions in stable osteosynthesis and an "asymmetrical healing". This term redefines the intramedullary nail screws function: "Usefull" in multifragmented fractures; "Nonusefull", distal interlocking in pertrochanteric fractures; "Wrong", anyone causing diminished local physiological SF/SE. 4. Even the Perren's experiments proved: the biology of fracture healing is in need of local stress, and not stability. Conclusion: As used in AO, the term "stability" is more related, akin to the term "rigidity" of technical mechanics. Although, stability, rigidity and stress are not directely comparable terms, their biological responses are. Stress induces a "biological response continuum" = from healing - asymmetrical healing - nonunion. SF/SE=YINYANG is the stress measure of bone healing biology, more reliably than AO stability!

#### Abstract no.: 40858 A STUDY OF 50 CASES OF TIBIAL PLATEAU FRACTURE IN ADULTS Vishal MANDLEWALA, Ashish SURYAWANSHI

Introduction: Tibial condylar fractures are specially challenging to the orthopaedic surgeons because of their number, variety, complexity, different concepts of management and injuries associated with it. Earlier, most of tibial plateau fractures were treated conservatively which resulted in joint line incongruity, early osteoarthritis and knee stiffness. Now treatment of these fractures has changed radically over the years, as our ability to achieve near anatomic reduction and fixation has improved, thereby reducing the incidence of early osteoarthosis. Aim and objectives: To study the advantages and disadvantages of surgical treatment, comparing treatment modalities and finding management strategies, depending on type and displacement of fractures. Materials and Methods: This is a study of management of 50 cases of closed tibial plateau fractures in adults, conducted in the department of orthopaedics at Dr D.Y.Patil medical college and research centre, pune between August 2010 to October 2013. 8 patients were treated by conservative methods and 42 patients were treated by surgical methods by Schatzkers classification. Result: 64.3% of low velocity injuries treated by surgical methods and 35.7% treated with conservative methods. Among the high velocity injuries 81.25% treated by surgical methods and 18.75% by conservative methods. The results showed that surgical treatment produced better results in both low velocity and high velocity injuries. Conclusion: Fracture treated by surgical methods give excellent results compare to conservative methods.

## Abstract no.: 41034 DEFINITION OF THE SAFE ZONE FOR ANTEGRADE LAG SCREW FIXATION OF ACETABULAR POSTERIOR COLUMN FRACTURE BY 3D TECHNOLOGY

Xiaoreng FENG, Sheng ZHANG, Chaowen LIN, Bin CHEN, Jintao FANG

This study aims at defining the safe zone for antegrade lag screw fixation of acetabular posterior column fractures using a novel 3D technology. Pelvic CT data of 59 human subjects were recruited to reconstruct three-dimensional (3D) models. The transparency of 3D models were then downgraded along the axial perspective (the view perpendicular to the cross section of the posterior column axis) to find the largest translucent area. The outline of the largest translucent area was drawn on the iliac fossa. The line segments of OA, AB, OC, CD, the angles of OAB and OCD that delineate the safe zone (ABDC) were precisely measured, respectively. The resultant line segments OA, AB, OC, CD, and angles OAB and OCD were 28.46 mm(13.15-44.97 mm), 45.89 mm (34.21-62.85mm), 36.34 mm (18.68-55.56mm), 53.08 mm (38.72-75.79mm), 37.44°(24.32-54.96°) and 55.78°(43.97-79.35°) respectively. In conclusion, computer-assisted 3Dmodeling techniques can aid in the precise definition of the safe zone for posterior column antegrade lag screws. A full-length lag screw can be inserted into the zone (ABDC), permitting a larger operational error.

#### Abstract no.: 40079 PERCUTANEOUS SCREW FIXATION FOR PELVIC FRACTURES WITH FLUOROSCOPY-BASED NAVIGATION Zhou XIANG

Objective: To investigate the applications of fluoroscopy based navigation in pelvic fractures and related surgical considerations. Methods : From May 2010 to December, 16 patients with pelvic fractures were treated with computerized navigation. There were 12 males and 4 females with an average age of 37 years. Based on the Tile classification , there were 15 cases of Tile C type and 1 case of Tile B type . In these patients, 4 patients were treated with sacroiliac screw fixation; 2 patients were treated with sacroiliac screw fixation, screw fixation for pubic symphysis diastasis and pubic fractures; 8 patients were treated with sacroiliac screw fixation and screw fixation for pubic fractures; 2 patients were treated with screw fixation for pubic fractures. The index such as screw inserting time, accurance of inserting screws, intra operative blood losing, injuries of nerve, vascular and other organs, reduction conditions were observed. Results: A total of 36 screws were inserted. The average time was 20 min for each screw placement. The blood loss ranged from 10 to 20 ml. There were no wound infections, neurovascualr injuries and other organ injuries. The postoperative pelvic X-ray and three dimensional CT showed that the fractures had good reduction and all the screws had good position . Conclusion: Percutaneous screw fixation of pelvic fractures with fluoroscopy based navigation have advantages such as little trauma, less blood loss, little complication, reliable fixation and no blood transfusion, which can reconstruct the stability of the pelvic ring, but need adequate preoperative reperation and high requirements for the surgeon.

## Abstract no.: 42366 SENSATE SOLE RECONSTRUCTION USING LATERAL SURAL NEUROCUTANEOUS FLAP

Chunyang WANG, Yi-Min CHAI, Pei HAN

Objectives: coverage of soft-tissue defects of the sole remains a tough challenge. It requires withstanding the forces of weight bearing, and providing protective sensation and adequacy for normal footwear. Herein, a lateral sural neurocutaneous flap was designed to solve the problem. Material and Methods: Five fresh cadavers were utilized for anatomic study. Each leg underwent arterial injection of red gelatin from femoral artery. The lateral sural nerve and its accompanying arteries were dissected. Five patients with soft tissue defects over the sole were reconstructed by the lateral sural neurocutaneous flap. The lateral sural nerve was coapted to branch of medial plantar nerve, and the accompanying vessels were used to anastomosis to those on the recipient sites. Results: The lateral sural nerve originated from the common peroneal nerve. It coursed down between the lateral head of the gastrocnemius and deep fascia. It penetrated the fascia in the proximal third of the leg, and innerved skin over the lateral calf. The accompanying artery in the proximal was lateral superficial sural artery originated from popliteal artery. This artery connecting with perforators from peroneal artery nourished the lateral sural nerve and supplied the skin. All five flaps survived completely without complication. The size of flap ranged from 8x4 cm to 12x8 cm.Follow-up ranged from 6 to 12 months with 7 months in average. The gait analysis demonstrated a normal gait pattern. Two-point discrimination was approximately 20mm in average. The donor site morbidity was minimal. Conclusion: The lateral sural neurocutaneous flap is a sensate flap with minimal donor site morbidity, and is a good candidate for sole reconstruction.

## Abstract no.: 42365 CONTRALATERAL C7 TRANSFER VIA THE PRESPINAL AND RETROPHARYNGEAL ROUTE TO REPAIR BRACHIAL PLEXUS ROOT AVULSION

Youlai ZHANG

OBJECTIVE: We sought to investigate a shorter and safer route for contralateral C7 transfer. METHODS: 28 patients were treated from December 2005 to November 2008. Their ages ranged from 10 to 40 years old. 20 patients had total brachial plexus avulsion. The operative delay was from 2 to 6 months (mean, 4 months). The bilateral scalenus anterior muscles were transected before a prespinal and retropharyngeal tunnel was made. The contralateral C7 nerve root was used to repair the upper trunk, the lower trunk, or the C6 and C8 nerve roots of the injured side via this route, with the use of direct neurorrhaphy or nerve grafting. RESULTS: The length of the harvested contralateral C7 nerve root was4.7 cmon average in all patients. The nerve graft was6.3 cmlong on average for repairing supraclavicular brachial plexus and 8.6 cmlong for repairing infraclavicular brachial plexus. Transient contralateral sensory symptoms were reported in most patients. In all cases, elbow flexion and shoulder abduction recovered by 12 months postoperatively, however, finger flexion recovered by 18 months postoperatively. CONCLUSION: Transection of the bilateral scalenus muscles can reduce the length of the nerve graft and allow the C7 nerve to be transferred more smoothly and safely through the prespinal and retropharyngeal route; this method also favors nerve regeneration and functional recovery.

#### Abstract no.: 42364 CURRENT PERCEPTION THRESHOLD APPLY TO OBSERVING SENSORY NERVE REGENERATION AFTER SURGICAL REPAIR Jie CHEN, Dong TIAN, Lei XU

Introduction: Current perception threshold (CPT) is an assessment of peripheral sensory nerve function by estimating 3 types of sensory nerve fibers (A-beta, A-delta and C) selectively at 3 frequencies (2000Hz, 250Hz and 5Hz). We want to develop CPT as a new measurement to observe sensory nerve regeneration after surgical repair. Methods: 23 wrist and forearm trauma patients with repaired median nerve or ulnar nerve were studied. They underwent different tests on the middle finger tips representing median nerve and on the little finger tips representing ulnar nerve: 1.sensory nerve conduct examination with sensory nerve action potentials (SNAP); 2.CPT test; 3. two physical sensory measurements scoring: static 2-point discrimination(s2-PD) which means function of myelinated afferent fibers classified as A-beta, and sharp/dull recognition which mediated by unmyelinated C-fibers. Results: 1.SNAP were not evoked for all the injured nerves, while CPT test and physical sensory measurements had got their results. 2.All the patients recognized the mechanical stimuli. Its mean score was 2.1, better than 3.1 of s2-PD. Every patient had better or equal scores of Sharp/dull sensory than that of s2-PD. 3. CPT values were: 324.1+329.1 for 5Hz, 503.6+337.4 for 250Hz, and 780.7+277.1 for 2000Hz, which means each type of the sensory nerve got severe dysfunction. 4. There was the most correlationship between CPT results at 2000Hz and s2-PD scores. (r=0.78, p<0.01), and results at 5Hz were more correlated with sharp/dull recognition scores (r=0.54, p<0.01). Conclusion: CPT test was available to apply in obeserving early recovery of those repaired nerves. Results at 3 frequencies could show the function of different types of sensory nerve fiber respectively. It might be a test more sensitive than SNAP for

#### Abstract no.: 42363 EMERGENT FREE FLOW-THROUGH ANTEROLATERAL THIGH FLAPS FOR UPPER LIMB SALVAGE Jian QI

Severe injury in the upper extremities usually causes extensive soft tissue and bone defects and may be associated with major arterial damage, leading to poor perfusion of the distal part of those limbs. It is necessary to cover wound and reconstruct the major artery at the same time in emergency situation. We reported successful emergent free flow-through anterolateral thigh flaps for upper limb salvage in 3 cases , that have huge soft tissue defect and long damaged main artery . We believe emergent Flow-through anterolateral thigh flaps to be the best choice in these situations as it can provide favorable arterial reconstruction and soft-tissue coverage at the same stage, as well as providing good soft bed for further functional reconstruction at the second stage .

#### Abstract no.: 41433 TREATMENT OF COMPLEX DISTAL FEMORAL FRACTURE WITH DEFECTION BY USING LCP PLUS BONE TRANSPLANTATION Zhanyu CHEN, Zongke ZHOU

Objective: To discuss the clinical effect of internal fixation with LCP plus bone transplantation treat complex distal femoral fracture. Method: From February 2009 to February 2014 46 patients with complex distal femoral fracture with defection were treat by using LCP plus bone transplantation, the clinical outcomes were followed up. In the operation, the reconstruction of the distal femur space structure through LCP first provided good conditions bone graft adequately. Result: all patients were followed up for 12-36 months (average 21.4 months).Bone union was achieved in all patients, with duration of union being 12 months. 2 case takes place abnormal 3 months after operation. Conclusion: LCP plus bone transplantation is an effective method to treat complex distal femoral fracture.

## Abstract no.: 40824 FUNCTIONAL OUTCOME OF DISTAL FEMUR INTRAARTICULAR FRACTURES MANAGED WITH ANATOMICAL CONTOURED LOCKED PLATES THROUGH MIPO TECHNIQUE.

Arul Jothi VAITHILINGAM, Vivek TRIKHA

Introduction: Fractures of distal femur still remain a challenge for the orthopaedic community considering the need to meticulously reconstruct the articular surface and achieving good functional outcome. Objectives: To evaluate the results of osteosynthesis for complex intra-articular distal femoral fractures using locking compression plating through MIPO technique. Methods: One hundred and twenty six distal femoral fractures were reconstructed in one hundred thirteen patients from June 2007 to March 2013. There were 91 males (103 knees), 22 females (23 knees) and the mean age was 28.1 years (range = 18-71 years). The fractures were classified according to AO/ASIF classification for fractures of distal femur. All the patients were followed for a minimum of 1 year (mean = 2.1 year; range = 1-5.7 year). Results: There were 73 (58%) C3, 33 (26%) C2, 20 (16%) C1 fractures. The average operative time was 98 min (range = 73-156 min). 98 fractures united radiologically with a mean union period of 16 weeks (range = 8-21 weeks). Eight fractures had no attempt to union and were treated with bone grafting at the end of 16 weeks. The average range of motion was  $115^{\circ}$  (range =  $40^{\circ}$ - $140^{\circ}$ ). Eight patients had deep infection that required implant removal and had decreased ROM. All these patients were compound fracture initially. Conclusions: Treatment with locked screw plate construct gives a reliable and versatile osteosynthesis for distal femur fractures if managed through MIPO technique with better results.

#### Abstract no.: 40501 163 UNICONDYLAR FEMORAL FRACTURES AO 33B3: ORIF

Jean-Christophe BEL, Charles COURT, Paul BONNEVIALLE, Christophe HULET, Christophe CHANTELOT, Franck DUJARDIN, Xavier FLECHER, Matthieu EHLINGER, Raoul BERTIN, Laurent PIDHORZ, Guy PIETU, Eric VANDENBUSSCHE

Methods: 163 fractures of two multicenter series, one retrospective (n=134) and one prospective (n = 29) were included. One year follow-up was obligatory. Were reported: epidemiology, type of treatment, accuracy of reduction confirmed radiographically -angular malunion, step-off and long leg axis-, range of motion, International Knee Score (IKS) and long term results. Results: Mean age was 50.9 ± 24 years, the majority was male and without history. 51% were high energy fractures and 17% were open fractures. 44% were poly-fractured or poly-traumatized patients. Distribution of lateral or medial condyle fracture was equal. 82% fractures were in the sagittal plane and 18% in the coronal plane i.e. Hoffa fracture-. Orthopedic treatment was used for 5% and surgical treatment for 95%. Up to 23% additional knee ligament and 12% additional meniscal injuries were found. After OR the most appropriate hardware was used to fix fractures with lag screws and condylar buttress plates. Indirect reduction and fixation of Hoffa fractures was usual. Initial weightbearing was restricted. Immediate rehabilitation was done for 65%. There were 10% coronal plane and 5% AP plane articular malunion and 12% coronal plane or AP plane step-off. 2% early fixation failure and 2% condylar necrosis after posterior approach (p = 0.02) were found. Knee IKS was 71 ± 20 and Function IKS was 64 ±7. Mean follow-up was 84 months. Final ROM was 106 ± 28° (27% <90°). 12% radiographic evidence of degenerative changes, 3% knee osteotomies and 2% TKA were correlated with postoperative malunion (p = 0.03).

#### Abstract no.: 39571 SURGICAL TREATMENT OF COMMINUTED DISTAL FEMORAL FRACTURES BY LOCKED PLATES IN OSTEOPOROTIC PATIENTS Mohamed HOSNI, Atef MORSY, Ahmed GABER

Background: distal femoral fractures constitute 7% of all femoral fractures. In elderly patients, they are invariably low-energy fractures predisposed to by osteoporosis. There is no consensus on what would be the ideal treatment for such cases. Elderly patients with supracondylar fractures of the femur constitute a challenging group for the trauma surgeon because of compromised general health, poor bone stock and poor tissue healing. Methods: forty patient aged from 62 to 90 years old classified their fractures according to the AO classification were operated upon using the the locked distal femoral plate. Operative time, wound healing, early mobilization, knee range of motion, pain, weight bearing, time of healing, deformity and shortening were assessed. Results: Distal femoral locking plates offer more fixation versatility without an apparent increase in mechanical complications or loss of reduction. Based on our study; plate showed more favorable outcome, less surgical morbidities, better rehabilitation. Clinicians should resist the 'cookbook' method of addressing these injuries and analyze patient factors, fracture geometry, and implant limitations when forming treatment plans. Key words: locked plate.

## Abstract no.: 41554 ANTEGRADE CLOSED INTERLOCKED NAILING IN FRACTURES ABOVE TOTAL KNEE ARTHROPLASTY

Alexander CHELNOKOV, Igor SHUGOL, Johangir KARIMOV

Introduction: Conventional treatment modalities in femoral fractures above total knee arthroplasty have been focused on locked plating and retrograde closed interlocked nailing. Capacities of antegrade nailing seem to be underestimated. Aim of our study was to develop a technique of antegrade closed nailing for the target injury. Matherial and methods: 18 patients (age 41-82) with fractures of the distal femur above knee prosthesis (Rorabeck type II) were treated by closed antegrade intramedullary nailing. Fixatorassisted nailing allowed to obtain and maintain reduction until nail was locked. Distal locking was done in frontal plane with 3-4 screws 6 mm. Option of insertion of 3 locking screws which locked each other in the oval hole was introduced. In 4/18 cases of femoral stems a nail connecting to the stem was used. Results: successful fracture healing occurred in 16/19 cases. In most cases union was reached to 12-16 weeks. Complications included non-union with distal screw cut-out and valgus angulation in 1/19 case exchange retrograde nailing was performed. Conclusion: fixator-assisted antegrade interlocked nailing appears to be least invasive surgical option. It provides rapid recovery and high union rate. Using of fixator-assisted technique for reduction provides alignment with good spatial control. Antegrade nails with multiplanar distal locking screws could be useful to provide better purchase in the osteoporotic metaphyseal fragment.

#### Abstract no.: 41954

## COMPARISION OF FUNCTIONAL OUTCOME IN SUPRACONDYLAR FEMUR FRACTURE WITH INTERCONDYLAR EXTENSION AO TYPE C1 AND C2 TREATED WITH IMIL NAIL WITH CC SCREWS VERSUS DFLCP Saurabh GUPTA, Sohan Lal GUPTA, Om SHAH

Methods – A prospective and retrospective study done from december 2010 to december 2012 at tertiary centre. A total of 55 knees in 50 patients were included (41 females and 9 males). All cases were randomly allocated into 2 groups: group 1 - IMIL Nail with CC Screws and group 2 - DFLCP. Group 1 IMIL Nail with CC Screws consist of 16 knees and group 2 DFLCP included 39 knees in 34 patients. All patients gave informed consent for participation in the study. Intraoperative assessment of transepicondylar axis was done by palpating the most prominent point on lateral epicondyle and sulcus on medial epicondyle and passing a k wire through it. Confirmation was done under image intensifier C arm with epicondylar view. Postoperative assessment was done using radiographs, range of motion and knee score. Results – The mean degree of ROM in group 2 was around 117° ± 2.0° and 102° ± 3.0° in group 1, both of which were within normal limit. The difference in two groups was not statistically significant. There was no postoperative infection. Post operative fat necrosis was seen in 1 patient which required exploration, debridement and secondary suturing. Conclusion - No functional, clinical and statistical difference was observed in between 2 groups. Though DFLCP group gave slightly better outcome.Key words - Supracondylar femur fracture with intercondylar extension. No conflict of interest

#### Abstract no.: 42361 BIFOCAL OSTEOSYNTHESIS FOR TREATMENT OF DISTAL FEMORAL DEFORMITY WITH SHORTENING: ACUTE CORRECTION AND GRADUAL LENGTHENING Qinglin KANG

Introduction: Distal femoral deformity with shortening is a common orthopedic disease, which is less challengeable for surgical disposition. The traditional treatment is gradual correction and lengthening after monofocal femoral supracondylar osteotomy. However, it always results in knee stiffness and dysfunction of quadriceps. We described our experience of acute correction and gradual lengthening with bifocal osteosynthesis. Methods: From 2008 to 2014, 18 cases with various distal femoral deformities with shortening were successfully treated by acute correction and gradual lengthening using bifocal osteosynthesis. There were 6 females and 12 males with a mean age of 19.6 years (range, 15 to 27 years). Types of deformities included 13 varum, 2 valgus, and 3 procurvatum ranging from 15 to 30 degree. The average length discrepancy of 30 femurs was 6.8 cm (range, 4 to 13 cm). Osteotomies were performed at the site of femoral supracondyle and middle or proximal shaft, and then orthofix LRS fixator were mounted. The distal femoral osteotomy was for acute deformity correction and midshaft osteotomy was for gradual lengthening. Results: All patients achieved the desired angular correction and realigned the mechanical axis of involved limb. The average lengthening was 6.5 cm (range, 4 to 11 cm), and the postoperative ROM of affected knees in 18 cases was similar to preoperative. Frames were removed at an average of 8 months (range, 5 to 15 months). Complications of superficial pin-tract infections were observed in 4 patients, but they resolved over time. Conclusions: On the basis of our preliminary experience, we believed that bifocal osteosynthesis would be a considerable procedure to prevent knee stiffness after femoral lengthening. Acute correction of distal femoral deformity by supracondyle osteotomy could hardly influence the ROM of knee joint, and gradual lengthening by midshaft osteotomy contributes to the rehabilitation of quadriceps after tension.

## Abstract no.: 41457 FUNCTIONAL OUTCOME OF PATELLAR FRACTURE FIXATION USING BRAIDED POLYESTER AND ENDOBUTTONS

Srikiran THALANKI, Rajesh GOEL, Chirag BHATIA, Shivbhagwan SHARMA, Ashwani BAGARIA, Avinash RAI

Symptoms and complications to the stainless steel wire are common following TBW fixation technique, and they often require additional surgery for removal of implants. As an alternative to stainless steel wire, braided polyester suture offers several advantages. BPS is mechanically superior to other non reabsorbable sutures in vitro, combining properties of high stiffness and high ultimate tensile strength. Our study combined the use of BPS and endobuttons to fix patellar fractures. Aim: To evaluate radiological and functional outcome of patellar fractures treated using BPS and endobuttons. Materials and methods: A total of 25 patients (average age 40.1 years) were treated by this technique. This study was conducted in the Department of Orthopaedic surgery, Govt. Medical College Kota during years July 2012- July 2013. The study population comprised of 15 men and 10 women. Active knee bending exercises were started at 3 weeks from day of surgery & pts were allowed to walk without brace at 3 weeks from day of surgery. Functional assessment was done on basis of Goodfellows scoring system taking pain on function and range of motion into consideration. Results: Radiological union was noted at 8-10 weeks following surgery. (92%) returned to work on an average of 8 weeks following surgery. At 1-year follow up, none of the patients had hardware problems and none of the patients needed a second surgery for removal of implant. Conclusion: BPS and endobuttons have provided us an excellant alternative to the 'gold standard' age old time tested procedure of modified TBW.

# Abstract no.: 40109 CONCOMITANT POSTERIOR CRUCIATE LIGAMENT INJURIES WITH DIRECTLY INJURED PATELLAR FRACTURES

Jae Ang SIM, Yong Cheol YOON, Beom Koo LEE, Byung Kag KIM

The causes of directly injured patellar fracture and posterior cruciate ligament (PCL) injury are similar. However, there is some difference in the mechanisms of injury. We evaluate the frequency and relationship of PCL injuries in directly injured patellar fractures. From 2007 to 2011, we retrospectively evaluated 104 patients who underwent magnetic resonance imaging (MRI) and surgery due to directly injured patellar fractures. PCL injury was estimated by MRI findings and posterior drawer test under anesthesia. We assessed whether the causes of trauma, the fracture classification, compression of the fracture fragment, and displacement of the fracture were related to the frequency of PCL injuries. Of 104 patients, 26 patients had concomitant PCL injuries with directly injured patellar fractures. The majority of PCL injuries were grade 1 and 2, which accounted for fourteen and nine patients, respectively. Among three patients with grade 3 PCL injury, only two patients required PCL reconstruction. No significant relationship was observed between the causes of trauma and the frequency of PCL injury. In terms of the fracture classification, lower pole fractures and comminuted fractures showed higher frequency of PCL injury than transverse fractures and vertical fractures. Compressed and displaced patellar fractures showed higher frequency of PCL injury. The frequency of concomitant PCL injury was 25% in the directly injured patellar fractures, even though cases in which surgery was needed for PCL injury were very rare. The frequency of PCL injury was increased in lower pole fractures, comminuted fractures, displaced fractures, and compressed fractures of the patella.

#### Abstract no.: 41630 FLOATING KNEE INJURIES- AN INDIAN EXPERIENCE OF 43 CASES Jefferson GEORGE

INTRODUCTION: Floating knee Injuries are described as the simultaneous ipsilateral disruption of skeletal integrity above and below knee. METHODS: 43 patients admitted between January 2013 and January 2015 were prospectively studied and followed up for 10-30 months. RESULTS: These injuries have male preponderance(41/43). Right side was commoner. The Injury severity Score ranged from 9-75 (mean-30).10 (23%) patients had closed fractures while 8(18%) had grade 3 compound fracture of both femur and tibia with rest falling in intermediate category. 11 femur and 9 tibial fractures were segmental. 10 femur and 8 tibial fractures had intra-articular extension. 29(67%) had comminution. According to Blake & Mcbride's classification, 29 grade 1, 13 grade 2a and 1 grade 2b. 24 tibial fractures treated with ex-fix, 7 with intramedullary nailing, 2 plating, 7 conservatively.3 required screws for tibial stabilization.18 femur fractures treated with nailing, 15 with ex-fix, 4 with AO plating, 1 required primary amputation. Vascular injury occurred in 3 patients. Two were repaired and one required amputation. Non union in 2 and malunion in 6 patients were observed. Knee stiffness occurred in 11 patients. Limp in five and laxity occurred in two, 28 required at least 1 plastic procedure. 3 died within 1st week of admission. Superficial infection and pintract infection occurred in 11, fat embolism in 2 and ARDS in 3 patients. CONCLUSION: Though rare, these injuries are a significant cause of morbidity. They require a multidisciplinary approach. Aggressive treatment of soft tissue defects with grafts and flaps are prerequisites for successful functional outcome.

#### Abstract no.: 41659 EXPERIENCE OF USE OPTIMIZED METHOD OF VERTEBROPLASTY IN PATIENTS WITH OSTEOLYTIC SPINAL LESIONS Mikalai CHUMAK, Andrei BABKIN, Oleg DULUB, Zinaida YAHORAVA

Introduction: Vertebroplasty is an effective method for treatment of severe back pain, caused by osteoporotic compression fractures, vertebral hemangiomas and other osteolytic spinal lesions. Purpose: To investigate the results of use an optimized method vertebroplasty in patients with osteolytic spinal lesions. Methods: 35 patients (24 women and 11man aged from 24 to 70) with osteolytic lesions in the spine (33 hemangiomas, 1 plasmacytoma, 1 multiple myeloma) were operated on using an vertebroplasty. 10 patients with aggressive vertebral hemangiomas, 1 patient with plasmacytoma and 1 patient with multiple myeloma, complicated with spinal cord compression were operated on using vertebroplasty in combination with open decompression - stabilizing intervention. For needle placement we used fluoroscopic guidance and in many cases computer-assisted system. In all cases venospondylography was performed for the prediction of cement pathways in the vertebral body. Generally the volume of the osteolytic focus was preliminary determined before the operation in order to determine the amount injected cement. Results: The reduction of pain syndrome was achieved in all cases. In patients with spinal stenosis and spinal cord compression caused by the tumor during vertebroplasty in combination with open decompression - stabilizing intervention the volume of intraoperative hemorrhage was moderate. In these patients after surgery in addition to reducing pain neurological status had improved. There was 1 case of asymptomatic extravertebral leakage of bone cement into the epidural vein. Conclusion: the use of optimized method vertebroplasty is effective and safe for the treatment of patients with osteolytic spinal lesions.

#### Abstract no.: 40665 ROLE OF EARLY VERTEBROPLASTY IN ALTERING LIFE-THREATENING CO MORBIDITY IN THE ELDERLY Vishal MANDLEWALA, Abhijeet SHROFF

Introduction: Elderly patients exhibit a fine balance between medical co-morbidities and function. Vertebral fractures alter this balance and invoke a physiological and psychological imbalance that can rapidly become life threatening. Rapid control of pain is important. Vertebroplasty provides a safe solution that significantly improves the complications in these patients. Aim and objectives: role of vertebroplasty, Improvement of pain in achieving early function, Reversal of complications in pre-existing co morbidity and Early and long term complications. Materials and methods: Prospective analysis of 30 consecutive patients from 2010-2014, Gender (12M : 18F). Xrays and mri was done to confirm diagnoses. Average age was 74.0662-88. The average ASA American society of anesthesiologists grade was 2.83 and co-morbidities 2.7. 14 patients developed 21 new complications that required hospitalization. Surgical approach was Minimal invasive and Performed under local anesthesia with Uni-pedicular Approach. Out of bed mobilization was commenced immediately as allowed by co morbidities. Result: Patients experienced significant improvement in VAS scores 4.06 immediately after the procedure p 0.001 allowing nursing and reversal of complications. Most noticeably was control of sepsis and correction of arrhythmia. Final VAS score however was insignificantly better at 3.66p 0.001. The ODI At 3months and final follow-up was 54.55 52.68 respectively p.0.001. Conclusion: Provides immediate pain relief, Prevents co morbidity related complications, Early functional improvement, Significantly improves health.

#### Abstract no.: 42316

#### SCREW TEMPORALLY UNIPEDICLE REDUCTION WITH PERCUTANEOUS **KYPHOPLASTY** COMPARED WITH SIMPLE PERCUTANEOUS **KYPHOPLASTY** FOR OSTEOPOROTIC COMPRESSION VERTEBRAL FRACTURE: RETROSPECTIVE Α **COMPARATIVE STUDY**

Tengjia ZHU

Purpose: Adequate reduction is necessary in treatment of OVCFs. With the currently popular minimal invasive treatment, the reduction of percutaneous kyphoplasty(PKP) is unsatisfactory. Temporally Unipedicle screw reduction with percutaneous kyphoplasty is a new method for the management of osteoporotic compression vertebral fracture (OVCF). We conducted a clinical retrospective comparative study to verify that if the temporally unipedicle screw reduction with PKP is superior to that of simple PKP regarding the management of OVCFs. Methods: A total number of 31 consecutive patients who sustained OVCFs without neurological deficits and underwent surgery in our hospital from June 2012 to January 2014 were included in the study. 16 were underwent with simple PKP(control group) while 15 were underwent with temporally unipedicle screw reduction with PKP(TUSR-PKP, treatment group). All the patients were followed up for at least 1 year. Visual analog scale(VAS) pain scores and ODI were recorded, and the Cobb angles and the vertebral body (VB) heights were measured on the lateral radiographs before surgery and also immediately 1day, 1 month, 3 months, 6 months, 1 year after surgery. Results: There was no significant difference between the two groups in the preoperative parameters. The treatment group had better vertebral height gain and greater improvement on ODI compared with the control group(P</span> < 0.05). The VAS scores of the two groups are similar for all the time set up for the follow-up. There are 2 patients in the control group and 2 patients in the treatment group who had the cement leakage. In the control group, 2 patients suffered from adjacent nor non-adjacent vertebra fractures. Other perioperative parameters differed significantly between the two groups, but both

parameters were within the range of the operative tolerance of elderly patients.

Conclusions: Temporally unipedicle screw reduction with PKP is a safe

#### Abstract no.: 40166 PREDICATING VALUE OF SHORT TAU INVERSION RECOVERY MRI IN EARLY PAINFUL OSTEOPOROTIC VERTEBRAL FRACTURES TREATED BY PERCUTANEOUS KYPHOPLASTY Jian WANG

Objectives To determine the value of short tau inversion recovery magnetic resonance imaging in patient selection, treatment planning, and prediction of response to percutaneous kyphoplasty (PKP) for acute vertebral pain on the basis of a comparison with T2 weighted MRI. Methods A prospective clinical study of 54 consecutive cases of painful OVFs treated with PKP was done. The patients were respectively divided into STIR and T2 weighted group based on signal differences of MRI. The STIR group was made of 30 patients with low or equal intensity T2 weighted and high STIR signal, and the T2 weighted group included 24 consecutive patients with high intensity T2 weighted signal. Clinical, radiological outcomes and bone mineral density between both groups were compared. Results There was no significant difference on the bone mineral density between the STIR group (mean T-score = -3.6) and the T2 weighted group (mean T-score = -3.2). The visual analogue scale for back pain decreased respectively from 7.3  $\pm$  0.6 (STIR group), 7.1  $\pm$  0.9 (T2 weighted group) preoperatively to 2.1  $\pm$  0.5 (STIR group), 2.4  $\pm$ 0.7 (T2 weighted group) at the second day after surgery, with a final score of  $1.5 \pm 0.4$ (STIR group) and 1.7 ± 0.3 (T2 weighted group). ODI reduced from 38.9±10.4 (STIR group), 37.6±8.1 (T2 weighted group) before operation to 21.4±7.2 (STIR group), 20.5±8.9 (T2 weighted group) postoperatively at final follow up. Conclusion Positive STIR MRI seems a good predictor of acute painful OVFs.

## Abstract no.: 40687 MINI-OPEN TRANS-SPATIUM INTERMUSCULAR VERSUS PERCUTANEOUS PEDICLE SCREWS FIXATION ON THORACOLUMBAR MONO-SEGMENTAL VERTEBRAL FRACTURES WITHOUT NEUROLOGICAL DEFICITS

Weihu MA, Guoqing LI

Introduction: Over recent years, both trans-spatium intermuscular and percutaneous pedicle fixation are mainly two widespread minimally invasive methods on the treatment of thoracolumbar fractures, especially for cases without neurologic deficit. Compared with the traditional posterior approach, these techniques have equivalent or better curative effect and significantly reduce approach-related complications such as iatrogenic muscle damage and faster functional recovery . And, some authors compared the clinical outcomes of trans-spatium intermuscular with that of percutaneous pedicle fixation on thoracolumbar fractures: the percutaneous group had significantly less intraoperative bleeding and less postoperative pains, but suffered significantly longer fluoroscopy time and higher hospitalization costs. In this study, the author compared the clinical and radiographic outcomes of miniopen transspatium intermuscular with that of percutaneous pedicle screws fixation on thoracolumbar monosegmental vertebral fractures without neurological deficits. Methods: The author retrospectively analysed the clinical and radiographic records of consecutive patients with thoracolumbar mono-segmental vertebral fractures without neurological deficits who had undergone mini-open transspatium intermuscular or percutaneous pedicle screws fixation between August 2009 and August 2012. The authors compared perioperative parameters, Visual Analog Scale scores, and radiologic parameters. Results: A total of 95 patients were enrolled. And all patients were followed up for 19.6±7.3 months. No significant differences were found in terms of age, gender, injured segment, fracture type, operation time, bleeding amounts, Visual Analog Scale scores, and radiologic parameters between the two kinds of minimally invasive methods. However, the mini-open trans-spatium intermuscular had significantly lower hospitalization costs and less intraoperative radiation exposure times, but suffered significantly longer operative incision.

#### Abstract no.: 40424 COMPARATIVE STUDY OF MIS-TLIF AND PLIF IN THE TREATMENT OF LUMBAR SPINAL STENOSIS Jixian QIAN

Objective: To compare clinical effect of MIS-TLIF versus PLIF in the treatment of lumbar spinal stenosis (LSS). Methods: 80 LSS patients undergoing MIS-TLIF or PLIF were enrolled. In the two groups, the patients were treated with the help of Mast Quadrant Retractor System or by open posterior lumbar interbody fusion respectively. Observation index: 1.Time of operation, blood loss, length of stay (LOS) after surgery and complication. 2. Pain (VAS), low-back disability (ODI). 3. Fusion rate using the Bridwell grading scale. 4. Muscle damage index was accessed by CKP level and the multifidus muscle's T2 relaxation time.Results: The time of operation in MIS-TLIF group is no difference comparing in PLIF. The volume of intraoperative blood loss and postoperative in MIS-TLIF are less than that in PLIF respectively. The LOS of the MIS-TLIF group is significantly shorter than the PLIF. VAS score showed better improvement at 1 month postoperatively for MIS-TLIF vs. PLIF patients, while were similar at 24 months after surgery between two groups. There were no difference between the ODI score of the two groups both at 1 and 24 months after surgery. The total Incidence of complication in two group were 23.75%, with 20.0% in MIS-TLIF and 27.5% respectively, which were included operative incision infection, dural tearing, and so on.Conclusions: MIS-TLIF shows less blood loss and muscle and soft tissue injury, earlier functional recovery. The satisfactory effect and after MIS-TLIF can be only obtained in cases selected strictly according to different conditions.

# Abstract no.: 41050 NAVIGATION CAN MAKE TLIF LESS INVASIVE

Yu WANG, Hong LIU, Chunde LI, Yongkai HU

The current study presents a technique (navigated TLIF) which takes a 4-cm incision to accomplish a single-level TLIF, and compared its efficacy and efficiency with those of conventional TLIF. 40 patients who were indicated for single-level lumbar fusion were included and randomized to either navigated-TLIF group or conventional-TLIF group. Blood loss, operation time, incision length, complications, bed rest period, and length of hospitalization were recorded. ODI scoring was also performed for each patient before surgery, 3 months after surgery, and 2 years after surgery. The incision length was significantly shorter in the navigated-TLIF group than in the conventional-TLIF group (4.2 vs 8.3 cm, p=0.001). Accordingly, the blood loss was also significantly less in the navigated-TLIF group than in the conventional-TLIF group (122.5 vs 220.5 ml, p=0.049). There was no significant difference in total operation time between the two groups (134.4 vs 124.5 min, p=0.226). The navigated-TLIF group showed significantly shorter length of hospital stay and time to mobilization compared to the conventional-TLIF group. The incision length decreased with time. At final follow-up, the incision length had decreased averagely from 4.2 cm to 3.7 cm in the navigated-TLIF group and from 8.3 cm to 7.7 cm in the conventional-TLIF group. The ODI score improved significantly in the both groups immediately after surgery, and maintained well in the following two years. Navigation can make single-level TLIF less invasive. Compared with conventional TLIF, navigated TLIF proved to be superior with regard to intraoperative blood loss, length of hospital stay, and incision length.

#### Abstract no.: 41432 PERCUTANEOUS NOVEL TRANSPEDICULAR LAG-SCREW FIXATION FOR HANGMAN'S FRACTURE USING INTRA-OPERATIVE, THREE-DIMENSIONAL IMAGE (O-ARM): A PRELIMINARY REPORT Weimin JIANG

Purpose: The aim of this study was to evaluate the effectiveness and feasibility of percutaneous novel transpedicular lag-screw fixation for hangman's fracture under the monitoring of three-dimensional image (O-arm). Methods: During the period of July 2013~October 2014, seven patients received operation (5 male, 2 female), who were, based on the Levine-Edwards classification, divided as follows: type I fracture, two cases; type II, four cases; type IIa, one case. Two cases accompanied with multiple fractures such as ribs and thoracolumber fractures. All patients achieved satisfactory reduction before operation, and were treated by percutaneous novel transpedicular lag-screw which is specially designed by us. The whole procedure was performed under O-arm monitor. The clinical evaluation, including range of motion (ROM) and Visual Analogue Scale (VAS) scores, and plain X-rays were performed at each visit including dynamic lateral views. CT scan was also performed at three-month postoperatively to assess the fracture healing. Results: Seven patients were observed for an average of 8 months, ranging from 5-18 months, and suffered from neither implant-related complication postoperatively nor spinal cord or vertebral artery injury intraoperatively. The patients went around the next day with the cervical collar if no other fractures accompanied. The difference of VAS scores between preoperative and three-month postoperative was significant (P<0.001). Solid fusion were achieved 3~6months. All patients regained the full ROM of the whole cervical spine. Conclusion: Percutaneous novel C2 transpedicular lag-screw fixation assisted by Oarm is an effective, safe and feasible minimally invasive technique for hangman's fracture.
Date: 2015-09-19 Session: Free Papers Minimal Invasive Spine I Time: 10:30 - 12:00 Room: Foshan Hall

# Abstract no.: 41732 TITANIUM MINI-PLATES PREVENTS SPRINGBACK CLOSURE IN SINGLE-DOOR CERVICAL LAMINOPLASTY

Kin Cheung MAK, Hai Qiang WANG, Tarek ELFIKY, Dino SAMARTZIS, Keith LUK, Kenneth CHEUNG

Introduction: Springback closure after single-door cervical laminoplasty is a known and feared complication. It's incidence and consequence has been poorly defined, and various techniques have been used to prevent its occurrence. With technological advancement, we progressed from sutures, to Mitek anchors, to titanium mini-plates. The latter represented a viable alternative with other potential benefits. Methods: Two cohorts of patients who underwent single-door cervical laminoplasty for spondylotic myelopathy and ossification of posterior longitudinal ligament were compared. One cohort, 30 patients, had laminoplasty hinges stabilized using traditional Hirabayashi suturing technique. The other cohort, 12 patients, had titanium mini-plates, with various patterns of plating ranging from plating at all levels to plating at 2 levels. Springback was defined as posterior diameter, and loss of end-on lamina silhouette and re-appearance of lateral profile of spinous process on lateral x-ray. Modified JOA score and recovery rates were the secondary outcome measures for this study. Results: There were 3 patients in Hirabayashi group with springback closure. All were partial and segmental. For the latter group, there was no springback closure by our definition, though at levels without miniplate a mild decrease in APD was noted in a few instances. Those with springback required revision surgery, but only had partial recovery. Conclusion: Springback closure represents a complication that can result in neurological deterioration and maybe revision surgery. Titanium mini-plates represents an excellent alternative to Hirabayashi technique with added benefit of potentially reducing axial neck pain & neck collar use due to its immediate stability.

≧ 4mm in

### Abstract no.: 42312 COMBINED TWO FOOT FLAPS WITH ILIAC GRAFT FOR RECONSTRUCTION OF THE THUMB Guangliang ZHANG

Purpose: The purpose of this report was to retrospectively review the results of reconstruction of the thumb by use of combined two foot flaps with iliac graft. Methods: From 2009 to 2014, nine patients with traumatic amputation of the thumb were reconstructed with combined two foot flaps and iliac graft. The two flaps were based on one pedicle. Three cases with the defects of distal phalanx were repaired with combined great toenail flap and second toe medial flap and iliac graft. Six cases with the defects of proximal phalanx were repaired with combined great toenail flap and dorsalis pedis flap and iliac graft. Results: All flaps survived completely. All postoperative courses were uneventful. Patients were followed for an average of 15.6 months (range, 6 months to 35months). The appearance of the reconstructed thumb was comparable to normal one, except for one which required debulking. The appearance of the nail was satisfactory without deformity. The ROM of joint was satisfactory. The 2PD of the pulp averaged 11.0 mm (range, 6 to>15mm). The dorsal nail-skin flap in all cases recovered a protective sensory response. Besides scar formation occurred in three cases, the donor sites healed well. All the patients were able to walk without difficulty. The MHQ score averaged 63.2±6.1 points and Maryland foot rating score averaged 94.8±3.4 points. Conclusion: The combined two foot flaps with iliac graft may provide an option for the reconstruction of the thumb. The procedure achieves satisfactory functional and cosmetic results.

#### Abstract no.: 42311 FINGER RECONSTRUCTION BY TOE-TO-HAND TRANSPLANTATION COMBINED WITH CALLUS DISTRACTION Youlai ZHANG

OBJECTIVE: Toe-to-hand transplantation is useful for missing finger reconstruction. However, the length of the toe phalange does not match that of the finger. We hypothesize that the transferred toe phalange can be lengthened by callus distraction, which therefore improve the functional and aesthetic results. METHODS: Three patients who underwent toe to hand transfer for finger reconstructions were treated in 2011. Average age was 23 years (18-29). Distraction was performed 6 months to 3 years after toe-to-hand transplantation, using a unilateral external fixator device (Orthofix). The corticotomy was done at the middle phalange of the finger. Gradual distraction was performed 1 week after that and at the rate of 0.25 to 0.5 mm/day. Once the desired length was reached, progressive distraction was discontinued. External fixator device was removed 6-8 weeks later. Finger splint was applied until adequate mineralization was achieved. Outcome measurements included length of finger, radiographic evidence of bone healing, finger extension and flexion. Cosmetic and functional assessments were made. RESULTS:All patients achieved the planned increase in length of 1.8-2.2 cm (average 2.0 mm). Bony consolidation was obtained in all patients. The range of motion of the PIP (proximal interphalangeal) joint was preserved. All patients were satisfied with the cosmetic and functional results. CONCLUSIONS: · After toe-to-hand transplantation, the toe phalange can be lengthened by callus distraction. And the level and range of motion of the PIP joint is preserved. · Callus distraction combined with toe-to-hand transplantation can be considered an effective procedure to reconstruct an amputated finger leveled at the proximal phalange. It provides desirable functional and aesthetic results that other reconstructive techniques cannot achieve.

### Abstract no.: 42310 FREE DIGITAL ARTERY PERFORATOR FLAP TRANSFER FOR RECONSTRUCTION OF FINGERTIP Lei ZHU

Objective: To investigate the clinical efficacy of fingertip reconstruction by the free digital artery perforator flaps. Methods: 6 cases (6 fingers) of fingertip defect were treated with the appropriate size and shape of the free digital artery perforator flaps from the proximal phalanx according to the fingertip defect. During the operation, we used the superficial vein at the edge of flap as reflux vessels and the palmer cutaneous branch of proper digital nerve or the cutaneous branch of the dorsal branch of proper digital nerve as the sensory nerve. After finding the cutaneous branches of digital artery to the flap, the beginning was cut off to form a branch artery pedicled skin flap. The fingertips were reconstructed with the free flap with artery anastomosis between the cutaneous branches of the digital artery, nerve anastomosis between the flap nerve and the nerve stump and venous anastomosis between flap and superficial veins. Results: 6 flaps survived and skin grafting succeeded. Patients were followed up for

6~9 months, the appearance and texture of the 6 flaps were all satisfactory and two-point

discriminations were  $3 \sim 8$ mm. Conclusion: To repair fingertip defect by the free digital artery perforator flap, the texture of flaps were fine and sensation of finger tip went well, without damage to the digital artery or nerve.

# Abstract no.: 42308 MICROSURGICAL REPAIRMENT OF DISTAL INDEX FINGFER DEFECTION

Jianwen LIAO

[Abstract] Objective To investigate the clinical effect of distal index finger defection with microsurgical repairement . Methods To repair wounds, 19 cases of distal index finger defection were admitted,9 fingers were repaired with wrap-around flap from sencond toe,6 fingers were covered using medial wrap-around flap from sencond toe,4 fingers were reconstructed with sencond toe.Results Nineteen cases were followed up,and the rang beteen 1to 5 years.All the fingers were survived.The distance of touch-senstive distinguish for fixed fingers are ranged 4.3mm-7.1mm,with an average space of 5.6 mm.According to the upper extremity functional evaluation standard set up by handsurgery branch of Chinese Medical Association, 12 cases were excellent,5 good,and 2 fair.The rate of excellent and good was 89.4%. Conclosion Microsurgical repairement of distal index finger defection can recover the finger function as much as possible ,which is an ideal method in clinical application. distal index finger ; tissue defection; microsurgical repairment ;

transplant; repair

### Abstract no.: 42309 PRESERVING THE RECIPIENT ARTERY AND VEIN: END-TO-SIDE MICROVASCULAR VESSEL ANASTOMOSIS FOR PERFORATOR FLAP IN HAND SOFT TISSUE RECONSTRUCTION Xuevuan LI

BACKGROUND: End to end vessel anastomosis was priority for revascularization in most conventional free flaps. And we paid less attention to the recipient vessel's preservation. However, for perforator flaps which were popular now with small vessel caliber, an end-to-side technique to the recipient artery and vein will fulfill both the need to spare the recipient vessel and provide a better technique for unmatched vessel anastomosis. The aim of this study is to discuss the feasibility and reliability of the end-toside arterial and vein anastomosis by comparing it with the end-to-end anastomosis in terms of anastomosis time, spasm occurrence, incidence of thrombosis, and overall flap survival. METHODS: We reviewed the medical records since June,2010 to June,2013, 152 consecutive patients who underwent free perforator flaps were involved in our study, including SIEP 23 cases, lateral arm 36 cases, peroneal perorator flap 25 cases, ALT 78 cases .The end to side anastomosis were performed in 72 cases while end to end anastomosis in 80 cases; all patients were followed up for 6-24 months, early circulation, vascular spasm, anastomotic thrombosis were observed. Overall survival rate were analyzed statistically. RESULTS: The average anastomosis time for end to side anastomosis was 21.3 minutes, which was a little bit longer than end to end anastomosis with 14.4 minutes in average. The incidence of anastomotic vasospasm after end to side anastomosis was significantly lower than the end to end anastomosis (P < 0.05), postoperative anastomotic thrombosis rate had no statistically significant (P > 0.05), all flaps survived in end to side anastomosis group without crisis, 1 flap failed and partial necrosis occurred in another case in end to end anastomosis group. CONCLUSIONS: Although anastomosis times were increased in the end-to-side group, this technique showed lower spasm rate and similar flap survival rate. Therefore,

### Abstract no.: 42313 THE TREATMENT OF NEAR PHALANX BONE FRACTURE WITH CLOSED REDUCTION UNDER MINOR EXTERNAL FIXATIONS Jun HU

Objective: To study the curative effect of the treatment of near phalanx bone fracture with closed reduction under minor external fixations. Method: 120 patients with near phalanx bone fracture were treated with closed reduction under minor external fixations in our department from 2007.3 to 2013.6. The total number of near phalanx bone fracture was 136. The mean time of external fixation was approximately 5 w~7w. All of the patients were immediately encouraged for early rehabilitation training after operations . Results: The duration of follow-up ranged from 6 months to 16 months and the mean time was 10±1.5 months. As the Dargan system functional evaluation showed, 128 were excellent, 6 were good, 2 were modest. Conclusion: The operation of closed reduction with minor external fixation to treat near phalanx bone fracture was simple, disturbed tendons little as well as brought satisfactory results. However, this method also have its limits: a) the position of inserting needle was strictly accurate; b) the candidate have to be patients with stable near phalanx bone fractures; c) experienced surgeons. phalanx bone fracture, external fixation, closed reduction

# Abstract no.: 42307 DORSAL TANGENTIAL FLUOROSCOPIC VIEW DETECTING DORSAL SCREWS PENETRATING INTRAOPERATIVELY IN THE VOLAR PLATING OF DISTAL FRACTURES

Haifeng LI

Purpose: Application of the volar locking plate on the distal radial fractures reduces the dorsal tissues complications, but risk of extensor tendon irritation and rupture could not be avoided totally. Screw penetrating the dorsal cortex is one of mainly causes. It is difficult to determine the accurate length of srew by depth gauge when far cortex is comminuted.Similarly it is difficult to determine screw length and protrusion using the standard anter-posterior(AP) and lateral intraoperative fluoroscopic views for the triangular configuration of the distal radius and Lister tubercle. However in fractures with coronal split, enough screw length is essential to capture the dorsal fragment. The purpose of this study was to assess screws penetrating through the dorsal cortex by a supplemental dorsal tangential fluoroscopic view intraoperatively in volar plating of distal radius. Methods: A retrospective study of 21 patients with acute distal radius fractures treated with open reduction and volar locking plate fixation was undertaken. All the operation were performed by experienced orthopedists(above and including attending level). After reduction, standard AP and lateral fluoroscopic views were taken to adjust the position of hardware and length of the screws. Then dorsal tangential view(wrist was hyperflexed and longitudinal axis of the radius inclined 15° relative to the x-ray beam) was used to detect screws penetrating through the dorsal cortex. If screws penetrating were detected, shorter screws were exchanged. The position and length of penetrating were measured and recorded lately from the fluoroscopic images. CT scans of the wrist were performed in 1 week post-operative to confirm that the screw length as determined intraoperatively. Results: A total of 5 screws in 4 patients(19.05%) were revealed penetrating by the dorsal tangential view which was not detectable on standard AP and lateral views, and were exchanged for shorter screws. The

# Abstract no.: 41387 TRIPLE PELVIC OSTEOTOMY IN THE TREATMENT OF DYSPLASTIC COXARTHROSIS IN ADULTS

Pavel VOLOTOVSKI, Ivan MINAKOUSKY, Aleh SAKALOUSKI, Darya SAKALOUSKAYA

Dysplastic coxarthrosis is a common cause of disability in young adults. We performed TPO in 67 patients (81 hips) from 1998 to 2006. The mean age was 30.2 (18 - 55) years at the time of surgery. 11 patients had radiographic evidence of preosteoarthritis, 33 - 1stage and 37 - 2 stage. The mean duration of follow-up was 80 (45 - 129) months. Results: Clinical evaluation of results at the time of the latest follow-up by Tschauner was: Excellent - 22 (27%), Good - 28 (34%), Satisfactory - 20 (25%), Unsatisfactory - 11 (13%). 61 (75%) patients reported they were satisfied with results of treatment, 7 (9%) - partially satisfied, 13 (16%) - unsatisfied. The mean center-edge angle improved from 6,7 (-10 -25) degrees preoperatively to 41.5 (10 - 80) degrees. The mean angle of Sharp improved from 49,3 (40 - 60) degrees to 30 (10 - 43) degrees. The mean degree of a coverage of the femoral head increased from 0.6 (0.3 - 0.83) preoperatively to 0.99 (0.6 - 1.3). Fefteen hips had radiographic evidence of progression of osteoarthritis: 3 from first to third stage, 11 from second to third stage, in one case developed necrosis of the femoral head. 6 patients (7 hips) underwent total hip arthroplasty in the mean term 73 months The outcome of TPO was satisfactory for hip with pre- or early-stage osteoarthritis, secondary to acetabular dysplasia. Timely realization of TPO eliminates hip replacement or delay it.

### Abstract no.: 39258 PERIACETABULAR OSTEOTOMY UNDER DIRECT VISION Khaled EMARA, Ramy DIAB, Khaled GHAFAR

Introduction: Bernese periacetabular osteotomy is used to treat symptomatic acetabular dysplasia, this study aims to describe an easier technique for this osteotomy with less exposure intraoperative radiation. Methods: Twenty patients with symptomatic acetabular dysplasia were treated with periacetabular osteotomy via posterior hip approach and limited anterior approach approach, cuts were performed under direct vision, and fixation by cancellous screws .The age, gender, side of operated hip ,total time of follow up complications and need for revision surgery were recorded in all patients. Results: At the time of surgery, the mean age was 17.2 years, The change in the acetabular inclination ranged from 5 to 19 degrees, the change in anterior and lateral center edge angles ranged from 14 to 42 degrees and 20-38 degrees respectively, the procedure provided medial translation of hip center with an average change of 6 mm, clinical outcome analysis showed pain relief and improved hip function in 17 patients with improvement in the Harris Hip Score ranging from 15-25 points. Three patients did not show improvement of hip function, sciatic nerve palsy occurred in one patient which recovered spontaneously after 6 weeks ,delayed union of the trochanteric osteotomy occurred in one patient. Conclusion: Our technique of performing periacetabular osteotomy through posterior hip approach with greater trochanteric osteotomy and a limited anterior approach provides an easier technique, allows minimizing the intraoperative fluoroscopic use ,with less blood loss and with no need for special surgical instruments, with comparable results to the standard Bernese periacetabular osteotomy.

### Abstract no.: 41693 LABRAL TEAR LEADING CAUSE OF OSTEOARTHRITIS OF THE HIP Anton PLAKSEYCHUK, Pisit Lertwanich LERTWANICH, Akira MAEYAMA

The purpose of this study was to evaluate the effect of labral injury to stability of the femoral head in the acetabular socket and understand possible mechanisms of the development of osteoarthritis of the hip joint. Ten cadaver hip specimens were tested using a robotic system under four different loading conditions: axial loading (80 N) along the femoral axis and axial loading (80 N) combined with either anterior, posterior or lateral loading (60 N). The hip states were examined were intact, with a 1.5 cm capsulotomy and with a 1 cm resection of the anterosuperior labrum. Results: At 30° of flexion, under axial load, the displacement of the hip with capsulotomy and labral resection (9.6±2.5 mm) was significantly larger then the hip with capsulotomy alone (5.6±4.1 mm, p=0.005) and the intact hip (5.2±3.8 mm, p=0.005). Also, at 30° of flexion the displacement under combined axial and anterior/posterior load was increased with capsulotomy and labral resection. Conclusions: The acetabular labrum provides stability to the hip joint in response to a distraction force and combined distraction and translation forces. One centimeter of labral resection caused significant displacement ( "wobbling" effect) of the femoral head within the acetabulum with normal range of motion, that leads to cartilage overload and eventual arthritic changes. Successful labral repair could be crucial for restoration of the hip biomechanics and prevention of osteoarthritis of the hip joint.

### Abstract no.: 41854 LATE CORRECTION OF NECK DEFORMITY IN HEALED SLIPPED CAPITAL FEMORAL EPIPHYSIS – A RELIABLE OPTION WITH ENCOURAGING CLINICAL OUTCOMES. Balakumar BALASUBRAMANIAN

We hypothesized delayed sub capital neck osteotomy in severe Slipped Capital Femoral Epiphysis (SCFE) as an alternative to transphyseal realignment. 17 patients with chronic severe SCFE in the oblique plane formed the study group. 5 patients underwent modified Dunn capital realignment through the physis and 12 patients underwent surgical dislocation and corrective neck osteotomy. 10 patients had undergone prior in-situ pinning before neck osteotomy. The mean follow-up was 4.5 years. The mean Modified Harris hip score at last follow up was 89.9 and mean non arthritis hip score was 92.5. All the radiological parameters showed improvement when compared with the preoperative measurements in both the groups. Complications included one non-union and two varus collapse in neck osteotomy and one chondrolysis in modified Dunn's group. There was no difference in the outcomes between the groups both clinically and radiologically. Delayed femoral neck osteotomy gave equally good results and was found to be technically easier than early capital realignment. However the optimal time to do the femoral neck osteotomy needs to studied further.

### Abstract no.: 40642 OUTCOMES OF CURVED INTERTROCHANTERIC VARUS OSTEOTOMY COMBINED WITH BONE IMPACTION GRAFTING FOR OSTEONECROSIS OF THE FEMORAL HEAD

Yukiharu HASEGAWA, Taisuke SEKI, Takafumi AMANO, Yasuhiko TAKEGAMI

We investigated the clinical and radiographic outcomes of curved intertrochanteric varus osteotomy (CIVO) combined with bone impaction grafting (BIG) for osteonecrosis of the femoral head (ONFH) with a mean follow-up of 7.5 years (5 to 11). Traumatic osteonecrosis and small lesion treated only CIVO were excluded. A total of 34 patients (male 17, female 17) with 35 hips with a mean age of 36 years at the time of surgery were investigated. Etiology of ONFH was steroid-induced in 24 hips, alcohol-associated in 5 hips, and idiopathic in 6 hips. According to JOA classification Type B: 2 hips, Type C1:29 hips Type C2: 4 hips; and Stage 2 (pre-collapsed stage): 8 hips, Stage 3A (collapse< 3mm): 15 hips and 3B (collapse >3mm): 7 hips, and Stage 4: 1 hip were treated. After curved varus osteotomy tunnel from the proximal femur to the antero-lateral osteonecrosis was made (diameter 1cm). Autologous BIG form ilium was performed using special impactor to reduce the collapse to the spherical shape. Varus correction of the femoral head was performed and fixed with plate and screw. The mean Harris hip score improved from 65 points before surgery to 85 points at the final follow-up. The mean varus angulations were 26 degrees. Re-collapse was observed in 11 hips (32%), and not observed in 24 pips (68%). Conversion to total hip arthroplasty was performed in 5 hips (steroid-induced in 4). Clinical and radiographic outcomes of CIVO and combined with BIG was satisfactory for mid-term follow-up.

### Abstract no.: 39138 WHY TO PLACE FEMORAL STEM FIRST IN SURGICAL MANAGEMENT OF CONGENITAL HIP DYSPLASIA

Mikheil ZIMLITSKI, Levan NATCHKEBIA, Giorgi LORIA, Giorgi ZIMLITSKI, Gaphrindashvili VAGA

Total Hip Artroplasty remains an excellent option for the management of Hip dysplasia. In total hip arthroplasty (THA) for dysplastic hip osteoarthritis, bony deformity makes it difficult to identify the correct cup position witch is crucial for long-levity of the prosthesis. Review of our 386 cases of hip dysplasia during last 10 years operated by presented technique showed us that the correct operative planning, surgical technique and usage of modern uncemented implants leads to bone stock preserving procedures and a relatively low grade of complications. Despite of variety surgical techniques and navigation systems intraoperative accurate placement of the cup in dysplastic acetabulum is still in challenge.Correct placement of the acetabular cup is a crucial step in total hip replacement to achieve a satisfactory result and remains a challenge with free-hand techniques. In total hip arthroplasty (THA) for dysplastic hip osteoarthritis, bony deformity makes it difficult to identify the correct cup position witch is crucial for long-levity of the prosthesis. Placement of the femoral head center or cup orientation remains controversial, especially with a severe anterolateral shallow acetabulum or dislocated femoral head. The aim of our study is to perform analysis of operative technique, witch makes easier for surgeons to determine true femoral head rotational center in dysplastic acetabulum.

### Abstract no.: 42320 GENOME-WIDE COPY NUMBER VARIATION AND COPY-NEUTRAL LOSS OF HETEROZYGOSITY ANALYSES IDENTIFIED NOVEL GENES IN LEGG-CALVE-PERTHES DISEASE Renhao ZE

Legg-Calve-Perthes disease (LCPD) is a common idiopathic hip disorder that occurs in childhood, which usually result in sterility femoral head necrosis of children. Heredity is considered a high risk factor for LCPD. Gene COL2A1, LEP, FGB, THBD, PEPD were reported be related to pathologenesis of some sporadic LCPD patients, or be related to LCPD in protein expression. But these genes show no generality of abnormal gene sequence in LCPD patients. To identify genomic regions that might be involved in the pathogenesis of LCPD, 18 LCPD patients were picked out for a genome-wide study. Remarkably, copy number variation (CNV) of chromosome Xp21.1 and copy-neutral loss of heterozygosity (CN-LOH) of chromosome 10g22.1, 15g15.2, 16g22.1 were founded in all study LCPD patients. Therefor, dystrophin(DMD) gene of CNV and the adrenocortical dysplasia(ACD) gene, agouti related protein(AGRP) gene of CN-LOH in these 100% abnormal regions were selected. The scoring of CNV and CN-LOH in LCPD was verified by real-time quantitative PCR(qPCR) of DMD, ACD and AGRP mRNA expression in peripheral blood, and immunohistochemical validation of DMD, ACD and AGRP protein expression in formalin-fixed paraffin-embeded(FFPE) synovialis. We conclude that the low expression of DMD may be a critical factor in pathologenesis of LCPD. No evidence show ACD and AGRP are involved in pathogenic mechanism of LCPD directly. But the hormones regulated by ACD have been proved be highly correlated to the femoral head necrosis in adult. For the CN-LOH of ACD were founded in all study LCPD patients and ACD is suspected a manternal imprinted gene, it may be a high risk nosogenesis in LCDP.

#### Abstract no.: 39601 FEMOROACETABULAR IMPINGEMENT WITH OS ACETABULI: A 11 YEARS EXPERIENCE

Manuel RIBAS, Carlomagno CARDENAS, Vittorio BELLOTTI, Emanuele ASTARITA, Esther MOYA, De Meo FEDERICO

Introduction: One particular and challenging FAI presentation constituted a mixed pattern (pincer plus cam) with os acetabuli inclusion. Methods: From 2003 to 2008, 41/296 hips in 35 patients presented marked mixed pattern with os acetabuli and were available for study. All patients underwent to femoracetabular osteoplasty and labral. Registered data from medical records were used to evaluate this procedure: radiological Tönnis classification, operation time, acetabular fragment localization and dimensions, labral refixation or transplantation, clinico-functional. Results: 33 male patients (6 bilateral), 2 female. Mean age was 33,8 years (19 - 44), 28 patients were classified Tönnis 0, 13 Tönnis 1. Mean operation time was 1,44 hours (1,25 to 2,15). In 34 cases labrum was dettached from rim fragment, where previewed final LCE angle was above 25° and Tönnis angle was below 10° after os acetabuli excision. Labrum was reattached to refreshed stable host acetabular rim. Mean number of anchors was 4,6 (3 - 7). After 5 to 11 years FU (mean 7,2) no patient needed further surgical operation, NAHS improved from 69,7 (56 - 78) to 94, 3 (87 - 100). To date in this serie no patient has needed any hip replacement, despite 2 out 41 hips (2 out 13 Tönnis 1) clinical result was poor. Conclusions: Arthroscopic procedure for FAI patients with os acetabuli provides efficient solution to reconstruct mixed cases (pincer plus cam) with precised excision of whole osteochondral rim fragment and labral reattachement. Late-midterm results emphasize the need to treat symtomatic patients as early as posible.

### Abstract no.: 41410 DUAL MOBILITY CUPS FOR RECURRENT THA DISLOCATION Afshin TAHERIAZAM, Farshad SAFDARI

Instability following total hip arthroplasty (THA) is a serious disabling complication. Even revision THA due to the recurrent dislocation can be associated with persistent instability. Dual mobility implants (tripolar prosthesis) are used to reduce the risk of recurrent hip dislocation. However, there is little knowledge about the mid-term and long-term outcomes of using these implants. Between 2005 and 2011, 24 consecutive patients were revised due to recurrent hip dislocation. The patients aged  $62.4\pm10.6$  years at the time of surgery. All of the patients had at least 2 episodes of dislocation. Preoperative Harris hip score (HHS) was  $46.1\pm11.5$ . Patients were followed for  $6.2\pm4.1$  years. At the last visit, HHS improved significantly ( $83.5\pm12.6$ , p<0.001). Redislocation occurred in one patient who required a more revision surgery (4.1%). No patient developed infection and or symptomatic deep venous thrombosis. Also, we found no patient with implant loosening or periprosthetic fracture. Tripolar hip prostheses are useful and effective for treatment of patients with recurrent hip instability after THA. However, more large long-lasting prospective studies are required.

### Abstract no.: 40545 PROSPECTIVE STUDY OF A NEW DUAL MOBILITY CUP MODEL: COMPARISON OF SURVEY AND EFFICACY WITHIN DEGENERATIVE CASES AND FRACTURES USING THA WITH DUAL MOBILITY CUP André FERREIRA, François STEFFAN, Jean-Louis PRUDHON, Jean-Marc PUCH, Loys DESCAMPS

INTRODUCTION: Dislocation continues to be a major complication of THA, especially for elderly patients and/or after neck fracture. Mortality rate is also directly depending of dislocations: 8% during first year and 16% in case of dislocation (French Orthopaedic Society data). Dual mobility cups were first introduced in France 40 years ago. First results confirmed efficacy against instability (rate < 2% vs 5 to 10% with standard cups). We wanted to evaluate specific efficacy of the latest generation cup in preventing early dislocation in both situations: degenerative disease and neck fracture. METHODS: a dual mobility cup with a spherical shape without cylindrical extension beyond his equator was implanted by 7 different surgeons at 5 facilities for arthritis, necrosis (group 1, 558 hips) or fractures (group 2, 84 hips) in 642 patients between May 2012 and December 2013. Results were analysed as a prospective, continuous and multicentre study. RESULTS: at last follow up, survival rate was 99,3% in group 1 and 100% for THA after neck fracture. There were one acetabular component revision (groin pain) and one bipolar revision (infection) in group 1, but none dislocation. Only one dislocation occurred in second group, without any other complication. Mortality rate was 0% for group 1 and 12,5% at mean follow up of 18 months for group 2. CONCLUSION: latest generation dual mobility cup has confirmed its efficacy against THA instability and improved results of first generation ones; its use for neck fracture is a good option to decrease dislocation rate and mortality risk.

#### Abstract no.: 39529 DUAL MOBILITY CUP (DMC) : A SAFE SOLUTION FOR HIGH RISK PATIENTS (HRP) WITH PROXIMAL FEMORAL FRACTURES (PFF). Jacques, Henry CATON, François STEFFANN, Jean Louis PRUDHON, André FERREIRA, Régis VERDIER, Thierry ASLANIAN

Introduction: Hip fractures are a major public health issue. In 2013, 2 millions of PFF occur every year in the world and 600 000 in European community. The mortality rate is of 12 to 23 % at 1 year, with a loss of autonomy. Method: Total hip arthroplasty (THA) was a revolution but till today those possibilities are not available for HRP with cognitive impairment, neurologic diseases, Parker score minor than 5 with an increase dislocations rate. The use of DMC described in France (1976) by G. Bousquet has dramatically modified and improved this evolution in THA after intra-capsular fracture (ICF). For Extracapsular trochanteric fracture (ECTF) we have treated our patients systematically by THA with a new procedure. 143 patients with ECTF are operated on, mean age (81.3 years) and 40 ICF with a posterolateral approach and a DMC (mean age 82.8 years). Results : At 1 year FU, we have no dislocation in ICF and 2 dislocations with closed reduction and without recurrence for ECTF (1.4%), only 15% mortality at 1 year and an increase Parker score (5.7). For the whole series, there is no revision for dislocation. Discussion : Dislocations after THA in PFF increase mortality (8% vs 17% if dislocations). DMC use for ICF show only 1.4% dislocations at 9months FU(Adam). Conclusion : DMC is a very important factor to improve the surgical treatment of these HRP with a very good cost/efficacy rapport and to decrease complications even if there is a neurologic disease or a cognitive impairment.

### Abstract no.: 39355 COMPARISON OF CAUSES FOR REVISION BETWEEN DUAL MOBILITY AND STANDARD PRIMARY TOTAL HIP ARTHROPLASTY PROSPECTIVE MULTICENTER STUDY OF 2044 IMPLANTS Jean Louis PRUDHON

Introduction: The causes for revision of primary Total Hip Arthroplasty (THA) are various and well known. The use of Dual Mobility Total Hip Arthroplasty (DM THA) seems a relevant option to decrease the risk of instability. Purpose of this study is to analyze the causes for revision of DM THA. Material, methods: The SoFCOT group conducted an observational prospective multicentric study from January 1st 2010 to December 31 2011. Results: Revision for aseptic loosening is the first reason for revision (72 cases, 28.7%). Infection is the second cause for revision (57 cases, 22.7%). . Fifty DM-THA (19.9%) have been revised for peri-prosthetic fracture. Nine-teen patients (7.6%) have been revised for osteolysis/wear. Among these 19 patients, 9 were revised for osteolysis/wear and 10 patients for Intra prosthetic dislocation (IPD). Thirteen cases (5.2%) of DM-THA have been revised for dislocation. Discussion: Infection and peri-prosthetic fracture are more represented in DM-THA. It could be more linked to patient's risk factors. Osteolysis/wear and aseptic loosening is less frequent in DM-THA. These complications may be linked to ageing process of the implant. Dislocation is less frequent . DM-THA was used in patients with high risk factors for dislocation. Despite these bad patient's conditions, dislocation rate is lower . Given these results, we can affirm that DM-THA is efficient to decrease dislocation rate. Concerns regarding polyethylene wear risk of DM concept and its use in a young and demanding population could be questionable.

## Abstract no.: 41367 ANALYSIS OF 237 REVISION TOTAL HIP ARTHROPLASTY IN NORTHEASTERN CHINA

Bojian LIANG, Wenchuan ZHAO, Changyue GU

Introduction: Comprehension of the causes of revision total hip arthroplasty (RTHA) in China is essential for clinical decision-making, especially in the absence of Chinese Joint Replacement Registry System. The purpose of the present study was to evaluate the mechanisms of failure and the types of RTHA procedures performed in our hospital with largest numbers of adult joint reconstruction patients in northeastern China. Methods: The inpatient sample database of our hospital was used to analyze clinical and radiographic data from 3088 primary THA (PTHA) procedures performed between January 1, 2009 and December 31, 2014. The original diseases, the cause of failure, the revision type, and the survival period of PTHA were analyzed. Results: 237 RTHA procedures were analyzed, of which 74 PTHA procedures were performed in our hospital. The original diseases for PTHA were osteonecrosis of femoral head (127, 53.6%), femoral neck fracture (61, 25.7%), developmental hip dysplasia (16, 6.8%), and inter-trochanter fracture (9, 3.8%). The reasons for RTHA were aseptic loosening (119, 50.2%), infection (73, 30.8%), dislocation (18, 7.6%), wear (9, 3.8%), peri-prosthetic fracture (8, 3.8%), respectively. The mean survival period of PTHA were 6.6 years (range 0.1-30.5 years), of which 136 (57.4%) were less than 5 years, 54 (22.8%) between 5 and 10 years, 47 (11.8%) more than 10 years, respectively. Conclusions: Aseptic loosening and infection are the most common reasons for RTHA. This information will be extremely valuable in the establishment of Chinese Joint Replacement Registry System, implant design and future research.

### Abstract no.: 39145 CEMENTED POLYETHYLENE LINER IN CEMENTLESS METAL CUP, 10 YEARS FOLLOW UP

Dariush SAVADKOOHI, Babak SIAVASHI, Ehsan PENDAR, Dariush SAVADKOOHI

Introduction: In some situations in revision total hip arthroplasy, with well fixed well oriented cementless cup, orthopedic surgeon may prefer to retain the cementless cup. If there is not possible to use proper polyethylene liner inside the metal shell because of damaged locking mechanism or mismatch of head and liner or mismatch of liner with excisting cup, the surgeon may use polyethylene liner inside the cup with cement. Materials and methods: In this study we report ten years experience with these cases. 14 of 82 cases (16.5%) of revision total hip arthroplasties had cemented polyethylene liner in cementless metal shell. Average follow up was 6,2 years(1 to 10 years). Their age and sex, cause of revision, follow up time, harris hip score, loosening, constrained liner, osteolysis, dislocation, dislodgement of cemented liner from cementless cup, Leg length discrepancy, cause of using this combination, infection, using allograft behind shell for osteolysis around cup are considered. Reults: The most common cause of revision was osteolysis (64%). The most common cause of using this combination was impaired locking mechanism (65%). There were few complications (one osteolysis and one infection). In five cases (36%) constrained liner were used and in ten cases(72%) allograft were needed. The final Harris Hip scores were mostly good or excellent (78%). Only one dislocation was seen. Discussion: It seems that if it is necessary to use this non ordinary combination of cemented cup in cementless shell, there is no significant problems and complications.

#### Abstract no.: 39615 OUTCOME OF A MODULAR TAPERED UNCEMENTED TITANIUM FEMORAL STEM IN REVISION HIP ARTHROPLASTY Maximilian RUDERT, Christian KONRADS, Maik HOBERG

Introduction: Revision hip arthroplasty using a modular tapered design gives the possibility for customising the prostheses to the individual anatomy intra-operatively. The success of this kind of surgery is still controversial due to the relative lack of medium- to long-term follow-up. Therefore we analysed the clinical and radiological outcome of the modular MRP- TITAN stem with diaphyseal fixation in revision hip surgery. Methods: In this retrospective study we included 136 consec- utive patients with MRP-TITAN stem implanted during revi- sion hip arthroplasty. The average follow-up was 55 months. For clinical evaluation we used the Harris Hip Score and the Merle d'Aubigné and Postel score. The health-related quality of life was determined with the visual analogue pain scale. Results: The surgeries were performed 109 months after primary total hip arthroplasty on average. The main indications for the MRP-TITAN revision stem were aseptic loosening, infection, and periprosthetic fracture. In the clinical outcome, patients achieved 75.1 points in the Harris Hip Score and 14.4 points in the Merle d'Aubigné and Postel Score. Mean level of persisting pain was 0.7 (VAS). The overall survival of the MRP stem in revision hip arthroplasty revealed 85.6 % sur- vival at 9.75 years' follow-up with a repeat revision rate of 6.8 %. Conclusion: Revision hip arthroplasty using the MRP-TITAN stem revealed a good clinical outcome and can be recommended.

### Abstract no.: 40171 OUR EXPERIENCE OF USE OF REVISION MODULAR SYSTEMS OF ASEPTIC LOOSENING FEMORAL COMPONENTS OF THE ENDOPROSTHESIS

Tsimafei TALAKO, Andrey VORONOVICH

Research objective. The Improvement result execution revision operation beside patient with aseptic loosening femoral component endoprosthesis of a hip joint. Materials and methods. From 2001 to 2009 was carried out 128 operations to replace the unstable femoral components of cement and cementless hip replacements using modular revision MR (WLink). Age at surgery averaged 55,9 ± 11,35 years (range 21 to 77 years). In 13 cases, the operations are performed on the periprosthetic fractures. Results. Long term results was study at 70 patients. Follow-up of 24 months to 108 months, with an average 57,9 ± 28,9. Clinical evaluation was performed on the system Harris. The Harris Hip score before surgery was 42, 35 ± 8,23 (from 27,1 to 55,6), after surgery 78,6 ± 11,7 (from 44.2 to 100). Radiographic data were assessed by the scheme T.A. Gruen. Survival in the stem was 98.6%, one (1.4%) case, there is an infectious instability, prosthesis was removed. Heterotopic ossification of the hip was observed in 12 (17.1%) cases. Noted a discrepancy between the clinical and radiological results. X-ray results were significantly better than clinical. Intra- and postoperative complications were observed in 23 (30.8%) patients. Conclusions. Modular stem MP shows the replacement femoral component of unstable femoral defects II, III A and III B on W.G. Paprosky. The modular stem allows to produce adequate reconstruction of even large defects and restore the function of the hip joint.

# Abstract no.: 41636 NON-MODULAR STEMS IN HIP REVISION SURGERY

Valeriy MURYLEV, Gennadiy KAVALERSKIY, Yaroslav RUKIN, Alexander GUCHKOV, Alexey MUZYCHENKOV

Introduction: revision hip replacement may increase in 137% till 2030. About 5% of revisions are prosthesis stem problem. We have a lot of stem components, some of them are so expansive, but are they so useful in hip revision surgery? Materials and methods: we analyzed non-modular stems (Wagner SL Revision Stem, beaded Full Coat, Zwymuller stem) from 2005 we followed up 165 patients with stem revision, mean age of them was 60,7 years. Isolating revision of femur component were in 33 cases, total revision were in 132 cases. We divided patients by W.Paprosky classification: I type- 27 patients, 5 of them with periprosthetic fracture Vancouver type B 2 (all stems were non-modular), II type- 68, 63 of them were non-modular, (4 of them were used with periprosthetic fracture Vancouver type B 3), 5 – were modular stems. Illa type- 49, 28 – non-modular stems (2 of them were with Vancouver type B 3), 21 stems were modular. IIIb type- 17, 11 of them were nonmodular, 6 stems were modular, IV type- 4 modular stems. All patients were appreciated by Harris hip score. Excellent and good results in patients with non-modular stems with type I to II b was achieved in 87,9% in 8 years and in modular stems in the same group was 91.3%. Summary: non-modular stem application in I - IIIb type bone defects closer to modular stem usage in the same defects. We recommend use non-modular stems, because of simplicity of setting and price.

# Abstract no.: 39514 THE MID-TERM THERAPEUTIC EFFECT OF IMPACTING BONE GRAFT COMBINED WITH TITANIUM MESH CUP IN THE RECONSTRUCTION OF SEGMENTAL BONE DEFECT OF ACETABULUM IN REVISION HIP ARTHROPLASTY

Weiming LIAO

Objective: To investigate the mid-term therapeutic effect of impacting bone graft combined with titanium mesh cup in the reconstruction of segmental bone defect of acetabulum in revision hip arthroplasty. Methods: We retrospectively reviewed 16 patients undergoing revision hip arthroplasty using titanium mesh cup from January 2005 to December 2011. Acetabular segmental bone defects were seen and confirmed by X-ray, CT and surgical observations in all cases, in which biological acetabulum prosthesis could hardly provide a stable fixation as estimated in operations. Surgical procedures mainly included: (1) clearing the acetabulum; (2) grafting bones impactedly using particle allograft and placing titanium mesh cup with appropriate diameter, which was fixed by 5~6 self-tapping screws. Acetabulum prosthesis was fixed using bone cement. Results: Follow-up time ranged from 34 months to 102 months with an average of 75 months. Wounds healed well in all cases. There were no infection, allograft reaction, dislocation, acetabular fracture, acetabulum loosening and revision surgery, blood vessel damage and VTE in all patients. Pain of the joint disappeared and gait patterns improved as compared to that before surgery. Image data showed: (1) acetabulum prosthesis matched well with the surrounding bone; (2) no large bone graft was found; (3) no titanium cup shift or prosthesis shift was found. Conclusions: Impacting bone graft using particle allograft combined with titanium mesh cup to reconstruct the acetabulum is an effective and simple repairing method which is suitable for segmental bone defect that biological prosthesis cannot achieve.

# Abstract no.: 41941 THE DIRECT ANTERIOR VERSUS OTHER APPROACHES IN PRIMARY TOTAL HIP ARTHROPLASTY: A SYSTEMATIC REVIEW AND META-ANALYSIS

Fatih KUCUKDURMAZ, Mohamed SUKEIK, Javad PARVIZI

Background: In recent years the direct anterior approach (DAA) for total hip arthroplasty (THA) has been gaining popularity. Proponents of the approach state earlier functional recovery as the advantage of this surgical approach, while the opponents of the approach claim that performing THA using the DAA leads to a higher complication without improving outcome considerably. We conducted a meta-analysis of all the randomized controlled trials (RCTs) to compare outcomes of the DAA versus other approaches in primary hip arthroplasties. Methods: The study was conducted according to the guidelines described in the Cochrane Handbook for Systematic Reviews of Interventions. Methodological features were rated independently by two reviewers. Results: Our search of the literature revealed eight 8 RCTs which were suitable for detailed extraction of data. There were no trials that used DAA in revision THA. The RCTs included a total of 813 patients with mean age of 61.5 vears (SD  $\pm$  2.5) for the DAA and 60.6 years (SD  $\pm$  10.9) for all other approaches. Using the DAA led to significant improvement in the Harris Hip Score at 6 weeks (mean difference (MD) 5.06, 95% confidence interval (CI) 3.13 to 6.98, P<0.001) and one year postoperatively (MD 1.67, 95% CI 0.07 to 3.27, P=0.04) and the WOMAC score at 6 weeks postoperatively (MD -4.40 95% CI -6.88 to -1.91, P<0.001). Using the DAA also led to a significant reduction in length of hospital stay (MD -1.65 days 95% CI -1.80 to -1.51, P<0.001), a smaller incision (MD -2.08cm 95% CI -2.34 to -1.82, P<0.001) and reduction in perioperative blood loss (MD -76.52mls 95% CI -101.14 to -51.91, P<0.

### Abstract no.: 39225 DOES THE SURGICAL APPROACH INFUENCE DIGITAL TEMPLATING ACCURACY IN THA USING A SHORT MODULAR STEM? Alfonso MANZOTTI, Andrea CORRIERO, Norberto CONFALONIERI

Introduction: Aim of this study is to assess any differences in digital templanting accuracy of a modular short femoral stems implanted with 2 different appoaches (direct anterior and posterolateral). Material and Methods: From December 2012 to Jenaury 2014 100 patient undergoing to a THA using the same implant with a short femoral modular stem were prospectively included in the study and divided in 2 groups according to the surgical approach. All the patients underwent to the same preoperative radiological protocol and the digital templating. The digital templating results were compared with the truly inserted implant size and a statistical analysis was carried on. Results: For the cup the mean percentage of agreement (±2 size) was 90.0 % in Anterior approach-group and 89.6 % in the the posterolateral approach group. For the mean percentage of agreement (± 2 size) was 88.0 % in and 89.1 % respectively. Likewise there was a statistical significant better accuracy in the modular femoral neck accuracy in the anterior approach (±2 size) and a statistical significant higher percentage of modular femoral neck with an increased antiversion in the posterolateral approach. Discussion: In our experience digital templating in short modular femoral stem seems to be less accurate for the posterior-lateral approach in term of both femoral neck length and antiversion. A possible explanation may be not a technical error but just a surgeon behavior to overcorrect the templating to prevent dislocation potentially more common using a postero-lateral approach

#### Abstract no.: 41949 PRIMARY TOTAL HIP ARTHROPLASTY USING MODIFIED POSTERIOR APPROACH THROUGH QUADRATUS FEMORIS FLAP OSTEOTOMY; COMPARISON WITH CONVENTIONAL POSTERIOR APPROACH Se-Won LEE, Weon-Yoo KIM, Ji-Yoon HA

Introduction: Despite many attempts to preserve the short external rotator, to our knowledge, there is no description about the approach without any dissection of all short external rotator muscle groups. We developed a modified posterior approach only through the quadratus femoris muscle area, made by flap osteotomy, named as quadratus femoris osteotomy (QFO) approach. We therefore sought to introduce the QFO approach, which could not damage any short external rotators of hip, and compared it with conventional posterior approach to determine the effectiveness of the technique. Materials and Methods: We retrospectively reviewed 329 patients (383 hips) who had undergone primary THA between March 2006 and January 2013 by a single hip surgeon. Conventional group consisted of consecutive 118 patients (138 hips) who had been undergone THA using the conventional posterior approach between March 2006 and March 2009. QFO group consisted of consecutive 101 patients (120 hips) who were treated with THA by QFO approach between March 2011 and January 2013. Results: No dislocation was observed, and there was no failure of the flap osteotomy fragment at the guadratus femoris insertion. Conclusion: Even if further studies were needed to empower the validity of our findings, we recommend this approach to hip surgeons, using the posterior approach, believing that the bone to bone healing would be better than tendon to bone healing, hoping to decrease the damage of external rotator muscles and surrounding soft tissue and reduce the posterior hip dislocation rate after THA.

### Abstract no.: 39572 SIMULTANEOUS, SEQUENTIAL HIP REPLACEMENTS AT STAVANGER UNIVERSITY HOSPITAL (SUS), NORWAY Elin HAARR, Knut HARBOE

In Norway and Sweden the tradition for simultaneous sequential prostheses surgery is quite rare. In other countries in Europe and in the USA bilateral sequential surgeries, are more common. The register in Sweden reported that a 30% of hip prostheses had the second hip operated within six months. For the patient and the society there are numerous advantages of operating both hips within the same procedure, if done in a safe manner. Previous research reports good results with few complications related to simultaneous, sequential replacements, but also a few reporting on an increased risk compared to two separate surgeries. At our hospital (SUS) we have given this solution as an offer for many years with good results and experiences. In 2012 we put these procedures into a FAST TRACK system and increased the numbers of patents greatly. Since then we have 63 patients included. We grade our results by the following scores, HOOS and Harris Hip Score. Our experiences are very satisfactory. The patients Health-related quality of life is scored by EQ-5D. They are happy, the hospital stay is short and the complication rate is low.

# Abstract no.: 41197 BILATERAL TOTAL HIP ARTHROPLASTY: ONE-STAGE VERSUS TWO-STAGE PROCEDURE

Afshin TAHERIAZAM, Farshad SAFDARI

Despite several studies, controversies prevailed about the rate of complications following one-stage and two-stage bilateral total hip arthroplasty (THA). In current prospective study, we compared the complications and functional outcomes of one-stage and two-stage procedures. One hundred and eighty patients (ASA class I or II) with bilateral hip osteoarthritis were assigned randomly to two equal groups. Two groups were matched in term of age and sex. All of the surgeries were performed through the Harding approach using uncemented implants. In two-stage procedures, surgeries were performed with 6 months to one year interval. All patients were evaluated one year postoperatively. The Harris hip score averaged 84.1±12.6 and 82.6±15.3 in one-stage and two-stage groups, respectively (p=0.528). The hospital stay was significantly longer in two-stage group (9.8±1.1 versus 4.9±0.8 days). The cumulative hemoglobin drop and number of transfused blood units were the same. One patient in each group developed symptomatic deep venous thrombosis and managed successfully. There was no patient with perioperative death, pulmonary embolism, infection, dislocation, periprosthetic fracture or heterotrophic ossification. No patient required reoperation. Two patients in one-stage group developed unilateral temporary peroneal nerve palsy resolved after 3 and 4 months. The current study showed that one-stage bilateral THA can be used successfully for patients who require bilateral hip arthroplasty without increased rate of complications. The functional and clinical outcomes are comparable and hospital stay is significantly shorter. However, the authors recommend to perform one-stage bilateral THA for healthy patients with ASA class I or II.

#### Abstract no.: 39290 THA: 108 UNILATERAL VS. 108 BILATERAL IMPLANTATIONS (IN 54 PATIENTS) USING A CEMENTLESS SHORT-STEM - A COMPARISON Karl Philipp KUTZNER, Dominik PFEIL, Mark Predrag KOVACEVIC, Philipp REHBEIN, Joachim PFEIL

Purpose: Simultaneous bilateral THA is emerging. Still to date, there is concern about the safety and reliability. Short-stems provide favorable qualities using a MIS-technique, preservation of soft tissue and bone stock and a satisfying metaphyseal osteointegration. However, long-term-results are missing. Purpose of this prospective study is a comparison of postoperative clinical results and radiographic alterations in 108 unilateral vs. 108 simultaneous bilateral cases, using a member of the newest generation of short-stems in a 2 year-follow-up. Methods: A total of 216 short-stems (optimys, Mathys Ltd) was implanted in 162 consecutive patients with a cementless cup. Full-weight-bearing was allowed. Groups: unilateral (108 hips) vs. bilateral (108 hips). HHS, VAS-pain and VAS-satisfaction were assessed preop and at 6w, 6m, 1y and 2y. X-rays were done in a standardized technique. Subsidence was measured in a digital technique. Rate of postoperative anemia and rate of transfusion were evaluated. Results: HHS, VAS-pain and VAS-satisfaction showed no significant differences (p>0.05). Measurable subsidence over 2mm was detected in a total of 15.3%. After 6w almost no progression could be found. Postoperative haemoglobin decreased in unilateral group by 3,2 g/dl, 3 patients (2.8%) received transfusion. In bilateral group haemoglobin decreased by 4,6 g/dl and 7 patients (13.0%) received transfusion. Conclusion: Simultaneous bilateral THA with a short-stem is a safe and satisfying procedure. Being able to utilize MIS-technique, sparing soft-tissue along with an early and stable osteointegration by metaphyseal anchoring supports the usage of this device in bilateral THA. Clinical results are excellent. However, risk of bloodtransfusion is increased.

### Abstract no.: 39515 THE KEY TECHNIQUE IN TOTAL HIP ARTHROPLASTY OF ANKYLOSING SPONDYLITIS AND THE MIDDLE-TERM FOLLOW-UP Weiming LIAO

Objective: To investigate the key skill in total hip arthroplasty of ankylosing spondylitis and the median follow-up. Methods: From April 2004 to December 2011, 24 patients (33 hips) with ankylosing spondylitis in our hospital received THA. The follow-up time was (6.12±3.32 years). These patients included 23 males and 1 female, 9 of them received the operation for their both hips. The average age was (39±10 years), and the average course of disease was 12.1 years. Preoperatively, Harris hip score was (37.76±15.9) points. Results: The rate of follow-up was 83%. All the patients were satisfactory, and the function of suffered hips were significantly improved. They resumed a normal life and work. No complication was found at final follow-up, including loosening, infection and dislocation. Harris hip score at final follow-up was (88±7.6) points, indicating there was a significant difference between before and after operation (t=-9.096, P<0.01). Conclusion: The median follow-up showed that all the patients were satisfactory. To achieve the good results in THA in AS, we need to give attention to the key skills and carry them out. The skills included: 1) Selection of the appropriate approach; 2) Correct secondary osteotomy of the femoral neck; 3) Releasing the soft tissue appropriately; 4) Confirmation of the original acetabulum joint surface; 5) Choosing the methods (anatomic localization or functional localization) reasonably to place the acetabulum prosthesis; 6) Deciding the diameter of the acetabulum prosthesis, femoral prosthesis, acetabulum lining and femoral head appropriately; 7) Reasonable rehabilitation.

# Date: 2015-09-19 Session: Free Papers Hip Complications & Miscellaneous Time: 16:00 - 17:30 Room: Guangdong Grand Hall

# Abstract no.: 41635 THE PAIN AFTER HIP ARTHROPLASTY

Alexey DENISOV, Viktor SHILNIKOV, Rashid TIKHILOV, Igor SHUBNYAKOV

Among the factors that significantly reduce quality of life of patients after hip arthroplasty produce instability, infections, dislocations, neurological disorders and pain. OBJECTIVES: In Vreden Institute for Traumatology and Orthopedics conducted a study of pain after hip replacement. We surveyed 1,000 patients at various intervals after surgery. METHODS: All patients underwent clinical examination with the additional use of the scale of Harris, radiographs, neurological examination. Assessment of pain by subjective factors based on the use of specially developed "Questionnaire pain syndrome," which patients independently completed before discharge from hospital visits and consultation at various intervals after surgery. RESULTS: The study identified the etiopathogenesis of pain, developed algorithms for the differential diagnosis for each location of pain, suggested methods of prevention and possible treatment of pain after surgery. The analysis showed the predominance of localization of pain in the lumbosacral region (14.9%) and trochanteric region (14.1%). Pain in the groin area complained of 11.6% of patients on the front of the thigh - 9.7%; in the knee - 6.8%, gluteal region - 4.7%. CONCLUSION: For localization of the pain syndrome is characterized by certain factors each etiopathogenetical with their clinical and radiographic features. The high correlation between the growth of the intensity of pain in the lower limb lengthening and the change in offset. Knowledge of the pathogenesis can develop a framework of differential diagnosis of pain after arthroplasty, which is important and essential factors in terms of prevention and treatment of pain in order to achieve good results.

# Date: 2015-09-19 Session: Free Papers Hip Complications & Miscellaneous Time: 16:00 - 17:30 Room: Guangdong Grand Hall

Igor SHUBNYAKOV

### Abstract no.: 41631 THE STRUCTURE OF HIP ARTHROPLASTY EARLY REVISIONS Alexey DENISOV, Rashid TIKHILOV, Anton KOVALENKO, Stanislav BILYK,

Most of patients experience a success outcome rate greater than 90% after hip arthroplasty. However, part of them requires early revision surgery within 5 years after the index procedure. Purpose is to determine structure of hip replacment early revisions Methods: The authors retrospectively reviewed data of the Vreden Russian Research Institute Arthroplasty Registry of revision hip arthroplasties performed in 3 year period (2011-2013) to reveal early revisions and their reasons within 5 years after primary total hip arthroplasty. Available post primary THA X-rays were assessed in patients with first early non-infection revisions to detect mistakes of primary implantation such as cup or stem malposition. Results: 1293 revision procedures were performed in our Institute in this period, 425 (32,9%) from them - early revisions within 5 years. Early first revisions after primary hip arthroplasty were performed in 254 (19,6%) hips and repeated revisions in 171 (13.3%) hips. More than half of first revisions were performed within the first year after the primary procedure. 125 (49,2%) patients from first revisions group had primary total hip athroplasty in our hospital, and 129 (50,8%) patients had primary total hip athroplasty in other hospitals Conclusions: Although common percent of early revisions is similar to literature data, our THA early revision structure significantly differs from published in literature, moreover there is difference between revision reasons after primary total hip arthroplasty in our hospital and other hospitals. Revision reasons structure doesn't demonstrate the rate of primary THA complications, but defines main problems have to be solved.

Date: 2015-09-19 Session: Free Papers Hip Complications & Miscellaneous Time: 16:00 - 17:30 Room: Guangdong Grand Hall

### Abstract no.: 39226 PROBLEMS, OBSTACLES AND COMPLICATIONS IN MORE THAN 400 NAVIGATED MODULAR SHORT STEMS IN HIP ARTHROPLASTY Alfonso MANZOTTI, Andrea CORRIERO, Norberto CONFALONIERI

Purpose: Aim of the study was to assess difficulties and adverse effects in more than 400 CAS THA using a short modular femoral stem to assess their incidence and to determine if this surgical procedure has to be considered as an high demanding surgical technique. Materials and Methods: 403 implants were followed for at least 6 months and included in the study. All the cases were divided in 3 series according to when the surgery had been performed to consider the evolution of the navigation process improvements/familiarity. All intraoperative problems, intraoperative obstacles and complications were registered. Adverse facts not directly caused by the surgical but derived by other conditions were excluded from the study. Results: There were no differences in number of total problems/complications among the 3 series. Obstacles were statistically higher in earlier series where together with an higher incidence of navigation failures. We registered 8 cases of proximal femur fractures wit different distribution among the 3 groups. In 1 cases in group A we experienced an acetabular fracture. Surgical-time was longer in earlier series. Conclusion: The authors registered both a higher rate in navigation failure and longer surgical time in the earlier series even because of less advance navigation systems and lower experience with CAS. However in whole series of more than 400 CAS THRs using a modular short femoral stem the authors could demonstrated no increased rate of complications compared to traditional techniques
## Abstract no.: 41930 14-YEAR FOLLOW-UP OF THE CEMENTED WEBER STEM: SURVIVORSHIP, CLINICAL AND RADIOLOGICAL RESULTS Pia ZURMUEHLE, Kerstin SCHNEIDER, Karl GROB, Johannes B. ERHARDT

Introduction: There are 2 main design philosophies in use for primary cemented hip replacement: composite beam (shape closed) and taper slip (force closed). The composite beam cemented Weber stem has been used for more than 40 years, however little published data is available. Main outcome measure of this study was survivorship of this stem with a minimum follow-up of 14 years. Methods: In 1999 and 2000, 200 consecutive stems were implanted in 181 patients (mean age of 66 years), half of them with the use of normal polyethylene (PE), half of them with highly cross-linked PE. In all cases a 28mm diameter head was used. In December 2013, a clinical and radiological follow-up was performed in 64 patients. Fifty-two additional patients provided a systematic interview in written. From the 70 patients who died during the observation period, information on the stem survival could be retrieved from their general practitioners or their relatives by a structured phone interview. Fourteen patients were lost to follow-up. Results: Stem survival was 95% after 14-years. Overall revision rate was 4%. Eight patients had a stem revision due to aseptic loosening (3 cases), infection (2 low grad, 1 acute) and after periprosthetic fracture (2 cases). There was no correlation between gender or type of PE and revision rate, respectively. In the patients available for clinical and radiological followup, the mean HHS was 89. Conclusion: Our data show excellent long-term survival of the cemented Weber stem, independently of age, sex and type of PE.

#### Abstract no.: 41073 THE EFFECT AND BALANCE OF ANTI-COAGULATION SEQUENTIAL ANTI-FIBRINOLYSIS ON VTE AND TRANSFUSION **FOLLOWING** PRIMARY THA: Α LARGE. SINGLE CENTER. PROSPECTIVE **OBSERVATIONAL STUDY OF CONSECUTIVE CASES** Jinwei XIE, Fuxing PEI

Objective: This large, single center, prospective observational study of consecutive cases aimed to investigate the epidemiology of vascular occlusive events associated with TXA following primary THA and introduce the preliminary clinical results of anti-coagulation sequential anti-fibrinolysis. Materials and methods: We prospectively collected patients' data of our institution through National Health Database. All the eligible patients were operated with intravenous TXA or IV combined with topical TXA administration. And sequential anti-coagulation was started 6 hour postoperatively with LMWH or Rivaroxaban. The primary outcomes were the incidence of venous thromboembolism and mortality within 30 days following primary THA. Secondary outcome was transfusion rate. Subgroup analysis was performed on the basis of TXA administration methods. Results: During 2012 to 2014, a total of 3043 unilateral THA procedures were conducted in our institution. 199 vascular occlusive events occurred. The frequency of calf muscle vein thrombosis was the largest 6.01% (183/3043), followed by asymptomatic DVT 0.53% (16/3043). No episode of symptomatic DVT, symptomatic PE and all-cause mortality within 30 days postoperatively occurred. Subgroup analysis revealed lower transfusion rate with use of combined TXA administration (5.4% Vs 7.2%, p= 0.039). And no significant difference was detected with regard to the incidence of DVT (0.6% Vs 0.4%, p= 0.578). Conclusion: This study indicated that anti-coagulation sequential anti-fibrinolysist to maintain its balance, was safe and efficient to reduce perioperative blood transfusion rate following primary unilateral THA.

#### Abstract no.: 41924 WHICH ROUTE OF TRANEXAMIC ACID ADMINISTRATION DECREASE THE POSTOPERATIVE HEMORRHAGE? LOCAL VERSUS INTRAVENOUS ADMINISTRATION Afshin TAHERIAZAM. Farshad SAFDARI

Postoperative bleeding is one of the most important problems after major orthopedic surgeries including Total hip arthroplasty (THA). It has been demonstrated that Tranexamic acid is a useful agent to control the volume of blood loss. However, the more effective route of TXA administration remained controversial. In current study, we compared the effects of local and intravenous (IV) administration of TXA on need to blood transfusion and hemoglobin drop. There were 80 patients underwent THA assigned to 2 groups, randomly: local (L) group and IV group. In group IV, 500 mg TXA was administered systematically and in group IV the joint was irrigated with 4 of TXA in 100 cc of normal saline. The level of Hb was measured before and 12 hours after the operation and the rate of Hb drop was compared. Also, the number of packed cell transfused were compared in two group. The mean of Hb drop was 1.7±1.1 mg/dL and 2.5±1.2 mg/dL in group IV and L, respectively. In group IV, 0.32±0.6 units and in group L, 0.46±0.41 units of packed-cell were transfused. The difference in non of the variables was statistically significant. Although, there was no statistically difference between two groups, however, it seems that IV administration of TXA is associated with lower Hb drop and decreased blood transfusion. More studies are required.

# Abstract no.: 41077 A PROSPECTIVE STUDY OF DIFFERENT SINGLE-DOSE TRANEXAMIC ACID FOR REDUCING BLEEDING AND TRANSFUSIONS IN TOTAL HIP ARTHROPLASTY

Chen YUE, Jing YANG

Objective: To evaluate the efficacy and safety of different single dose intravenous tranexamic acid (IV-TXA) for reducing bleeding and transfusions in THA. Methods: A total of 122 patients were divided into three groups: control group (CG), 10mg/kg intravenous tranexamic acid group (10mg/kg IV-TXA), 15mg/kg intravenous tranexamic acid group (15mg/kg IV-TXA). The transfusions and deep venous thrombosis were the primary outcomes. The total blood loss, postoperative drainage, HB and HCT drop and other complications were considered to be the secondary outcomes. Results: In all IV-TXA groups, the total blood loss, postoperative drainage, HB and HCT drop were lower than control group without increasing the risks of DVT and other complications, and the effects of 15mg/kg IV-TXA were obviously better than 10mg/kg IV-TXA. Conclusions: From this study, we could get the conclusion that the effect of 15mg/kg IV-TXA was better for reducing bleeding than 10mg/kg IV-TXA. So, compared with 10mg/kg IV-TXA, 15mg/kg IV-TXA was recommended.

### Abstract no.: 39126 ARTICULATING AND NON-ARTICULATING SPACERS IN TREATMENT OF DEEP PERIPROSTHETIC INFECTION Alexey MUZYCHENKOV

Introduction: deep periprosthetic infection of the hip and knee joints is the most severe complication of the total hip and knee replacement. According to the literature data the average frequency of deep periprosthetic infection in year after hip replacement is 0.25-1%, and in year after knee arthroplasty 0.4-2%. Objectives: analyze the results of the treatment in patients with deep periprosthetic c infection. Show the peculiarities of individual spacers in treatment of deep periprosthetic infection. Methods: we operated 23 patients with deep periprosthetic infection of the hip joint and 25 patients with deep follow-up periprosthetic infection of the knee joint.Results:mean was 38 months.Recurrences of infections in 4 cases (21.1%) after application of of the spacers in the treatment of periprosthetic infection of the knee joint and in 2 cases after the application of the spacers in the treatment of deep periprosthetic infection of the hip joint (8.7%). The average score on a scale of PSI in patients after treatment of deep periprosthetic infection of the hip joint using articulating spacers in year after the removal of the spacer and install of the revision implant was 65.7% in the same situation after applying non-articulating spacers - 55.8%. Conclusions: Late deep periprosthetic infection requires removal of the prosthesis components, regardless of their stability. With two-stage revision arthroplasty, functional results of articulating spacers are better. Individual custommade articulating spacers allows to increase stability, filling all existing defects, reducing scarring, and thus facilitating the second stage of revision cases. It is useless to install nonarticulating spacer after second change of spacer.

# Abstract no.: 39329 SEPTIC SINGLE-STAGE KNEE ARTHRODESIS AFTER FAILED TOTAL KNEE ARTHROPLASTY USING A CEMENTED COUPLED NAIL Nael HAWI, Kendoff DANIEL, Christian KRETTEK, Mustafa CITAK, Thorsten GEHRKE, Carl HAASPER

Introduction: Knee arthrodesis is a potential salvage procedure for limb preservation after failure of total knee arthroplasty (TKA) due to infection. Methods: In this study, we evaluated the outcome of single stage knee arthrodesis using an intramedullary cemented coupled nail without bone-on-bone fusion after failed and infected TKA with extensor mechanism deficiency. Between 2002 and 2012, 27 patients (ten female, 17 male; mean age 68.8 years; 52 to 87) were treated with septic single-stage exchange. Mean follow-up duration was 67.1 months (24 to 143, n = 27) (minimum follow-up 24 months) and for patients with a minimum follow-up of five years 104.9 (65 to 143,; n = 13). A subjective patient evaluation (Short Form (SF)-36) was obtained in addition to the Visual Analogue Scale (VAS). Results: The mean VAS score was 1.44 (SD 1.48). At final follow-up, four patients had recurrent infections after arthrodesis (14.8%). Of these, three patients were treated with a one-stage arthrodesis nail exchange; one of the three patients had an aseptic loosening with a third single-stage exchange, and one patientunderwent knee amputation for uncontrolled sepsis at 108 months. All patients, including the amputee, indicated that they would choose arthrodesis again. Data indicate that asingle-stage knee arthrodesis offers an acceptable salvage procedure after failed and infected TKA.

#### Abstract no.: 41646

# TANTALUM TRABECULAR METAL CONES ARE ASSOCIATED WITH LOWER RATES OF PERIPROSTHETIC JOINT INFECTION FOLLOWING REVISION TOTAL KNEE ARTHROPLASTY

Alvin ONG, Ronald HUANG, Danijel PERICIC, Fabio OROZCO, Zachary POST, Victor HERNANDEZ

Introduction: The use of tantalum components has been associated with lower incidence of failure due to periprosthetic joint infection (PJI) following revision total hip arthroplasty (THA). We hypothesized that the use of tantalum trabecular metal (TM) cone augments in revision total knee arthroplasty (TKA) also leads to lower incidence of PJI. Methods: We identified 282 patients (299 knees) that underwent revision TKA between 2008 and 2010. Average age of patients was 63.2 years and average BMI was 32.9 kg/m2. Six patients underwent revision for prior PJI. Tantalum TM cones were used in 58 knees. Results: One knee that had tantalum TM cones implanted underwent subsequent reoperation for stiffness, but none underwent reoperation for subsequent for PJI at an average of 3.5 years followup (range: 1.0 to 5.9 years). Of the remaining 241 knees that underwent revision TKA without tantalum implants, overall reoperation rate was 17.4% (42 of 241 knees) and reoperation rate for subsequent PJI was 2.9% (7 of 241 knees). Conclusion: The use of tantalum TM cones in revision TKA was associated with lower rates of overall reoperation and subsequent periprosthetic joint infection.

## Abstract no.: 42359 EFFECTIVE PROVENTION OF PERIOPERATIVE INFECTION IN TOTAL KNEE ARTHROPLASTY Xinghuo ZHANG

INTRUCTION: Infection is disaster to the patient who underwent total knee arthroplasty(TKA). How to perform the successful TKA without infection happening is the first aim for all orthopedic surgeons. We report our efforts and results of prevention infection in our hospital. .METHODS: From Jan 2012 to Sep 2014, 535 TKA in 362 patients (235 women and1127men)were performed in our hospital. The patients' mean age was 68 years (59-83 years). A comprehensive perioperative protocol have involved: the same group surgeons performed the operation, skin preparation, optimization of the operative environment, surgical field irrigation, careful wound closure and so on. prophylactic perioperative antibiotic administration is one of the most important strategies in preventing infection. 357 patients were available for final review. The mean follow-up period was 22 months(8-29 months). RESULTS: There are no deep infection and loosing cases in all patients. 6 patients suffered would delayed healing, but no infection happened. Asymptomatic DVT were found in 12 patients. Mean KSS score was 86.5(80-95) at the final follow-up. .CONCLUSIONS: strategies should be organised and implemented as stringent perioperative protocols in order to minimise risk factors and effectively prevent infection. The successful surgical procedure demands experienced surgical group, careful patients selection, a sterile operating room. Healthy host who will have a full and quick recovery resulting in a pain-free, functional knee.

## Abstract no.: 40329 LONG-TERM RESULTS OF ROTATING HINGED KNEE PROSTHESIS IN COMPLEX PRIMARY AND REVISION CASES Mostafa AZAB, Mohamed ELRAKAYBI, Enjie IBRAHIM

The hinged rotating knee is a solution for revision and primary cases with complex ligamentous instability and severe deformity. Literature lacks evidence for indications and long-term results after using such implant.63 patients operated on from 2001-2004 enrolled in this retrospective study. Cases were divided into 3 groups. Group A-28 cases with severe varus flexion deformity due to osteoarthritis (obese). Group-B-- 12 patients with major ligamentous instability accompanying advanced osteoarthritis; group- C --23 patients of revision arthroplasty with aseptic loosening and peri-prosthetic osteolysis. Assessment using Knee society scoring(KSS) system and x-ray were used to evaluate all groups. According to the KSS system; group-A showed 17 excellent results ,5 good ,5 fair and 1 poor result. X-ray follow-up revealed good bone cement integration without evidence of loosening through 10 years follow-up in 26 cases;2 cases of loosening were revised using modular prosthesis. Group-B showed 7 excellent results,3 good results and 2 fair results. X-ray follow-up revealed occurrence of loosening in 4 cases with no clinical evidence of pain or limitation of movement. Group-C showed 22 excellent results and one poor result due to infection and removal of prosthesis. Long-term x-ray follow-up showed no evidence of loosening. Hinged knee prosthesis is standard for revision cases having bony deficiencies with excellent results 10 years follow-up.It is considered optimal for managing cases of complex ligamentous instability who aren't candidates for ligamentous reconstructions. In primary knee arthroplasty with severe flexion varus deformities; the prosthesis was not the best choice having a considerable rate of complications and less patient satisfaction.

# Abstract no.: 40066 COMPLEX PRIMARY TKR USING ROTATING HINGE KNEE AND PROPHYLACTIC GASTROCNEMIUS FLAP IN NEGLECTED POST-TRAUMATIC INFECTIVE ARTHRITIS OF KNEE – A CASE REPORT Sanjeev PATNAIK, Biswaranjan NAYAK

Prophylactic gastrocnemius flap with primary rotating hinge knee is technically demanding in a neglected post-traumatic, infective arthritis of knee, with the challenges of compromised skin and soft tissues, articular bone defect, limb malalignment, gross instability, retained hardware and contracted extensor mechanism with patella fixed in the lateral gutter, all in combination, is rare. We present such a complex case in a 48 year male patient with a history of fracture lateral femoral condyle of right knee due to road traffic accident 10 years back, got operated with open reduction and internal fixation with cancellous screws, which had subsequently got infected. Primary procedure undertaken was removal of implants, debridement, placement of antibiotic-cement spacer, followed by prophylactic medial gastrocnemius flap and a temporary joint spanning external fixator. Definitive procedure undertaken, after clearance of infection in 12 weeks, was conversion to a rotating hinge TKR with metallic wedges, using a lateral para-patellar arthrotomy & tibial tubercle osteotomy to address the challenges of fixed patella in the lateral gutter and contracted ligamentum patellae. At 1.5 years follow up, the knee was painless, stable, with satisfactory range of motion and improved function, without any infection or aseptic lysis. Prophylactic Gastrocnemius flap cover with rotating hinge knee arthroplasty using lateral para-patellar approach and tibial tubercle osteotomy in a case of neglected post-traumatic, infective arthritis of knee with the complexities of limb mal-alignment, compromised skin and soft tissue, articular bone loss and ligamentous instability is a satisfactory bail out option in such a highly complex joint scenario.

# Abstract no.: 40508 TOTAL KNEE REPLACEMENT USING REVISION HYBRID STEMS David LIONBERGER, Karen LIN

Philosophies differ with regards to fixation of long stems in revision total knee surgery (R-TKR). Seventy R-TKR were reviewed utilizing cement less stem fixation applying cement to the condylar region of the femoral condyle and tibial tray. Minimum follow up was 2 years, with an (average of 6.) Excluding infections, the revision rate over the study period was 10%, the bulk of which occurred in the first 2 years following surgery.17 patients showed at risk radiographic changes such as stem migration, progressive lucency, or secondary hypertrophy around the stem tip, which suggested a dynamic process at work. When looking at the comparative historical series using smaller flexible stems performed by the same surgeon, the failure rate was double (10 versus 5%) in 2 versus 6 years respectively. While cement less fixation may be utilized, the potential for hypertrophy and stem pain experienced in this short follow up is reason to counsel patient with regards to expectations and limitations of the implant. Where stems are thinner and bone health exists, good outcomes may be expected. However these results suggest less satisfactory results may be seen in high stem diameter ratios where thin cortical bone exists and/or osteoporosis and female gender create modulus mismatch. The use of hybrid fixation is appropriate in healthy bone stock where flexible stems or low stem diameter to diaphyseal ratios exist providing better modulus of elasticity modulation and dispersion.

### Abstract no.: 39211 IS SYNOVECTOMY NECESSARY IN TOTAL KNEE ARTHROPLASTY WITH SEVERE CHONDROCALCINOSIS? Philippe HERNIGOU, Alexandre POIGNARD

Co-existence of calcium pyrophosphate dihydrate (CPPD) crystals (or radiological chondralcinosis) with osteoarthritis (OA) of the knees is frequent. It has been described that chrondrocalcinosis predisposes to inflammatory reactions after total knee arthroplasty. and sometimes to loosening of arthroplasty. This has led some surgeons to consider chondrocalcinosis as an indication to a synovectomy when severe synovitis is observed at the time of TKA. Methods: The results of a consecutive series of 74 bilateral staged PS fixed-bearing total knee arthroplasties (36 men, 38 women) performed in knees with severe chondrocalcinosis (based on the amount of visible crystal deposits found at the time of surgery) were reviewed at an average of 16 years FU (ranging 15 to 22 years). The first knee underwent a synovectomy; the synovium in the suprapatellar pouch, medial, and lateral gutters was excised. The second knee of the same patient had no synovectomy and received the same implant. Results: The Knee Score of the KSS (89.1 versus 81.3 points; p = 0.02) and the ROM for flexion (129 versus 105 degrees; p = 0.01) were significantly better in the group without synovectomy. The Insall-Salvati ratio showed six patients with patella baja in the group with synovectomy. There were two severe hematoma and deep infections after synovectomy. The Kaplan-Meier survivorship for revision at 15 years of follow-up was 91% for TKA with synovectomy and 97% for TKA without synovectomy. Discussion: In our series, knees with severe chondrocalcinosis treated with complete synovectomy at the time of primary TKA had lower knee flexion and inferior KS pain scores, and more complications as compared with contralateral knees without synovectomy. Absence of synovectomy in severe chondrocalcinosis did not increase the risk of loosening

### Abstract no.: 40580 LOW MORBIDITY IN 5 YEARS IN UNICONDYLAR KNEE ARTHROPLASTY BY APPROPRIATE SURGICAL ALGORITHMS AND PATIENT SELECTION Yusuf ERDEM, Bulent KARSLIOGLU

Introduction: Although unicondylar knee arthroplasty(UKP) is a suitable surgical treatment option in the medial/lateral compartment arthritis of the knee, if attention is not paid to the surgical algorithms, it can cause bleeding, pain, implant malposition, insert dislocation, plateau fracture and lateral compartment arthritis resulting in serious morbidity and mortality. We aimed to present the patients on whom we have applied unicondylar knee prosthesis after appropriate patient selection and surgical algorithms retrospectively. Methods: Between 2009-2014, 56 unicondylar knee prosthesis were applied on 46 patients. During the patient selection BMI<27, activity, extension disability<10 degrees, varus/valgus<10 degrees and outerbridge classification with grade I-II patellofemoral osteoarthritis criteria were taken into account. Tranexamic acid, pressure bandage (Jones) and drainage clamps were applied postoperatively. Combined and hypotensive anesthesia was used tourniquet was not used and patients were mobilized same day. Results: There were 43 female and 3 male patients with the average age of 54. The average surgery time was 60 minutes, There has been no need to blood transfusion. Postoperative 1st, 3rd, 6th, 12th months average knee flexion was measured 125 degrees, no extension disability was observed. One insert dislocation developed, replaced with anatomical insert. Two patellofemoral pain was observed for 1 year, relief was provided by intraarticular injections. No revision arthroplasty was needed. Discussion: Appropriate patient selection, surgical technique, respond to the post surgical expectations, acknowledgement about the surgery and high adaptation to the rehabilitation by relieving the pain are cruel thoroughly for low morbidity in UKA satisfaction next to common advantages.

# Abstract no.: 41574 IS UKA DEFINITIVE TREATMENT FOR TRICOMPARTMENTAL ARTHRITIS IN OCTOGENARIANS: RESULTS IN 55 KNEES Rajiv THUKRAL, Sks MARYA

Background: Unicompartmental knee arthroplasty (UKA) has a limited longevity, needing eventual conversion to total knee arthroplasty (TKA). It is a temporizing procedure in select active young patients with unicompartmental osteoarthritis (UCOA). A possible alternative indication is as definitive treatment of tricompartmental osteoarthritis (TCOA) in the very elderly patient. We analyzed the results of UKA in a series of 45 octogenarians with TCOA (predominant medial UCOA). Methods: 45 octogenarian patients with TCOA (predominant medial UCOA) underwent UKA (19 bilateral) from January 2002 to January 2012. Clinicoradiological assessment was done 3 monthly (first year), then yearly till last follow-up (average, 72mths, range 8-128mths). Results were evaluated using Knee Society scores (KSS), satisfaction index (VAS) and orthogonal radiographs (for loosening, subsidence, lysis or implant wear). Re-surgery (any cause) was considered failure. Results: Four patients (6 knees) died due to medical conditions, two patients (3 knees) were lost to follow-up. These were excluded from the final analysis. All but two patients were pain-free and performing well at final follow-up. Indications for re-surgery (2 failures) were: medial femoral condyle fracture needing fixation in one patient (subsequent conversion to TKA at 2 years), and progression of arthritis and pain in one patient (revision to TKA at 6 years). Conclusions: UKA is a less morbid procedure compared to TKA. Results of 96.4% implant survival rates and 94.9% good or excellent outcomes in our series of UKA match results of series of UKA and TKA in high-volume centers worldwide. UKA can successfully manage TCOA in octogenarians.

#### Abstract no.: 42357 MID-TERM CLINICAL OUTCOME OF OXFORD III UNICOMPARTMENTAL KNEE REPLACEMENT Yaonan ZHANG

Objective: To evaluate the mid-term clinical outcome of the Oxford III unicompartmental knee arthroplasty (UKA) for the patients with the medial compartment arthropathy of the knee joint only. Methods: 30 knees in 30 patients received the UKA with the mobile bearing Oxford III prosthesis by a minimally invasive approach from January 2010 to June 2014. A retrospective study of the clinical outcomes was carried out. All patients were evaluated pre-and post-operatively using X-ray image, the Knee Society Score (KSS), the WOMAC index and VAS score. Results: The mean follow-up period was (47±3.2) months. No patient had the complications of dislocation of the mobile bearing, infection, or thrombosis. No revision surgery was needed. The KSS Clinical Score and Function Score were improved from an average of  $(43.1 \pm 2.1)$  and  $(49.1 \pm 4.4)$  to  $(95.6 \pm 4.3)$  and  $(95.1 \pm 4.3)$ ±2.2) respectively. The mean WOMAC Score was (47.6 ±3.2) preoperatively, and (10.4 ±1.3) at the follow up. The VAS score dropped from (6.58 ±1.12) preoperatively to (1.17 ±0.29) postoperatively. Statistically significant differences were found pre- and postoperatively with those related index (P Conclusion: The mid-term clinical outcomes of the Oxford III mobile-bearing UKA through a minimally invasive approach are satisfactory, and it is a good alternative option for the patients with medial compartment arthropathy of the knee only.

# Abstract no.: 39990 ALL CEMENTLESS TOTAL KNEE ARTHROPLASTY WITH MOBILE BEARING. A PROSPECTIVE STUDY WITH RESULTS AT MINIMUM 8-YEAR FOLLOW-UP

Jacques Henri CATON, Jean-Marie RAGOT, Xavier NORMAND, Jean-Louis PINCON

One of the main factors affecting the survival of a total knee arthroplasty (TKA) is the fixation method. The constraints placed on the bone-implant interface of a mobile-bearing TKA must be taken into account during the design and evaluation phases. For more than two decades, calcium phosphate ceramics, particularly hydroxyapatite (HA), have been used in Europe to accelerate the bone integration of cementless implants. A prospective study of patients operated on by a cementless TKA with a bilayer coating titanium/HA consecutively recruited has been carried out. There were no exclusion criteria. Eighty-four (84) cementless mobile bearing TKA were implanted in 74 patients over a 2-year period (2004-2005). Survivorship at 8 years follow-up was 95%CI[80.2-96.4 %] when revision for any cause was defined as the endpoint. Five implants required surgical revision to exchange all or part of the implant: two for aseptic loosening of tibial component, one for osteolysis, one for persistent flessum and one for tibial periprosthetic fracture. Completely integrated implants and event-free outcomes were recorded in 91.4 % of the cases at 8year follow-up. The HSS score significantly improved from 56.8/100 points preoperatively to 83.9/100 points at the last follow-up (p<0.05). This cementless TKA with a bilayer coating yielded very good medium-term survival. This cementless TKA with a bilayer coating generates solid and durable bone fixation and so we still use this implant in all knee osteoarthritis requiring knee replacement

# Abstract no.: 41208 AN INTERESTING ASYMMETRICAL CAM DESIGNED TO RAPIDLY RESTORE FUNCTION AFTER TOTAL KNEE ARTHROPLASTY André FERREIRA

INTRODUCTION: Good long term results following Total Knee Arthroplasty are directly dependent on reducing pain and improving function. Lack of range of motion (ROM), poor patellar tracking or patellar instability lead to increased patient dissatisfaction and poor quality of life. To counter this and to optimise the patient's recovery, intense rehabilitation is necessary to minimise the length of hospital stay post surgery. New designs of implants must therefore be engineered to allow better biomechanics that guarantee full flexion and extension whilst keeping the knee stable. METHODS: We report a prospective, continuous series of 48 patients (21 male, 27 female, 70.7 +/- 9.6 years) All patients were operated on by the same senior surgeon using a new PS implant. This implant includes an asymmetrical cam, new posterior plate geometry and multi radius femoral component design to ensure correct stress distribution during the flexion-extension cycle and that gives natural posterior femoral rollback linked to physiological tibial rotation. All patients were reviewed at 2, 6 and 12 months; ROM, IKS and Oxford scores were recorded. RESULTS: at 2 months post operative, all but 3 patients in the group had at least 110° of flexion with a mean of 125° +/-5° and at 1 year had a mean increase of 5°. IKS increased from 75.5 to 141 at 2 months and 168.7 at last follow up. The Oxford score decreased from 42 to 29 at 2 months and further decreased to 22 at 1 year. CONCLUSION: The new assymetrical cam design is associated with a cam and spine interaction that leads to accelerated return of knee function which may be useful for aiding patient rapid recovery

Abstract no.: 41571

# DOES THE MID-VASTUS APPROACH OFFER FASTER RECOVERY? RCT STUDY OF 50 PATIENTS OPERATED FOR BILATERAL TKA USING MEDIAL PARAPATELLAR APPROACH ON ONE SIDE AND MID-VASTUS APPROACH ON THE OTHER SIDE.

Rajiv THUKRAL, Sks MARYA

Background: Modified approaches (mid-vastus, subvastus) purportedly improve quadriceps power, knee flexion and provide better pain relief, with reports of early patient rehabilitation and improved clinical results. We report an analysis of our prospective randomised controlled trial in 50 patients undergoing simultaneous bilateral total knee arthroplasty (TKA) using medial parapatellar approach in one knee and mid-vastus approach in the other. Methods: 50 consecutive elderly patients with bilateral knee osteoarthritis underwent simultaneous bilateral TKA (randomized to undergo medial parapatellar approach in one knee and mid-vastus approach in other) from Dec 2012 to Mar 2013. A blinded independent observer evaulated immediate and early post-operative clinical radiological criteria for each knee at 2 weeks, 6 weeks, 3 months and 12 months post-surgery. The collated results were then matched to the approach taken, and analysed for statistical differences. Results: The return of active straight leg raise, quadriceps power and function was statistically higher with the mid-vastus approach at 2 weeks, 3 months and 6 months only. Pain relief was better in mid-vastus approached knee, but without statistical significance. All other intra- and post-operative parameters were comparable. At 12 months, the two groups were comparable. Conclusions: Mid-vastus approach significantly reduces immediate post-operative pain, improving quadriceps function and knee flexion. However, this advantage lasts for 3 months, with no extra benefit in the midor long-term. Patients with low BMI are ideal indications, and provide early recovery and reduced hospital stay. Concerns regarding difficulty in exposing the lateral tibial surface for tibial implantation are unfounded.

# Abstract no.: 39090 DIGGING DEEPER INTO THE PATELLO – FEMORAL JOINT: PATELLO – FEMORAL COMPOSITE - A NEW DIMENSION FOR THE OVERSTUFFING OF PATELLO – FEMORAL JOINT

Vikram KANDHARI, Mohan DESAI, Surendarsingh BAVA, Roshan WADE

Introduction: To study effects of overstuffing of PFJ in post op total knee arthroplasty (TKA) patients we put forth a new dimension - "PATELLO - FEMORAL COMPOSITE (PFC)". This is the maximum distance between anterior cortical line of femur shaft and anterior cortex of patella with knee in full extension. Through our study we wish to calculate chances of overstuffing of PFJ in post op TKA patients and document the effect of overstuffing of PFJ on passive knee range of motion (ROM) in post – op TKA patients. Material and methods: This was a prospective observational study and included 51 consecutive primary TKAs. Pre op and post op (24 weeks) passive knee ROM was measured. Pre op and post op radiological parameters [PFC, Anterior Femur Offset (AFO), Patellar thickness (PT)] were recorded using Computed Tomography (CT) Scanogram image of patient in lateral view with knee in full extension and perfect overlap of both femur condyles, using DICOM format of the CT Scanogram image on the DICOM viewer. Results and Conclusions: Chances of overstuffing of PFJ in post - op TKA patients were 80.39 %. Patients with increased post op PFC had significantly less pre op AFO, especially females; thus, more chances of post op PFJ overstuffing in females compared to males. Passive knee ROM in the post op TKA patients with PFJ overstuffing was significantly less than the patients without PFJ overstuffing. Passive knee ROM approximately decreased by 2 degrees for every 1 mm of increase in post op PFC.

### Abstract no.: 42358 THE TREATMENT OF STIFF KNEE AFTER TOTAL KNEE ARTHROPLASTY Qi LI

Purpose:to analyse the results of the treatment of stiff knee after total knee arthroplasty . Method:From 1998.7 to 2014.5, 29 knees of 25 cases, because of stiff knee after total knee arthroplasty, were treated. Total 25 cases include 6 cases of male, 19 cases of female, of which 4 cases were bilateral. The average age was 66.2 years (52 - 76). The average range of motion after primary total knee arthroplasty was 5° in extension and 75 degrees in flexion. The average time for treatment was 2.4 months after primary arthroplasty (1.2 - 38 months).3 cases were restricted only in extension and 17 cases in flexion. There were 5 cases accompanied by the both of extension and flexion restriction. The patients were treated by arthroscopic solution or for manipulation after anesthesia according to the patient's situation. Results: the postoperative average activity of the patients extends from 0 degrees to 90 degrees of flexion (80 DEG and 110 DEG) .4 cases were treated by arthroscopic release and 2 by open release and partially replaced the implants. Conclusion: Knee stiffness of knee arthroplasty is one of the common complications, but the definition of stiff knee is not confirmed. We believe that the bending more than 90 degrees should be the basic requirements, but whether or not it need treatment, also depending on the patient satisfaction. In most of the cases the stiff knees could be resolved by manipulation or arthroscopic release

# Abstract no.: 42356 ADJUSTED FEMORAL OSTEOTOMY DURING TKA ACCORDING TO THE ANATOMICAL FEATURES IN CHINESE POPULATION-A RANDOMIZED, DOUBLE-BLIND, CONTROLLED STUDY Heng LI

Abstract: The posterior condylar offset ratio of Asian populations is larger than that of the Westerns. This difference is related to the risk of notching, gap balance and mismatch between prosthesis and the bone bed. Therefore, we try to take a new method of preparation for bone bed to accommodate the anatomy of Asian populations. We conducted a randomized, double-blind, controlled study in 200 participants to compare two methods in preparation for bone bed of femur. Patients were re-assessed at 6 and 24 months postoperatively. The pain relieve and range of motion in treatment group was significantly better than control group within follow-up. In conclusion, our new method seems to be an ideal alternative to coincide the prosthesis design and anatomical features in Chinese population.

#### Abstract no.: 39135 PATIENT SPECIFIC **INSTRUMENTS** DO NOT **IMPROVE** THE RADIOLOGICAL AND **CLINICAL** OUTCOMES IN TOTAL **KNEE ARTHROPLASTY:** Α RANDOMIZED CONTROLLED TRIAL WITH **MINIMUM 2 YEARS FOLLOW UP**

Chun Hoi YAN, Kwong Yuen CHIU, Fu Yuen NG, Ping Keung CHAN, Christian Xinshuo FANG

Introduction: The current study aimed at comparing the radiological and clinical outcomes of using patient specific instruments in total knee arthroplasty to existing techniques. Methods: Ninety knees in 81 patients (20 men, 61 women) were randomized in 1:1:1 ratio into conventional instruments (CON), computer navigation (NAV) and patient specific instruments (PSI) groups to receive total knee arthroplasty. The mean age was 68.1±8.0 years. Post-operative standing long films of the entire lower limbs were taken. Clinical information such as complications, knee range of motion and knee society knee score, knee society function score and Oxford knee score was documented. 89 patients completed 2 years follow-up. Results: There was no statistically significant difference between the 3 groups in the mean values and incidence of outliers in overall lower limb alignment, femoral and tibial component positions in the coronal plane, and tibial component in the sagittal plane. The only difference lay in the femoral components in the sagittal plane (flexion/extension). The NAV group had significantly less outliers than the CON group and PSI group (p=0.002). The complication rate was significantly higher in PSI group (p=0.02). The knee range of motion, knee society knee score, knee society function score and Oxford knee score at 3 months, 6 months, 1 year and 2 years also showed no difference among the 3 groups. Conclusion: We could not demonstrate significant radiological and clinical benefit of PSI over CON or NAV in total knee arthroplasty.

# Abstract no.: 40512 CAN CAS CURE ACCURACY DEFICIENCIES IN PSI-TKR? David LIONBERGER

Initial experience using patient-specific instrumentation (PSI) in TKR promised an improved speed and operative efficiency without it compromising accuracy. As most accuracy comparisons use at the very least restoration of the mechanical axis (MA), the authors set out to determine if abbreviated use of the CAS during PSI-TKR could improve accuracy enough to justify the added time and expense when compared to PSI alone. 20 PSI patients were enrolled in a randomly assigned study with 15 patients in the CAS and PSI study group abiding by IRB guidelines. Accuracy improvement on the study cohort was not statistically better then PSI alone, -1.7 versus -0.9 standard deviation= (2.5 versus 2.3) respectively at the expense of 6.2 minutes more OR time and \$400 more in the study cohort in terms of expense total time between groups. PSI may well have achieved meritable accuracy to where CAS simply is not necessary to take it to a higher level of precision. With a +/-3 accuracy in this study of 75 %( and other studies of 80%) using PSI, CAS using a (MA) only of 80% is better suited to the traditional instrumentation where precision and accuracy are only 70% on target. Given this and the added expense of time and money, PSI appears comparable in its own right by respectable accuracy without incurring excessive cost of CAS usage.

#### Abstract no.: 39506 THE EFFECT OF TIBIAL COMPONENT ALIGNMENT ON PERIPROSTHETIC BONE REMODELING AFTER TOTAL **KNEE** ARTHROPLASTY Haytham ABDELAZIM

Introduction: Total knee arthroplasty (TKA) implantation alters mechanical loading of both femur and tibia and leads to local bone loss which can compromise the prosthesis survival and present problems at revision arthroplasty. The aim of this study is to assess the effect of tibial component alignment on periprosthetic bone remodeling after TKA. Patients and Methods: A prospective study was conducted involving 60 patients (90 knees) who underwent primary cemented posterior stabilized fixed platform TKA. Tibial component alignment was measured in the immediate postoperative X-ray and patients were divided into three group: Group I with less than 10 degrees of malalignment, group II with 10-15 degrees of varus malalignment and group III with more than 15 degrees. Dual Energy Xray Absorptiometry (DEXA) was done within one week postoperatively and repeated after 12 and 24 months. Three regions of interest (ROIs) were measured: ROI 1 for the lateral tibial plateau, ROI 2 for the medial tibial plateau and ROI 3 just distal to the tip of the prosthesis. Results: The results of DEXA showed statistically insignificant difference in bone remodeling between group I and group II and statistically significant difference in group III compared to group I and II with increased bone loss in ROI1 in group III and increased bone loss in ROI2 in groups I and II. Conclusion: Marked tibial component malalignment more than 15 degrees significantly alters periprosthetic bone remodeling after total knee arthroplasty, however the effect of this abnormal remodeling on prosthetic survival needs longer follow up.

# Abstract no.: 40903 IMPACT OF TIBIA PLATEAU ANATOMICAL VARIATIONS ON KNEE ARTHROPLASTY OUTCOMES

Gurpal SINGH, Muhammed Yaser HASAN

Introduction: Tibial plateau geometry impacts biomechanics both in native and implanted knees. The geometry varies widely influenced both by gender and race. Although the sagittal aspect or AP slope of proximal tibia is extensively studied, there is little data on coronal or ML slope variations and their impact on arthroplasty outcomes. In this study we have described tibia plateau geometry in our local Asian cohort and evaluated the relationship of AP and ML slope variations with postop tibia-tray alignment and functional outcome. Methods: 209 Primary TKRs for osteoarthritis performed at our Institute were prospectively studied. Preop tibia ML and AP slopes were recorded and compared to postop tibia-tray alignment and knee functional outcomes. Results: Mean preop AP and ML slope was 8.6°(SD 2.9) and 6.8°(SD 3.8) respectively. The Malay racial subgroup had the steepest geometry, though the racial differences were not significant. Preop ML slope variation had no association with postop tibial tray alignment or postop flexion angle. Regarding AP slope, multiple linear regression analysis showed that the absolute difference between pre and postoperative AP slope predicted postop flexion (p<0.001), with higher the difference between pre and post op AP slope change, greater the odds for reduced flexion. Conclusion: There is inherent anatomical variation in tibia geometry both in AP and ML planes. Preop ML slope has no impact on tibia-tray placement accuracy or postop flexion. Regarding AP slope our data suggests placing the tibial-tray such that it corresponds to the preop tibia AP slope to attain maximal postop flexion

# Abstract no.: 41599 BIOMECHANICAL PROPERTIES OF POLYMETHYL METHACRYLATE (PMMA) BONE CEMENT CONTAMINATED WITH BLOOD

Bryan Thean Howe KOH, Jonathan Jiong Hao TAN, Amit Kumarsing RAMRUTTUN, Wilson WANG

Introduction: Aseptic loosening is a well-known complication of joint replacement surgery. Blood contamination of bone cement is common due to its presence in the surgical field and the surgeon's glove. The objective of this study was to determine if contamination of PMMA cement with blood could affect its biomechanical strength. Methods: We evaluated the biomechanical strength of antibiotic and non-antibiotic loaded PMMA cement after blood contamination. 1ml or 2ml of blood was added to PMMA cement, which was then hand packed into specimen molds, cured in Phosphate Buffered Saline at 37±1°C and sent for biomechanical testing. Results: In the non antibiotic-loaded cement group, the flexural strength reduced from 90.1±10.5MPa in the Control to 69.6±11.5MPa (p=0.022) and 48.3±3.1MPa (p<0.0001), when 1ml and 2ml of blood was admixed. The compressive strength reduced from 87.5±4.2MPa in the Control to 73.9±5.1MPa (p<0.0001) and 67.4±3.7MPa (p<0.0001) when 1ml and 2ml of blood was admixed. In the antibiotic-loaded cement group, the flexural strength reduced from 68.4±11.5MPa in the Control to 60.1±8.7MPa (p=0.700) and 40.9±4.3MPa (p=0.001), when 1ml and 2ml of blood was admixed. The compressive strength reduced from 61.2±1.7MPa in the Control to 60.1±6.2MPa (p=0.998) and 53.0±4.7MPa (p=0.008) when 1ml and 2ml of blood was admixed. Conclusion: We strongly advice precautions to be taken to prevent blood from the surgical field from contaminating bone cement. Such precautions entail good bone preparation techniques like saline lavage or pack drying the bone, a change of glove when hand-packing the implanted components and prompt

#### Abstract no.: 39286 POSTOPERATIVE ANALGESIA AFTER TKA - INTRAARTICULAR CATHETER VS. CONTINUOUS FEMORAL NERVE BLOCK Karl Philipp KUTZNER, Christopher PAULINI, Marlene HECHTNER, Philipp REHBEIN, Joachim PFEIL

Introduction: Postoperative pain management after TKA still today remains a great challenge. In the context of new fast-track concepts, the importance of multimodal therapies for an effective treatment of pain, reduction of side effects as well as for rapid ambulation of patients is increasing. Therefore new continuous intraarticular cathetersystems (IAC) are under investigation. Methods: A total of 120 patients were included receiving TKA in a prospective randomized comparative study. In a standardized treatment regime 60 patients received IAC, while in 60 patients a continuous femoral nerve block (FNB) was applied. All other therapy-components were identical for all patients. After surgery pain intensity (VAS), passive and active flexion, opioid requirements and selfinitiated- or hallway-ambulation were investigated and documented. Initiation time, operation-time and length of hospital stay were recorded. Results: Regarding pain intensity no significant differences occurred (mean 5.1±2.5 vs. 4.6±2.6; p=0.27). Also additional opioid requirements and range of motion (ROM) showed no relevant distinctions. In group of IAC more rapid independent mobilization was achieved (p<0.001). Mean initiation-time before surgery decreased markedly compared to the FNB-group by 11.9min (p<0.001). No differences in hospital-stay and operation-time. Failure rate and rate of dislocation of FNB appear to be increased. Conclusion: The treatment with an IAC-system is an easy technique, which ensures a markedly faster ambulation following TKA compared to continuous FNB. Hence, the usage, especially in fast-track concepts can be recommended. In pain intensity, additional requirement of opioids and early range of motion (ROM) no benefits can be observed. Cost-reduction can be achieved.

#### Abstract no.: 41837 ROUTINE USE MECHANICAL CALF PUMPS AS **VENOUS** OF ASIAN PATIENTS THROMBOEMBOLISM PROPHYLAXIS IN UNDERGOING TOTAL KNEE **ARTHROPLASTY:** SINGLE Α INSTITUTION'S EXPERIENCE

Jing Loong Moses LOH, Keng Lin WONG, Eng Soo YAP, Deborah Chia Hsin CHEW, Wilson WANG, Stephrene Seok Wei CHAN

Background: Venous thromboembolism (VTE), consisting of deep vein thrombosis (DVT) and pulmonary embolism (PE), is a major complication in patients undergoing total knee arthroplasty (TKA). Routine chemical prophylaxis is rarely done in Asia as it is believed that Asians have a lower risk of VTE. Recent evidence, however, suggest otherwise. Aims: We evaluated effectiveness of mechanical calf pumps in VTE prevention after TKA in a multi-ethnic Asian population. Methods: We conducted a retrospective study of consecutive patients who underwent elective TKA from 1st January 2004 to 30th June 2012. Post-operatively, all patients were immediately started on mechanical calf pumps with a postoperative day 3 to 5 doppler ultrasound (DUS) of bilateral lower limbs. Results: There were a total of 1885 patients (1359 Chinese, 207 Malays, 271 Indians, 28 Caucasians, 20 others). 1783 (94.6%) patients had DUS of the lower limbs with 144 diagnosed with DVT and 4 PE, giving an incidence of 8.3%. There were 23 (16.0%) proximal DVTs and 121 (84.0%) distal DVTs. None of the DVTs were symptomatic. After 3 months of follow up, no additional VTE occurred. There were 2 deaths directly attributed to VTE (1 DVT, 1 PE). Conclusion: The incidence of VTE in our study population is 8.3%, which was lower than the incidence in Asian patients without any prophylaxis. The sole use of mechanical prophylaxis effectively lowers the risk of VTE.

### Abstract no.: 39584 CONSENT FORMS IN ELECTIVE TOTAL KNEE REPLACEMENT (TKR) IN A LARGE TEACHING HOSPITAL Mathias NAGY, John ROWLES

Introduction: Consenting in elective total knee replacement (TKR) has fundamental ethical implications and can have serious legal consequences. Different consent forms are used in the UK, many hospitals use generic forms where procedure, risk, benefits and complications are hand written and entered for each patient individually. Methods: we retrospectively reviewed 100 consent forms, used in 100 consecutive primary total knee replacements in a large teaching hospital. We assessed our accuracy regarding the completion of the consent forms including patient's details, risks, benefits and complications. Results: consenter was in 90% middle grade or senior doctors, mean age of patients was 70 years (range 41-89 years), consent form was present in the clinical notes in 100% with correct patient's details, correctly signed and dated by surgeons and patients. Responsible health professional was entered in 39% and a copy of the form was given in 20% of the cases to the patient. Common complications entered on the consent form included infection in 100%, thromboembolism in 100%, pain in 67%, bleeding in 86%, stiffness in 88% and wear in 42%. Less common complications included nerve injury in 88%, fracture in 45%, dislocation in 16%, death in 27%, leg length problems in 1%. Conclusion: Important details, risks and complications are missing on most consent forms. Generic consent forms, where all details of a proposed procedure are entered for each patient individually can lead to inadequate consenting. We recommend the use of preprinted procedure specific consent forms.

# Abstract no.: 41423 WHEN IS IT SAFE FOR PATIENTS TO DRIVE AFTER RIGHT TOTAL KNEE ARTHROPLASTY?

Victor HERNANDEZ, Fabio OROZCO, Anne Marie MADDEN, Zachary POST, Alvin ONG

Introduction: Advances in surgical technique and pain management have changed patient expectations after TKA. A common question is how soon patients are able to return to driving. Most surgeons allow driving 6-8 weeks after surgery based on studies published over a decade ago. The purpose of this study is to prospectively evaluate the brake reaction time (BRT) after TKA. Our hypothesis is that patients who undergoe TKA with contemporary techniques will return to their baseline before the 6th week. Methods: After IRB approval, 49 patients who underwent right TKA were prospectively evaluated. All patients had a preoperative BRT as well as 2, 4 and 6 weeks post op and received this statement "I think I am ready to drive", Strongly disagree, Disagree, Neither, Agree and Strongly agree. General linear repeated measurement was used. Results: 49 patients completed the protocol. Mean pre-op BRT was 0.692 +/-0.15 sec SD. At 2-week 0.631 sec+/-0.16 sec SD (p=0.001). 39 (80%) were able to reach their baseline by 2 weeks and 10 (20%) reached it at the 4-week post-op. Confounding variables revealed no differences (age, gender, BMI, assistance devices, pain) Conclusion BRT returned to baseline in the majority of patients between the 2nd and the 4th week, all patients achieved a safe BRT according to guidelines. In addition patient perception of driving ability accurately predicted return of BRT. These findings have allowed us to encourage patients to re-evaluate their driving ability in between 2 to 4 weeks after TKA.

# Abstract no.: 42315 THE EXPERIENCE OF ONE-STAGED IPSILATERAL TOTAL HIP AND KNEE ARTHROPLASTY: 13 CASES (15 HIPS AND KNEES) REPORT Hu LI

Objectives We report 13 cases (15 sides) of one-staged ipsilateral total hip and knee arthroplasty to treat severe deformity of both hips and knees. Methods Thirteen patients were treated by one-staged ipsilateral total hip and knee arthroplasty of 15 hips and knees from Feb. 2005 to Mar. 2014. The preoperational diagnosis was rheumatoid arthritis in 12 cases, ankylosing spondylitis in 1 case, who all suffered severe flexional contracture deformity of ipsilateral both hip and knee. The average flexional contracture of hips was 55 degree(from 45 to 90 degree), as well as 60 degree(from 50 to 90 degree) of knees. There were 2 men, 11 women, whose average age was 25 years old(from 23 yr to 56 yr). There were 11 cases undergone one side ipsilateral total hip and knee arthroplasty, 2 cases undergone both side operations separatedly. During the operation, we performed total hip

arthroplasty first with anterolateral approach after general anesthesia, then we continued

doing total knee arthroplasty after implanting hip prosthesis without closing the hip wound. Before both hip and knee wounds were closed simultaneous, it was necessary to check whether the hip was dislocated or not, because the hip was flexed and twisted many times during knee arthroplasty. Results There was no any wound complications and no hip dislocations of all 13 cases(15 sides). Until recently follow-up, no prostheses were found to be loose or revised. The average Harris score was improved from 25 points pre-op to 85 points post-op. The average KSS score was improved from 30.5 points pre-op to 87 points post-op. The average residual flexional contracture of hips was 20 degree(from 10 to 30 degree), as well as 30 degree(from 10 to 45 degree) of knees after operations. All cases received skin traction for average 3 weeks(

# Abstract no.: 39629 REPAIR OF THE ACUTE DELTOID LIGAMENT COMPLEX RUPTURE ASSOCIATED WITH ANKLE FRACTURES: A MULTICENTER CLINICAL STUDY.

Guangrong YU, Mingzhu ZHANG, Xin TANG, Ming XIE, Linru ZENG, Yunfeng YANG, Youguang ZHAO

Controversy exists over the need for operative repair of the deltoid ligament during management of acute ankle fractures. The purpose of this article was to identify the indications for surgical intervention for deltoid ligament injury in the setting of ankle fractures. This was a multi-centered study, involving four clinical institutions. From January 2006 to December 2012, 1654 ankle fractures underwent surgical intervention. Of this group, 162 deltoid ligament ruptures were identified and repaired operatively. They were 86 males(53.1%) and 76 females(46.9%) with a mean age of 34.1 (range, 16-63) years. Outcome measures included clinical examination, radiographs, AOFAS ankle-hindfoot scores, VAS and SF-36 scores. All incisions healed primarily. 124 patients were followed up for a minimum of 12 months (12-72 months) with an average follow-up of 27 months. The mean time to fracture union was 14.1 weeks. The mean AOFAS ankle-hindfoot score at latest follow-up was 89.5 points. The mean VAS score was 1.2 points. The mean SF-36 score was 90.1 points. Compared to preoperative scores, the three outcome measures significantly improved after operation. Postoperative stress radiographs did not reveal any ankle instability. None had evidence of post-traumatic arthritis of the ankle based on clinical examination and radiographs. A reasonable clinical evaluation and surgical repair could be executed, choosing an appropriate repair technique according to the site of deltoid ligament rupture. The results of the current multi-centered study depicted that deltoid ligament repair can be repaired for patients with unstable medial ankles after fracture fixation and prevented ankle stabilization related complications.

# Abstract no.: 39920 IS MORPHOLOGY OF FIBULAR FRACTURE A CORRELATION FACTOR OF SYNDESMOSIS SYNOSTOSIS IN SURGICALLY TREATED ANKLE FRACTURE?

Lu BAI

Purpose: Through the clinical retrospective study to explore the correlated factors of syndesmosis synostosis after internal fixation of ankle fracture. Methods: From August 2012 to January 2015, 172 ankle fractures (121 male) with average 46.6 years old (22-71) were surgically treated and got follow-up. patients, According to AO Classification: A type 54 cases, 78 cases of type B and 40 patients of type C. According to Langer-Hans Classification, supination adduction type (SA) 17 cases, 98 external rotation supination (SE) cases, 31pronation external rotation fracture (PE) cases and 26 pronation abduction (PA) cases. The average time from injury to operation was 4.3 days (6h-7 days). Age, gender, BMI, Comorbities, ankle dislocation, tibiofibular syndesmosis separation. AO Classification; Langer-Hans Classification; triangular ligament injury; posterior ankle fracture, fibular fracture morphology, fixation type of tibiofibular syndesmosis, approach, postoperative immobilazation, and wound infection were analyzed by multi-factor analysis.Results: 36 cases (20.9%) of all cases revealed syndesmosis synostosis. The complete ossification in 11 cases (30.5%), 25 cases of partial ossification. By multivariate Logistics regression analysis, independent risk factors for synostosis were: AO Classification (P=0.0001, OR=4.14, 95%CI: 2.20 - 7.80). Distal tibiofibular syndesmosis deseparation (P=0.003, OR=0.3.83, 95%CI:3.17- 9.96), fibula fracture morphology (P=0.01, OR=2.64, 95%CI:1.78- 4.28).Conclusion: The AO Classification, syndesmosis deseparation and high fibular fracture factors associated with distal tibiofibular syndesmosis synostosis.

#### Abstract no.: 42304 OPERATIVE INDICATIONS FOR POSTERIOR MALLEOLAR FRACTURES Xiaofeng GONG

Objective To explore the operative indications for posterior malleolar fractures. Methods A retrospective study was conducted to analyze the clinical data of the whole year of 2011 of 298 combined fractures of ankle joint and posterior malleolus. They were 143 males and 155 females, 14 to 85 years of age (average, 43 years). Laterality: 152 right sides and 146 left sides. Associations of surgical fixation were analyzed respectively with dislocation of the tibiotalar joint, Danis-Weber classification of the ankle fracture, Haraguchi classification of posterior malleolar fracture, and fragmental size of posterior malleolar fracture. Results Significantly more posterior malleolar fractures combined with dislocation of the tibiotalar joint (56.98%) were subjected to surgical fixation than those without (33.96%) (P<0.05). Significantly more Haraguchi type II fractures (73.8%) were subjected to surgical fixation than those of Haraguchi type I (35.5%) and type III (>P<0.05). The fixation ratio increased significantly when the posterior fragment was more than 15% of the total joint area (>P<0.05). There was no significant association between the Danis-Weber classification and surgical fixation (>P>0.05). Conclusion In clinical treatment of posterior malleolar fractures, the factors influencing operative decision include combined dislocation of the tibiotalar joint, Haraguchi type II, and fragmental size more than 15% of the total joint area. Ankle joint; Bones, fracture; Fracture fixation, internal; Indication

#### Abstract no.: 39653 BONE PEG FIXATION FOR OSTEOCHONDRAL LESIONS OF THE TALUS Ichiro HIGASHIYAMA, Tsukasa KUMAI, Yasushi SHINOHARA, Tomohiro MATSUI, Yasuhito TANAKA

We perform reduction and fixation with bone pegs as a surgical procedure for osteochondral lesions of the talus. The subjects were 60 patients (63 feet), aged 12-69 years (mean: 29.5 years old). In surgery, the medial malleolus was cut into a chevronshape and turned over to expose. Curettage was applied to the intermediate layer between the osteochondral fragment and talar bed. The sclerotic region of the talar bed was drilled until bleeding occurred. Bone pegs with diameter of 2-3 mm and length of 10-20 mm were took from the tibia, and the osteochondral fragment was fixed with them. The lower leg was fixed with plaster and the patient walked without weight-bearing for 3 weeks after surgery. Gait training with PTB brace started thereafter. Partial weight-bearing started at 6 weeks, and full weight-bearing was permitted at 8 weeks. The outcome based on Berndt & Hart clinical evaluation was 'Good' in 47 feet (93.7%) and 'Fair' in 4 feet (6.3%), and that based on X-ray radiography was 'Good' in 47 feet (81%) and 'Fair' in 8 feet (13.8%). 25 patients play sports, and 24 (96%) of them were able to return the sports, and it took 5.2 months on average. When a high signal rim is present between the osteochondral lesion and talar bed on T2-weighted MRI, we judge the case as an unstable lesion. When an unstable lesion is present on MRI but the osteochondral fragment is not severely damaged, we applied reduction and fixation with bone pegs and achieved favorable outcomes.

## Abstract no.: 42306 LIMITED LATERAL INCISIONAL APPROACH WITH THE OPEN REDUCTION AND INTERNAL FIXATION (ORIF) OF DISPLACED CALCANEAL FRACTURES Junfeng ZHAN

BACKGROUND: Operative treatment of calcaneal fractures has a historically high rate of wound complications, so the most optimal operative approach has been a topic of investigation. A minimally lateral incisional approach for posterior facet exposure and ORIF of the calcaneal body has been implemented. This study reviews the radiographic and clinical outcomes of the use of lateral incisional approach for operative fixation of these fractures with attention to the rate of infection and restoration of angular measurements. METHODS: The radiographs and charts of 20 patients with 22 calcaneal fractures were reviewed to assess for restoration of angular and linear dimensions of the calcaneus. Secondary outcome measures included the rate of postoperative infection, osteomyelitis, revision surgeries, and nonunion. RESULTS: We found a statistically significant restoration of Bhler's angle and calcaneal width. None of the 22 cases had a superficial wound infection. None patient had revision surgery for symptomatic hardware removal. There were no events of osteomyelitis, deep infection, malunion, or nonunion. CONCLUSION: The authors conclude that the operative method used in the current study which followed the principle of minimal soft tissue damage and minimal internal fixation is a good option for management of calcaneus fractures. calcaneus Intra-artucular fractures Internal-plate fixation
# Abstract no.: 41534 COMPARISON BETWEEN LOCKED AND UNLOCKED PLATES IN TREATING INTRA-ARTICULAR CALCANEAL FRACTURES Hatem GALAL, Joseph ISAAK, Mohammad EL-SHARKAWI

The aim of this study is to determine the clinical and radiological results after treatment of displaced intra-articular calcaneal fractures by the AO locked plate in comparison to the nonlocked plates. Methods: This prospective randomized controlled study was performed in Assiut University Hospital and included 100 osteosynthesis of calcaneal fractures using the extended lateral approach from March 2012 to March 2014. Fifty operations using nonlocking calcaneal plates (group A) were performed, and fifty calcaneal fractures were stabilized using locking compression plates (group B). Bohler's angle and the crucial angle of Gissane in the immediate postoperative period and at the 6-month follow-up were compared. Any change in the subtalar joint status was documented and analyzed. The final outcomes of all patients were evaluated by the AOFAS Ankle Hindfoot Scale and compared in both groups.Results: The mean full weight-bearing time in group B was significantly lower (median 5 months, range 2.5-7 months) than that in group A (median 6 months, range 4 -8 months). The immediate-postoperative Bohler's angle and that at the 6 month follow-up were significantly higher in group B. The loss of Bohler's angle after 6 month was significantly lower in group B (mean 1.45+3.77) than in group A (mean 2.58+2.56). Regarding the efficacy outcomes, Group A (16% good, 44% fair, 40% poor), Group B (32% excellent, 44% good, 12% fair, 12% poor). Conclusion: Bohler's angle showed improved restoration with less loss after 6 month when locked plates are used. The functional outcome is significantly better when locked plates are used.

# Abstract no.: 40175 CLOSED REDUCTION AND INTERNAL FIXATION WITH MIPPO TECHNIQUE FOR CALCANEAL FRACTURES Yan GUO, Fang ZHOU

Introduction: Open reduction and internal fixation for calcaneal fractures is wildly used. The postoperative complications such as wound infection and skin necrosis are common and difficult to avoid. Objectives: To discuss and analyze the treatment of closed reduction and internal fixation with minimally invasive percutaneous plate osteosynthesis (MIPPO) technique for calcaneal fractures. Methods: From November 2011 to October 2013, The clinical data of 37 cases (39 feet) of calcaneal fractures treated by using closed reduction and internal fixation with MIPPO technique were analyzed retrospectively. According to Sanders classification, 6 feet in type II, 25 feet in type III, 8 feet in type IV. Closed reduction combined calcaneal traction and percutaneous leverage with K wires. A plate was inserted percutaneous through a small incision to fix the fracture and screws were inserted through stab incisions. Results: All cases were followed up for 12 to 24 months, averagely 16.5 months. Böhler's angle and Gissane's angle were restored from (8.6±7.3)° and (93.5±8.5)° to (21.2±6.4)° and (123.9±8.1)°. The improvements were statistically significant (P < 0.05). The outcomes were evaluated using Maryland Foot Score, 14 feet were excellent, 19 feet were good, 6 feet were fair, and the excellent and good rate were 84.6%. There is no wound complication. Conclusions: The treatment of closed reduction and internal fixation with MIPPO technique for calcaneal fractures can achieve satisfactory outcomes.

# Abstract no.: 39357 TREATMENT OF CALCANEAL FRACTURES USING A NOVEL MINIMALLY INVASIVE NON-METAL WORK TECHNIQUE: THE ROLE OF BONE GRAFTS

Chinyelu MENAKAYA, B ZWAN

Management of intra-articular calcaneal fractures remains controversial. Operative management achieves anatomic joint reduction, restores height, length, width and axis of the calcaneus. Stable internal fixation should allow early motion to restore function and is advocated for intra-articular fractures but is notorious for post-operative complications especially wound complications. Weight bearing is initially restricted to prevent further collapse of the fracture. This study reveals the use of non-metal bone grafts to maintain and restore anatomic joint reduction via a minimally invasive stab incision in a university teaching hospital. Retrospective review of consecutive patients treated with minimally invasive technique using tutobone grafts for their sanders type-3 calcaneal fractures over a 4-year period. Infection rate was recorded as primary outcome while restoration of Bohler and angle of Gissane were secondary outcomes. Radiological and clinical data was analysed using microsoft excel.17 calcaneal fractures in 16 patients were treated during the time period with an average age of 43 years. Time to surgery was 10.3 days with a 9.9 months average follow-up period. All patients lost their Bohler's angle with an average of 10.31 with 12 out of 17 patients losing their angle of Gissane. The angles of Gissane and Bohler's was restored in all cases. Weight bearing was commenced immediate postoperative period. At follow-up only two cases of superficial infection was reported with one infected bone graft. This novel treatment of calcaneal fractures is a promising technique with limited complications since it ensures early mobilisation and ultimately restoration of functional outcome.

### Abstract no.: 39234

# PLANNED SEMI-ELECTIVE FIXATION OF DISPLACED INTRA-ARTICULAR CALCANEAL FRACTURES MAY REDUCE POST-OPERATIVE INFECTION AND WOUND COMPLICATION RATES Mohammed ALI, Mustafa ALNAIB, Paul PATTERSON

Introduction: Displaced intra-articular calcaneal fractures are often associated with significant medium and long term disabilities. Many of those fractures are treated surgically. However, Infection rate and wound complications could be as high as 30%. The morbidity associated with post-operative wound complications warrants the adoption of techniques that could improve outcome of surgery. This study aims to evaluate the effect of planned semi-elective fixation on rate of post-operative wound complications. Methods: This is a retrospective comparative study. Local trauma database (M.E.T.A.L.) search identified 32 patients with displaced intra-articular calcaneal fractures. Patients were allocated into two groups. Surgery was performed within 3 days (Group One) or two-three weeks (Group Two). Both groups had internal fixation using an extended lateral approach. All patients had regular outpatient follow up at 2, 6 and 12 weeks postoperatively. Results: There were 15 patients in Group One and 17 patients in Group Two. Average age was 31 years (Range 25-50). Wound complication rate was 20% (3 patients) in Group One. No wound complications were found in Group Two. All patients in both groups had fracture union at 12 weeks post operatively. Conclusions: Planned semi-elective fixation of displaced intra-articular calcaneal fractures appears to be safe and may reduce postoperative infection and wound complications by minimising soft tissue swelling at the time of surgery without influencing fracture healing. We recognise the small number of patients in this study and acknowledge that surgical infection is multi-factorial. However, the results are promising.

# Abstract no.: 42305 DORSAL BRIDGE PLATING OF LISFRANC INJURIES: A MIDTERM FOLLOW-UP STUDY Xudong MIAO

OBJECTIVE: The present study investigated the midterm outcomes of dorsal bridge plating in the treatment of fresh Lisfranc injuries. Methods Thirty-six patients with fresh Lisfranc injuries underwent dorsal bridge plating between January 2006 and December 2009. Twenty-one were males and 15 were females. The mean age was 32.4 years (range, 17-61 years). According to Myerson's three-column classification, 14 patients had middlecolumn injuries, 12 had combined middle- and medial-column injuries, and 10 had threecolumn injuries. The average interval between injury and surgery was 10.4 days (range, 6-20 days). The average time to removal of the dorsal microplates and other internal fixation devices after surgery was 5.8 months (range, 5–7 months). Results Primary wound healing was achieved in 35 patients[ss1], and delayed healing was observed in 1 patient. The mean operation time was 54 min (range, 35-75 min). All patients were followed up, and the average follow-up period was 44 months (range, 30-60 months). The mean AOFAS [ss2] score was 86.12 ± 11.47, and the average time to recovery of a normal life was 12.4 months (range, 10-16 months). The mean AOFAS score of 34 patients who had an anatomical reduction was 87.63 ± 13.71, and the AOFAS scores of 2 patients who did not have an anatomical reduction were 76 and 73. The mean AOFAS score of 10 patients with three-column injuries was 78.83 ± 10.14. Five patients had painful traumatic osteoarthritis, which was the most common complication. Conclusion Dorsal bridge plating of Lisfranc joint injuries can help restore the stability of the Lisfranc joint complex, preserve the articular surface of the Lisfranc joint, avoid secondary cartilage damage, and achieve satisfactory reduction and clinical outcomes. The quality of intraoperative reduction is closely related

# Abstract no.: 41781 EVALUATION OF TREATMENT OF SUPINATION \_ADDUCTION INJURIES OF THE ANKLE BY PERCUTANEOUS WIRES AND SCREWS. Nehad EL MAHBOUB, Waleed ARAFAT, Alaa AL TAHAN, Mina MALAK

Supination \_adduction fractures represent 10 to 20% of ankle fractures. The injury occurs with the foot supinated, the lateral side is subjected to tension causing transverse fracture of the lateral malleolus, with possible rupture of the anterior and posterior syndesmotic ligaments and a vertical fracture of the medial malleolus. In the period between June 2012 to December 2013, 20 patients with supination \_adduction ankle injuries underwent closed reduction and fixation of the lateral malleolus by wires and the medial malleolus by cancellous screws and a splint was applied for 4 weeks in all cases. 12 cases were males and 8 cases were females. The age ranged between 18 to 42 years. The right side affected in 13 patients and the left side in 7 patients. All operations underwent under general or regional anesthesia and under image intensifier. All cases evaluated preoperative for skin condition, swelling and x-rays for reduction and fixation. All cases followed up for a period ranged from 12 to 24 months. The follow up was clinical using Olerud and Molander ankle score and radiological. All cases united in a period ranged between 6 to 10 weeks and could return to their preinjury level of activities and function.

# Abstract no.: 39084 SUCCESSFUL OSTEOSYNTEHSIS IN CASES OF COMMINUTED FRACTURE NECK OF TALUS: OUR EXPERINCE OF 7 CASES WITH MEDIAL SCREW AND LATERAL PLATE CONSTRUCT Raghuveer Chander ALLURI, Aditya Krishna MOOTHA

Introduction: Talar neck fractures are usually the result of high-energy trauma. The goal of talar neck fracture treatment is anatomic reduction of both the neck and subtalar joint, because even minimal residual displacement can adversely affect subtalar joint mechanics. Here we are presenting out short series of 7 cases of comminuted talar neck fractures successfully managed by medial screw and lateral plate construct. Material and methods: All cases of type II and III talar neck fractures with significant fracture site comminution are prospectively included from June 2011 to January 2014. All cases are treated by a same surgical technique of open reduction with dual incision, anatomical reduction and fixation with medial screw and lateral plate construct. In the initial 3 cases 3.5 mm reconstruction plate is used while in the later 4 cases customised 2 hole locking plate with 4.0 mm screws. In 4 of 7 cases autogenous bone graft is used. All cases are followed for a minimum period of 6 months. Results: Out of 7 cases, 2 had associated fractures while the rest 5 had none. Mean age is 32.3 years (14-55 yrs). All cases went on to union. 3 of 7 had radiologically identified avascular necrosis. Conclusion: Comminuted fractures of talar nack are a challenge to the treating surgeon and successful osteosynthesis can be achieved with our technique of medial screw and lateral 2 screw customised plate construct.

## Abstract no.: 40918 HINDFOOT STABILITY FOLLOWING MEDIAL TALAR FACET EXCISION Boyko GUEORGUIEV, Jannifer HAGEN, Andrew SANDS, Geoff RICHARDS, Michael SWORDS, Stefan RAMMELT

Background: Talocalcaneal tarsal coalition commonly refers to a congenital fusion of the medial subtalar joint. Often these coalitions are resected when they become symptomatic, but it is unclear how much of the medial talus can be taken before the subtalar joint becomes unstable. The aim of this study is to evaluate the effect limited resection of the medial talar facet(s) has on subtalar stability. Methods: Nine fresh frozen human cadaveric limbs were mounted in a simulated weight-bearing jig. CT scans were obtained under footflat (75N) and single-legged stance (700N) loading, with the foot in neutral, 15° of inversion, and 15° of eversion positions. 10%, 20%, and 30% of the medial and medialanterior posterior talar facets were resected. The specimens were rescanned following each resection. Results: There was no gross clinical instability in any of the specimens. Measurements of subtalar vertical angulation, talar subluxation, the coronal posterior facet angle and the talo-calcaneal angle in the axial and sagittal planes were made. There were no statistically significant differences in the measurements between the resected states and the intact state when corrected for repeated measures. Conclusion: There is not evidence from this study that resecting up 30% of the medial facet and antero-medial portion of the posterior facet of the talus results in instability of the subtalar joint. Clinical investigation needs to be conducted prior to recommending this level of resection without subsequent subtalar fusion, but this study supports the effort for joint preservation.

# Abstract no.: 41648 DELAYED ORIF IN TREATMENT OPEN CALCANEAL FRACTURES. Aleh KORZUN, Aleh KORZUN, Alexandre BELETSKY

Background. Treatment intraarticular calcaneal fractures with soft tissue injury remains challenge for orthopedic surgeons. Open reduction is associated with additional trauma and may increase postoperative wound complication rate. We hypothesized that delayed open reduction and staged protocol can diminish the risk of the infection. Methods. Case control study, including 22 patients with open calcaneal fractures underwent staged surgery in our center since Jan 2009 till Sept 2014. Mean age was 37±6,7 years. Gustilo grade 2 were 12 cases, 3A - 10. The first step was debridement without immediate wound closure, applying external fixation (10 cases) or cast (12 cases). In 11 cases VAC therapy was used. On 4-20 days after trauma definitive internal fixation with wires through extensile lateral (12) or tarsal (10) approach was done. Results. All primary traumatic wound healed in 6±1 weeks. There were 2 (9%) wound necrosis attributed to ORIF. All fractures healed with mean Maryland foot score 82±7,2. Conclusion. Staged protocol and delayed open reduction is advisable method of surgical treatment of the open intraarticular calcaneal fractures.

# Abstract no.: 40953 INTERNAL FIXATION OF CALCANEUS FRACTURES Atef MORSY, Emad ELBANA, Ahmed Gaber MOSTAFA

Background : calcaneus fractures are the most common fractures of tarsal bone occurring approximately 2% of total fractures. Open reduction and internal fixation (ORIF) have been used to provide appropriate bone morphology and restore the subtalar joint mechanics Methods: sixty two cases of recent fractures in 50 egyptian patients age range (16 - 57) ± 32.54 years, were treated by open reduction and internal fixation using plates and screws via lateral approach between November 2011 and May 2012. 33 males (66%) and 17 females (34%). Extensive lateral approach was used to expose the fracture followed by reduction under image intensifier, patients were followed up regularly till union Results : follow up period ranged between 3-18 months, According to the Creighton-Nebraska Health Foundation Assessment sheet for fractures of the calcaneus, we had excellent 21 patients (45.65%)good 14 patients (30.43%) fair: 9 patients (19.56%)poor : 2 patients (4.34%).four patients were lost in follow up. Restoration of anatomy were based on tuberjoint angle, reduction of the tuberosity fragment and the posterior facet and Bohler's angle . The average percentage of correction was ranged from 60% to 100%. Conclusion: Lateral approach to calcaneal fractures provides easy and safe access to articular fragments and lateral wall reduction, although apical wound problems stands for challenge. Immediate ORIF is not recommended because of the soft tissue compromise, and delayed procedure is recommended. Key words: calcaneus, fracture, plate, internal fixation.

### Abstract no.: 39725 CALCANEAL NAIL - THE MIDDLE LONG TERM RESULTS Martin POMPACH, Martin CARDA, Lubos ZILKA, Hans ZWIPP, Michael AMLANG

The authors present the results of calcaneal fracture treatment using a new method with the calcaneal nail (C-NAIL). The aim is to evaluate the results of calcaneal fracture treatment using a new method with the C-NAIL and compare them with the results of calcaneal fracture treatment using other implants. At the Department of Traumatology Surgery in Pardubice Hospital, the authors performed a total of 107 calcaneal fracture surgeries over a period of 3 years using a new minimally invasive method – C-NAIL. The internationally accepted AOFAS (American Orthopaedic Foot and Ankle Society) scoring scheme was used to evaluate the performance results. The authors evaluated the AOFAS score six months and one year after the patient's surgery. The measured values ranged from 65-100 points, with an average of 93.0 after 6 months and 94.1 at 12 months after the surgery. They evaluated the restoration of the crossing Böhler angle in the traumatic values of 6.2° to 31.8°. After 3 months, the Böhler angle slightly decreased to 29.6° and after 12 months, to 28.3°. They recorded 2 cases of wound edge necrosis (1.9%) and one case of deep infection (0.93%). C-NAIL enables mini-invasive reposition of the articular surface and high biomechanical stability of calcaneal fractures with a significantly low incidence of complications.

# Abstract no.: 41545 THE USE OF MEMORY STAPLES IN TREATMENT OF LISFRANC INJURIES

Seyed ALI, Ismail FATHALLA

Lisfranc fractures and dislocations present an ongoing controversy with regards to management. Options for surgical management include the use of screws, screws/plate constructs and tightrope. With the exception of tightrope, there is a need to remove the metal work in cases were no fusion was attempted. We present the use of memory staples in the treatment of these injuries. They present an obvious advantage in that there is no violation of the articular cartilage while providing the necessary compression and without the need for removal at a later date. We performed the procedure on 8 cases for both fixation and fusion. None of the patients experienced problems related to metal work. At final follow-up before discharge, there was no loss of reduction and patients were fully weightbearing.

# Abstract no.: 41692 STAGED MANAGEMENT OF MISSED LISFRANC INJURIES Hui ZHANG

Background: Lisfranc joint injury is a rare injury and can be easily missed at the initial treatment. Once ignored, late reduction is very difficult and needs extensive dissection. Surgical outcome is not as good as that of an early reduction. The aim of this cohort study was to analyze the midterm (mean, 3.2years) clinical and radiographic outcomes of staged reduction and fixation in a consecutive series of patients with the old Lisfranc injuries. Materials and Methods: 15 patients (16 feet) with Lisfranc injuries (> 3 month old) were treated with staged reduction. Mean duration between injury and surgery was 4.8month (3-8month). In first stage an external fixator was applied across the Lisfranc joint and distraction was done at 1-3mm/day. In the second staged the ORIF(open reduction and internal fixation) was done and we were able to reduce all the fractures and dislocations. Extra-Articular screws and staple fixation were used for fixation. Results: The mean duration between two surgeries was 3.2 weeks (range 2.5-4.5 weeks). Anatomic reduction was obtained in all 15 patients. The average AOFAS scores for these patients were 85.8 points (range, 80 to 93 points). The Visual Analog Pain Scale was 2.1 points at the final follow-up point. Conclusion: Our study have displayed that staged reduction and Extra-Articular fixation should be considered for old Lisfranc injuries with a good reduction, the firm stability, low risk of intraoperative fracture, and if properly executed, a good functional pain free range of motion is the usual outcome.

# Abstract no.: 40243 ACUTE ACHILLES TENDON RUPTURE : SEARCHING FOR A TREATMENT ALGORITHM

Andrea MANENT, Alejandro SANTAMARIA, Maria Eulalia LOPEZ, Isabel PARADA, Juan Manuel RIOS, Jorge MURIANO

Introduction: There are múltiples treatments of the acute achilles tendon rupture, with no gold standard. Surgical treatment has been the best option, but lately percutaneous treatment and even a conservative approach combined with an early rehabilitation program has shown very good results. Objectives: Review of the functional and clinical results of the acute Achilles tendon rupture. Methods: Retrospective descriptive study of 62 patients treated in our center of an acute achilles tendon rupture of the mid portion (January 2010-October 2013), mean age of 41'73 years, 88'7% (55) men, minimum followup of 6 months. Evaluating AOFAS at 6-12 months, the ATRS and all the complications. Statistical analysis with T-Student, U-Mann Whitmann and W-Wilcoxon test.Results: 51 patients (82,3%) underwent open surgery, associating tendinous amplification in 20, and 9 were treated percutaneously. The improvement of the AOFAS interpatient was statistically significant (mean 90,49 vs 96,35. p< 0,001).Chronic tendinopathy was found in 5 cases intraoperatory, with worst clinical results (mean AOFAS 83,4 / ATRS de 23). All the complications occurred in the open surgery group, with no differences if an amplification was associated: 3,2% of reruptures, 11,3% wound problems and 9,1% of other minor complications. At six months postoperative, 86,2% had return to previous daily and physical activity. Conclusions: According to this study, the percutaneous group had less complications and better functional results, but were not significant due to the small number. As in the bibliography revised, this review study was not conclusive.Randomized clinical trial in progress to compare the three principle treatments for the acute achilles tendon rupture with an early rehabilitation program.

# Abstract no.: 40994 SURGICAL TREATMENT OF HEMOPHILIAC ACHILLES TENDON CONTRACTURES Peng GAO

Objective to explore perioperative management and postoperative effectiveness of hemophilia induced contraction of Achilles tendon. Methods Between 1998 and 2014, 15 cases (15 feet) of hemophilia induced contraction of Achilles tendon were treated with surgery, including 11 cases of hemophilia A and 4 cases of hemophilia B. Eleven cases involved left feet and 4 right feet. All were males, aged from 18-41 years (mean, 24.6 years). Preoperative American Orthopaedic Foot and Ankle Society (AOFAS) score was 41.2 ± 20.1. Short Form 36 Health Survey Scale (SF-36) score was 41.4±17.7. All patients were given clotting factors for pre-experiment and clotting factors substitution therapy was performed perioperatively. Results the operation time was 55-75 minutes; tourniquet were used in all cases and intraoperative blood loss less than 20 ml and no blood transfusion. Wounds healed by first intention in 14 patients, no postoperative infection, deep vein thrombosis, or other complications occurred. All cases were followed up 6 months to 15 years and 5 months. The Follow-up in 3 months and 6 months showed that AOFAS scores were 77.8±16.7 and 79.8±12.5 respectively; SF-36 scores were 73.6±13.8 and 77.7±11.2 respectively; and significant differences were found when compared with preoperative scores (P<0.05), but no significant difference between postoperative 3 months and 6 months follow-up (P>0.05). Conclusion For patients with hemophilia induced contraction of Achilles tendon, surgical treatment could correct deformity, release pain and improve the function. Clotting factors pre-experiment at preoperation and substitution therapy at perioperation can reduce the risk of severe postoperative hemorrhage.

# Abstract no.: 40600 RETURN TO ACTIVITY AFTER ARTHROSCOPIC DEBRIDEMENT SURGERY FOR ANTERIOR ANKLE SOFT TISSUE IMPINGEMENT SYNDROME

Jingwen NG, Gowreeson THEVENDRAN

Introduction: Anterior ankle soft tissue impingement syndrome is becoming increasingly common.Objectives:This study aims to assess the functional outcomes after ankle arthroscopy for the treatment of anterior ankle soft tissue impingement in a prospective series of 17 consecutive patients with a minimum follow-up of 12 months. Methods:17 subjects, (14 Male, 3 Female) with 17 ankles, of mean age 29.2(19 - 43) underwent arthroscopic debridement for clinical and MRI-diagnosed anterior ankle soft tissue impingement syndrome by two fellowship-trained foot and ankle surgeons. Functional evaluation was performed using the SF-36 and the American Orthopaedic Foot and Ankle Society (AOFAS) scores. Post-operative follow up ranged from 12 - 35 months. A procedure-related complication database was tabulated and patients' overall satisfaction on the modified Likert scale recorded. A p value of < 0.05 was considered significant. Results: Significant improvements were noted in 5 out of 8 component scores of the SF-36. The AOFAS scores improved significantly post-operatively from 68.1 to 88.5 (p =0.0001). Mean duration of return to both work and sports were 4.8 weeks (1 - 12 weeks)and 5.28 months(0.75 - 12 months) respectively. 3 patients were unable to maintain the same pre-operative level of Halasi ankle activity score. 3 patients reported mild and transient parasthesia over the superfical peroneal nerve distribution. The vast majority of patients reported good or very good results from their surgery. Conclusion: Anterior ankle arthroscopy for soft tissue impingement syndrome confers predictable results with outcomes that remain good for at least 1 year post surgery.

# Abstract no.: 40405 LITERATURE REVIEW OF ISOLATED TALONAVICULAR ARTHRODESIS AND A FINITE ELEMENT ANALYSIS FOR OPTIMAL SCREW PLACEMENT

Dan JIN, Shenghui MA

Isolated talonavicular arthrodesis has increased in popularity and is indicated for several disorders, including talonavicular arthritis, posterior tibial tendon dysfunction, and hindfoot deformity. Details about the satisfaction, complication rates and fixation methods of this procedure for those diseases were undefined. 12 retrospective studies of this procedure published between 1994 and 2014 were included through a PubMed search. CT-scanned images of a normal foot was reconstructed and imported to ANSYS. 6.5 mm and 4.5 mm screws were simulated, inserting from four locations (lateral third, central third, medial third, and medial tuberosity of the navicular) to the talar body perpendicular to the joint facet. Various fixation configurations of one, two or three screws were modeled through these locations. 4 N-m were applied when evaluating the stability of each fixation configuration. The overall satisfaction of patients among all studies after isolated talonavicular arthrodesis was 93.4%, while the overall incidence of complications was 21.1%. Isolated talonavicular joint fusions for varus deformity had the lowest rate of postoperative satisfaction. Adjacent arthrosis is the most notable complication associate with this procedure. The fixation configuration of one 6.5 mm screw inserting through the central third of navicular achieved the minimum peak stress of 3.70 MPa, 3.52 Mpa, 8.39 MPa and 8.11 MPa in dorsiflexion, plantarflexion, intorsion and extorsion. Most patients can achieved symptom improvement and regained foot function after isolated talonavicular arthrodesis. One 6.5 mm screw fixation can be the best choice to keep translational stability.

# Abstract no.: 41469 MANAGEMENT OF LISFRANC FRACTURE DISLOCATION INJURY BY CLOSED REDUCTION & PINNING

Atef MORSY, Emad ELBANA, Ahmed Gaber MOSTAFA

Background: Foot and ankle injuries are some of the more common injuries in athletes, with foot injuries accounting for 16% of all sports-related injuries, Tarsometatarsal or Lisfranc's injury accounts for 0.2% of all fractures. Treatment concepts have evolved over the past decade, with use of more rigid forms of fixation and the more important for athletes is intensive rehabilitation. Methods: The current study included fifteen patients; their age ranged from 25 to 57 years old with a mean age of 40.1 years. A trial of closed reduction and percutaneous pinning (either by K. wires or canulated screw) was done to all patients and succeeded in fourteen patients and failed in one patient where open reduction and fixation was done. Then they were followed up in the outpatient clinic for 4-12 months with a mean of 9 months. Results: Functional outcome was evaluated using the American Orthopedic Foot and Ankle Society (AOFAS) scale for midtarsal region, The overall results were excellent in 5 cases (33.3%), good in 8 cases (53.3%) and fair in 2 cases (13.4%). Conclusion: As a minimally invasive surgery, closed reduction & pinning of Lisfranc fracture and/or dislocation has the following advantages; decreased chance of wound breakdown and infection, faster recovery time, shorter hospital stay, decreased perioperative morbidity, and early rehabilitation compared with open procedures. Keywords: Lisfranc fracture, closed reduction, pinning

# Abstract no.: 42296 CLASSIFICATION OF CALCANEAL SPURS AND THEIR RELATIONSHIP WITH PLANTAR FASCIITIS Binghua ZHOU

Calcaneal spurs, as a cause of plantar fasciitis, are currently debatable. A prospective study was performed to classify the calcaneal spurs according to the findings from an investigation of the relationship between calcaneal spurs and plantar fasciitis. Thirty patients with calcaneal spurs and plantar heel pain underwent calcaneal spur removal and endoscopic plantar fasciotomy. The relationship between the classification of calcaneal spurs and plantar fasciitis was evaluated by endoscopic findings, clinical symptoms, radiographic images, and biopsy findings. The visual analog scale for pain and the American Orthopedic Foot and Ankle Society ankle-hindfoot scores for functional evaluation were used preoperatively and postoperatively, respectively. The mean follow-up period was 24 months. Two separate types of calcaneal spurs were recognized. Type A calcaneal spurs were located superior to the plantar fascia insertion, and type B calcaneal spurs were located within the plantar fascia. Magnetic resonance imaging results showed a more severe plantar fasciitis grade in type B calcaneal spurs preoperatively. Histologic examination showed that the numbers of granulocytes per image in type B spurs were significantly increased compared with those in type A spurs. Statistically significant improvements were found in the mean visual analog scale and American Orthopedic Foot and Ankle Society scores and magnetic resonance imaging results in both groups. The amount of change in the visual analog scale score and American Orthopedic Foot and Ankle Society score, the number of granulocytes per image, and calcaneal spur length showed a high association with the classification of the calcaneal spurs. Calcaneal spurs were completely removed and did not recur in any of the patients on radiographic assessment during the follow-up period. Calcaneal spurs can be classified into 2 distinct types that are indicative of the severity of plantar fasciitis. Classification; Calcaneal Spurs; Plantar Fasciitis ankle

#### Abstract no.: 42297 **INTERMEDIATE** RESULTS OF LARGE CYSTIC **MEDIAL** OSTEOCHONDRAL LESIONS OF THE **TALUS** TREATED WITH **OSTEOPERIOSTEAL CYCLINDER AUTOGRAFTS FROM MEDIAL TIBIA** Kanglai TANG

Purpose: To investigate the clinical and radiological outcomes of an autologous osteoperiosteal cylinder graft from the medial tibia for the treatment of large cystic medial osteochondral lesions (OCLs) of the talus. Methods: The study included 15 patients with large cystic medial OCLs. All underwent medial malleolus osteotomy, excision and curettage of the defect site, followed by transplantation with an autologous osteoperiosteal cylinder graft from the medial tibia. Patients were evaluated preoperatively and after a minimum of 24 months (mean, 44.8 months; range, 24 to 72 months) postoperatively using the visual analog scale (VAS), the American Orthopedic Foot and Ankle Society (AOFAS) ankle-hindfoot scale, the Ogilvie-Harris scale and magnetic resonance imaging (MRI) of the ankle. Results: The mean VAS score decreased from 5.40±1.06 to 1.00±1.00 points (P=0.000), and the mean AOFAS score increased from 49.00±8.96 to 89.00±4.17 points (P=0.000). The mean Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) score was 64.00±5.07 points. According to the Ogilvie-Harris scale, 7 cases were rated as "excellent", 5 cases as "good", 3 cases as "fair", and 0 cases as "poor". No complications were observed. Conclusion: An autologous osteoperiosteal cylinder graft from the medial tibia is effective for treating large cystic medial OCLs of the talus and has a low rate of complications. Osteochondral lesion; Talus; Tibia; Autologous; Graft

## Abstract no.: 42298 DIAGNOSIS AND TREATMENT OF FOOT AND ANKLE SCHWANNOMA Jiazhang HUANG

Objective: Schwannomasis the most common peripheral nerve tumor, but it is relatively rareon the foot and ankle region. Inadequate attention often results in delayed diagnosis and treatment. This study is to explore the diagnosis method and treatment effect of foot and ankle schwannoma. Methods:15 cases of foot and ankle schwannomawhich had been definitely diagnosed pathologically from 2009 to June 2013 were retrospectively analyzed fortheir diagnosis and treatment process, as well ascurative effect. Results: 3 cases were misdiagnosed as general foot mass preoperatively, but were demonstrated as delay,whose schwannoma postoperatively. 4 other cases were diagnosed with symptomsdisappeared after operation treatment. Conclusion:Foot and ankle schwannomatends to be misdiagnosed. Preoperative MRI scan can help to diagnose definitelyly, while surgical resection provides good effect.

# Abstract no.: 41914 HYBRID FIXATOR AS A DEFINITIVE MANAGEMENT OF DISTAL TIBIAL FRACTURES- THREE YEARS FOLLOW UP.

Jeya Venkatesh PALANISAMY, Fakhruddin FAROOK, Balachandran R

BACKGROUND: Distal tibial fractures are high velocity injuries with severe soft tissue damage. Management of these fractures pose a therapeutic dilemma weather to give priority to anatomic reduction and articular congruity or to soft tissue healing. AIM: This study aims to analyse outcome of distal tibial fractures treated with hybrid external fixator as a definitive management. MATERIALS & METHODS: Prospective study of twenty four patients with tibial pilon fractures treated with hybrid external fixator. Mean age of patients was 42 years with 18 men and 6 women. Road traffic accident and fall from height were predominant mode of violence. Out of 16 open fractures there were 8 Gustilo & Anderson type I and 4 type II and 2 type III. Fractures were classified with AO classification as Type A(n=14), Type B(n=3) and Type C(n=7). Fractures were operated under image intensifier with or without fibular fixation. Mean time of bony union was 5.1 months. Weight bearing started after bony union. RESULTS: Mean follow up was 32 months, Using Ovadia & Beals outcome scale, good-excellent results were achieved in 85 % (n=17) subjectively and 80% (n=16) objectively. Complications encountered were pin tract infection, pin were valgus malunion in cases fibula is not loosening. stabilized. ankle stiffness.DISCUSSION & CONCLUSION: Present series yields results similar to previous reports but higher complication rates. Still the patients have good functional outcome and Hybrid external fixator has a role in definitive management of distal tibial fractures especially for open, comminuted fractures where internal fixation is difficult.

## Abstract no.: 40256 POSTERIOR/POSTEROLATERAL PLATING FOR DISTAL FIBULA FRACTURES

Turner VOSSELLER, Danica VANCE, Alejandro PLANA, Anna FU, Justin GREISBERG

Posterior and posterolateral plating of the fibula is mechanically advantageous. The authors reviewed patients that had posterior or posterolateral plate placement for fibula ORIF to assess whether hardware removal was necessary and assess outcome at a minimum of two year follow-up. After IRB approval, patients who had a distal fibula ORIF with a posterior or posterolateral plate over a three year period were identified. A total of 69 patients were identified of whom 52 were eligible, as seventeen did not speak English. Thirteen patients did not have a minimum of two year follow-up and were excluded, leaving 39 patients. These patients were asked whether they had any ankle pain, any pain related to the hardware, and whether they had hardware removal. Twenty-eight of the 39 patients were able to be reached to obtain outcome scores (FAOS). At a mean follow-up of 36.2 months, ten of 39 patients had pain in the ankle (25.6%). Eight patients had their hardware removed (8/39, 20.5%). Four patients with the hardware in place had pain they felt was related to the hardware (4/31, 12.9%). FAOS scores were determined and scored as follows: pain (85.6, SD=18.7), activities of daily living (88.9, SD=18.2), symptoms (80.1, SD=20.2), sports (77.5, SD=29.3), and quality of life (62.8, SD=29.8). Posterior and posterolateral plating of distal fibula fractures achieved good to excellent results in this cohort. The rate of hardware removal in the current study was either equivalent to or less than historical controls for any type of fibular fixation.

## Abstract no.: 41551 NON-UNION OF FRACTURES OF THE DISTAL FIBULA Seved ALI, Ismail FATHALLA

Introduction: Non-union of fractures of the distal fibula continue to remain a challenging issue. There is no consensus on the exact incidence of these injuries. Patients present with persistent symptoms with or without a history of an ankle fracture. Radiographs can show evidence of non-union but further imaging by MRI or CT is usually required to confirm diagnosis. Treatment options include conservative or operative management depending on several variables. We present our case series from a major trauma centre describing the different tips and tricks we used in fixing these non-unions depending on the level of fibular fracture. Methods: A series of 8 patients were referred to our centre with a diagnosis of non-union of the distal fibula and ongoing lateral sided ankle pain. The mean duration of symptoms was 4 months. All the patients had CT evidence of non-union. We treated the patients by ORIF and bone graft obtained from the calcaneus. Results: All fractures healed and patients were asymptomatic.

# Abstract no.: 39597 OSTEOTOMY RECONSTRUCTION SURGERY FOR PILON FRACTURE MALUNION

Zhongmin SHI, Tonglong XU

Malunion and malposition of of Pilon fractures have a combination of angular deformity, translation, rotational malalignment, and shortening. These deformities require multiple correction in the reconstruction and herein we report our technique which had achieved a successful result. From Feb 2010 to Nov 2012, 23 malunion cases after pilon fracture were treated. There were 17 male and 6 female patients. Their ages ranged from 23 to 57 years (median 34 years). The procedure included fibular osteotomy for restoration of the lateral malleolar alignment, open or close wedge osteotomy of the distal tibia to restore the tibial alignment and reduction of subluxation of the tibio-talar articulation. Internal fixation of the osteotomy was performed with locking plate and screws. Fibular lengthening was performed in 12 cases, open wedge osteotomy of distal tibia was done in in 21 cases, and closing wedge osteotomy was done in 2 cases. The AOFAS score preoperatively ranged from 34 to 54 and at follow up ranged from 71 to 85. Progression of ankles arthrosis occurred in one patient leading to ankle arthrodesis as a secondary procedure. Results were satisfactory in 19 cases, and unsatisfactory in 4 cases due to stiffness and pain in the ankle joint. The follow-up ranged from 13 to 34 months. Corrective osteotomy of pilon fracture malunion produces considerable improvement provided that the patient does not have significant degenerative changes before surgery. Anatomical reconstruction of malunited pilon fracture appears to be a viable treatment option besides arthroplasty and fusion in carefully selected patients.

# Abstract no.: 41670 WEIL OSTEOTOMY OF THE FIRST METATARSAL. 179 CASES Isabel PARADA AVENDAÑO, Alejandro SANTAMARÍA FUMAS, Jorge MURIANO ROYO, Alejandro DOMINGUEZ SEVILLA, Juanmanuel RIOS RUTH, Laia LÓPEZ CAPDEVILA

Introduction: There are multiple techniques to correct degenerative diseases and painful deformities of the first ray; Weil osteotomy is gaining popularity for being versatile with a single cut line, correction with more translational control and no risk of head elevation. Methods: Retrospective descriptive study of 179 operated cases using this osteotomy for different indications in forefoot pathology. Statistical analysis Chi-square and T-student with SPSS 19.0 Results:179 cases operated(2008-2013) with the following diagnosis: hallux rigidus: 36 (20%), metatarsalgia:17 (9%), hallux valgus (IM <16°,excluding reconstructions): 80 (45%), recronstructions: 35 (20%) and correction of recurrences or sequelae of previous surgeries: 11 (6%). Improvement of the AOFAS scale pre and postoperative in all groups without statistically significant differences when compared. There were found 31 complications (17%) being the most common the hallux rigidus progression (6- 3.4%), metatarsalgias (17- 9.5%) and wound problems(2-1,2%). No statistically significant differences between hallux rigidus and other indications regarding complications however in this group, cases of recurrent rigidus increased. Comparing the global complications of Chevron-Weil M1 osteotomy, there are no statistically significant differences, but individual analysis shows more recurrence cases in Chevron (6%) compared to Weil M1(0'6%) p <0.003 (Chi-Square). Conclusion:No bibliographic references about the results of Weil osteotomy except in hallux rigidus pathology. Weil Osteotomy seems to be less demanding but less stable; the synthesizing with two screws is recommended: Vascularization should be preserved to prevent necrosis and evolution to rigidus. Where is the limit for indicating reconstructions? Where is the limit of distal osteotomy in hallux rigidus stage II?

# Abstract no.: 41818 TO EVALUATE THE CLINICAL AND RADIOLOGICAL OUTCOME FOLLOWING THE FOREFOOT RECONSTRUCTION IN RHEUMATOID ARTHRITIS Nipun RANA

Introdution: the main objective was to evaluate the mid-term results from the reconstruction of forefoot in patients with rheumatoid arthritis who underwent arthrodesis of the metatarsophalangeal joint of hallux using herbert screws; resection arthroplasty of the lateral metatarsal head or the corresponding base of proximal phalanx and correction of the lesser toe deformity at interphalangeal joints through extensor tendon lengthening and stabilization with k wires. Methods: 12 patients (17 feet) who underwent forefoot reconstruction surgery by means of reconstruction of forefoot, with arthrodesis of the metatarsophalangeal joint of hallux, resection arthroplasty of the lateral metatarsal head or the corresponding base of proximal phalanx and correction of the lesser toe deformity at interphalangeal joints through extensor tendon lengthening. The mean follow up was 24 months (12-32 months) and four were male and eight were female. Results: The results were classified according to the AOFAS (American Orthopedic foot and ankle society) scale, with excellent result in 8 feet, good in five, fair in two, and poor in two. The mean score on the AOFAS scale was 70 points, 13 (77 %) feet were found to be asymptomatic and 4 (23 %) presented with some type of symptom. One case later presented with pseudoarthrosis, which was successfully managed by skillful neglect. Conclusion: The above-mentioned procedure holds good midterm results for forefoot reconstruction in Rheumatoid arthritis with high satisfaction rate and clinic-radiological improvement.

# Abstract no.: 40692 FLAT SHOE IN POSTOPERATIVE CARE OF THE FIRST METATARSOPHALANGEAL JOINT ARTHRODESIS.

Andrea MANENT, Alejandro SANTAMARIA, Maria Eulalia LOPEZ, Eduardo GARDELLA, Isabel PARADA, Juanmanuel RIOS, Jorge MURIANO

Introduction: We published a study which showed results of the arthrodesis of the first metatarsophalangeal joint with Fyxis® plate in advanced hallux rigidus, evaluating the AOFAS scale with good results, and was reviewed two years later. Although debated, the trend in the postoperative period is the use of high-heeled inverted shoe a minimum of 6-8 weeks. Many of these patients, refer discomfort with this shoes in the form of trochanteritis, back pain, unsteadiness and even falls. After a biomechanical study, we asked ourselves; Why not use rigid flat shoe in the first metatarsophalangeal joint arthrodesis? Objectives: Prospective study about the use of the rigid flat shoe after arthrodesis of the first metatarsophalangeal joint.Methods:Review of 67 first radius arthrodesis between 2006-2013 with inverted heel shoe, evaluating clinical and radiological parameters pre and post surgical, satisfaction and AOFAS. Comparing with a prospective study of 16 patients with postoperative rigid flat shoe, evaluating the same parameters. SPSS statistical analysis system using the Mann Whitney U for nonparametric variables and Chi-square. Results: Patients in both groups showed an improvement in pre and postoperative AOFAS (27-87, on average). By comparison, we found no differences in postoperative AOFAS, functionality, satisfaction or complications; 20% wound complications, 2 delayed union and no cases of failure.Conclusions: Patients with postoperative use of rigid flat shoe were more satisfied and had less comorbidity. The next step is to design a double-blind randomized prospective study to demonstrate that the flat shoe is as effective as the inverted heel, but more comfortable.

# Abstract no.: 40662 TREATMENT OF RELAPSED RIGID IDIOPATHIC CLUBFOOT IN ELDER CHILDREN BY THE PONSETI METHOD COMBINED WITH ILLIZAROV TECHNIQUE Shi QIANG, Li XU

Introduction: This study presented the clinical and radiographic outcomes of 12 feet (8 patients) with relapsed idiopathic clubfoot that were treated with a combination of Ponseti method and the Illizarov technique. Methods: 12 feet (8 patients) were treated with ponseti technique in our institute from Jun 2008 to Aug 2011. The children aged 3-12 years (average, 5.6 years) at the initial treatment time and were followed up by an average of 27.6months (range, 11-49 months). All children had accepted the Ponseti cast under intravenous or combined with general anesthesia for 2 or more times (average, 6.5 times; range, 3-12 times). Then the Illizarov frame was applied and gradual distraction by 1 of 2 surgeons, distraction proceeded at 1 mm/d, divided into four 0.25 mm increments. At last, we used customized orthosis-shoes to maintain the corrected feet shapes. Results: All cases achieved a plantigrade foot, better walking ability, and parental satisfaction with the result. Clinical and radiographic assessment was undertaken. The mean Laaveg-Ponseti score, for the 8 feet treated with the Illizarov frame was 85.1. Postoperative radiographic measurements revealed values that can be considered as normal. Ankle joint range of motion increased from a mean of 12° (range, 8-17°) preoperatively to 23° (range, 19-30°) at final follow-up. These cases suggested the Ponseti method combined with Illizarov technique are beneficial for the treatment of relapsed idiopathic clubfoot.

# Abstract no.: 40416 OPERATIVE VERSUS NONOPERATIVE TREATMENT FOR COMPLEX PROXIMAL HUMERAL FRACTURES: A META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS Zhiwei JIA, Wei LI, Dike RUAN

Whether operative treatment for complex proximal humeral fractures has benefit over nonoperative treatment is uncertain. We conducted a meta-analysis to include all randomized controlled trials (RCTs) to determine the advantages and disadvantages of operative versus nonoperative treatment. Multiple databases, online registers of RCTs, and proceedings of major meetings were systematically searched up to November 2012. RCTs comparing operative with nonoperative treatment for three- and four-part proximal humeral fractures were included. Two authors independently assessed methodological quality and extracted data. Seven articles with 286 patients were identified. There were no significant differences between operative and nonoperative treatment regarding Constant Score, the Disabilities of the Arm, Shoulder and Hand score, American Shoulder and Elbow Surgeons score, Simple Shoulder Test, 15D and complications. Health-related quality of life according to the EuroQoI-5D score in operative treatment was statistically but not clinically significant improvement compared with nonoperative treatment. Operative treatment could significantly increase the incidence of additional surgery at 12 months and 24 months follow-ups compared with nonoperative treatment. However, sensitivity analysis showed a higher additional surgery rate at 12 months remained unstable. On the basis of current evidence, both operative and nonoperative treatment can achieve a similar treatment effect on complex proximal humeral fractures, but operative treatment may increase the occurrence of additional surgery. However, due to some limitations, the result of this meta-analysis should be cautionsly interpreted, and further studies are needed.

# Abstract no.: 40536 THE ISOLATED GREATER TUBEROSITY FRACTURE WITH INFERIOR DISPLACEMENT ON THE INITIAL AP VIEW CAN BE A RELIABLE SIGN OF THE UNRECOGNIZED HUMERAL NECK FRACTURE Xiaoming WU

INTRODUCTION Inferior displacement of the greater tuberosity was mentioned recently but its mechanism of injury and the clinical significance are not elucidated till now. We observed that the inferior displaced greater tuberosity fracture is part of the valgus impacted proximal humerus fracture. METHODS The inferior displacement sign was defined as the inferior cortical margin of the greater tuberosity overlap the proximal humerus shaft with absence of the humerus neck fracture on the initial AP view. We postulate that a patient with this sign associated with humerus neck fracture until proven otherwise. The initial radiographs and further CT study results were evaluated independently by three blinded observers. The presence of "inferior displacement" sign was recorded. Findings were then correlated with the CT results to confirm whether they had unrecognized humerus neck fractures on initial AP view or not. With 95% confidence interval, we calculated the sensitivity, specificity, positive and negative predictive values for this diagnostic sign. RESULTS Of 432 patients, 36 patients had this sign on the initial AP shoulder view. Of these, 30 were confirmed humerus neck fracture on further CT study result. The positive predictive value of the sign was 83.3%. The specificity and sensitivity were 85% and 72%, respectively. The results suggest thist sign can be a reliable indicator of the humeral neck fracture. In fact, it is the part of the valgus impacted proximal humerus fracture with greater tuberosity fractured and displaced first to make room for the humeral head to be tilted into valgus position.

# Abstract no.: 41597 ELASTIC STABLE INTRAMEDULLARY NAILING IN EXTRA-ARTICULAR DISTAL HUMERAL FRACTURES Alexander CHELNOKOV, Alexey BAZHENOV

Introduction: Plating through posterior approach is a conventional treatment option in distal third humeral fractures, and antegrade nailing has not been widely accepted in adults as a treatment modality in fractures near the elbow. Aim of this study was to develop a technique of antegrade elastic stable intramedullary nailing suitable for distal humeral fractures. Methods: Fixator-assisted nailing with a tapered elastic titanium nail inserted through the greater tubercle was performed in 42 patients. Clinical and radiological assessment in 1, 2, 3, 6 and 12 month included measurement of shoulder and elbow range of motions, and functional outcome using Constant shoulder and SF-36 scores. Results: Patients demonstrated rapid functional recovery. 37 patients were available for follow-up in six month. Union occurred in 35/37 fractures (94,6%), mean time to union was 10 weeks (range, 4 to 15 weeks). 35/37 patients had minimal or no pain and full range of motion without any sign of rotator cuff problem. After six month the mean Constant shoulder score was 88, the mean SF-36 score was 92. Four patients had four complications, which included two nonunions (union reached after exchange nailing), and proximal migration of the nail in two cases: the nail was re-inserted and locked proximally with further uneventful healing. Conclusion: The tapered elastic titanium nail provides high union rate and good functional recovery in distal third humeral fractures without damage of the articular surface of the humeral head or violating the rotator cuff. So the approach can be treatment of choice in these injuries.

# Abstract no.: 39170 PROXIMAL HUMERUS FRACTURE TREATED WITH TRANSDELTOID LATERAL (MIPO) APPROACH

Asen BALTOV, Mihail RASHKOV, Dian ENCHEV, Tabet AL SADEK

Background: The locking plating of proximal humerus treated by DP approach leads many complications. Aim: To present results with transdeltoid lateral MIPO techniques. Material and method: For a period of 3 years, 90 patients at the average age of 71 /26 – 90/. Fracture spread was as follows: 25(28%) 3-part and 22(23%) 4-part varus dislocated; 22(23%) 3-part and 23(25%) 4-part valgus impacted. We applied PHVariax locking plates. The mean operative time was 55 min, X-ray exposure 2 min and blood loss 200 ml. In 32(36%) patients ABG was used. Results: The observed complications were: varus deformation 5(6%); impingement 14(15%); AVN 3(4%); screws cut-aut 5(6%); fixation failure 2(3%); no injury n. axillaris. An additional operative procedure 24(27%) and the CS was 81. FU mean 12 months. Conclusion: MIPO decreasing the mean operative time and the blood loss and preserved soft tissue and humeral head nutricion. The disadvantages of the method are the X-ray explosure, danger of neurological injury (n. axillaris) and impingement of the shoulder. The rang of complications was may be lower that DP approach.

# Abstract no.: 39751 MINIMALLY INVASIVE PERCUTANEOUS PLATE OSTEOSYNTHESIS (MIPPO) FOR PROXIMAL HUMERUS FRACTURES WITH A T-SHAPE INCISION: A CLINICAL STUDY

Changqing ZHANG, Sen LIN, Dongxu JIN

Background: Though minimally invasive percutaneous plate osteosynthesis (MIPPO) via anterolateral deltoid splitting is a widely used technique in the management of proximal humerus fractures, it puts the axillary nerve at a higher risk of damage. This study evaluated the advantages and clinical outcomes of MIPPO with a T-shape incision in proximal humerus fractures. Methods: We retrospectively studied 160 patients with proximal humerus fractures between 2010 and 2014. A 4.5-mm proximal humeral locking plates was applied in each patient via an anterior approach and a T-shape incision. Bone healing was investigated by radiograph and functional outcomes were assessed using the Constant-Murley Scoring system. Results: With T-shape incisions, the mean operational time is 40±5 (range:30 to 50) minutes and the mean blood loss is 70±10 (range: 60 to 100) ml. T-shape incision resulted in less scarring, and thus better cosmetic outcomes. Bony unions were obtained within an average of 10±1 (range: 8 to 16) weeks. The mean Constant-Murley Score is 92±2 (range:85 to 96). No axillary nerve damage was found. No implant broken or screw loosening occurred in this study. Conclusion: The use of T-shape incision MIPPO procedure in the management of proximal humerus fractures was proved to be a safe and effective method. The technique provides satisfactory clincal outcomes with less scarring and no damage of axillary nerve. The T-shape incision may further simplify the surgical procedure and improve the clinical out -comes in the treatment of proximal humerus fractures.

### Abstract no.: 40986

# TIPS AND TRICKS IN HELICAL PLATING OF PROXIMAL METAPHYSEAL-DIAPHYSEAL HUMERAL SHAFT FRACTURES WITH LONG PHILOS PLATE PERCUTANOUSLY: BASED ON A CADAVERIC STUDY

Lei WANG, Yun-Feng CHEN, Cong-Feng LUO, Yi-Min CHAI

Several recent reports have described the helical plating of proximal metaphysealdiaphyseal humeral shaft fractures with long PHILOS plate percutanously. The purpose of this study is to identify the safe zone and danger zone for locking screw placement to avoid the neurovascular injury. The 10-hole long PHILOS plate was twisted 90° and precontoured on the synbone of humerus before the operation, lying on the lateral aspect of the greater tuberosity proximally and anterior humeral shaft distally. Six arms of fresh cadavers were then fixed with helical plates percutanously. The distance between the screws and axillary nerve, radial nerve and musculocutaneous nerve were measured respectively. The average humeral length was 29.31cm. The proximal four locking screws were in the safe zone, while the average distance between C hole and the axillary nerve was 0.41cm. The average distance between the plate and the point where radial nerve was passing through the lateral intermuscular septum was 1.09cm. The tip of the 6th locking screw was in the posterior side of the humerus, and the average distance with the radial nerve in the posterior groove was 0.82cm. The musculocutaneous passed across the distal plate on 8.34cm in average from the lateral epicondylar, which might be danger just during the screw insertion at the distal 8th hole. Based on this cadaveric study, we performed this technique with some tips and tricks in fifteen cases from February 2011 to February 2013. There was no iatrogenic nerve injuried postoperatively, and the clinical outcome were all satisfied.

# Abstract no.: 39634 OPEN REDUCTION AND INTERNAL FIXATION VERSUS RADIAL HEAD ARTHROPLASTY IN THE TREATMENT OF ADULT CLOSED COMMINUTED RADIAL HEAD FRACTURES (MODIFIED MASON TYPE III AND IV)

Ghalib AHMED, Salah AL-BURDENI, Yousef ABUODEH, Talal IBRAHIM

Background: The purpose of our study was to compare the outcome of radial head fractures (modified Mason type III and IV) treated by open reduction internal fixation (ORIF) versus radial head arthroplasty (RHA). Patients and Methods: A retrospective review of 36 patients with closed comminuted radial head fractures treated either by ORIF or RHA with an average of 15-month follow-up was undertaken. The primary outcome was the Quick DASH score. Other outcomes included re-gain of functional range of motion of the elbow and duration of surgery. Surgical complications were noted. Results: Thirty six patients with a mean age of 36 years were evaluated. Nineteen patients underwent ORIF and 17 had a RHA. The two treatment groups were comparable with regards to gender, side of injury, Mason type and mechanism of injury. The patients whom underwent RHA were slightly older than the ORIF patients (p<0.001). At follow-up, the Quick DASH score was similar amongst the two groups (p=0.58). The re-gain of functional range of motion of the elbow (p=0.13) and rate of complication (p=0.57) were similar amongst the two groups. Conclusion: The treatment of closed comminuted radial head fracture (modified Mason type III and IV) with ORIF and RHA demonstrate similar findings despite less surgical time for performing a radial head arthroplasty. Key words: Radial Head Fracture, Radial Head Fixation, Radial Head Arthroplasty
# Abstract no.: 41521 A STUDY ON TFCC STATUS AFTER VOLAR PLATE FIXATION IN DISTAL RADIUS FRACTURES

Margaret Woon Man FOK, Boris Kwon Keung FUNG, Kelvin YEUNG, Shew Ping CHOW

Introduction: Despite that distal radius fractures was associated with a high incidence of Triangular Fibrocartilage Complex (TFCC) tear, it was postulated that the tear may heal after volar plate fixation. This study aims to evaluate the status of TFCC after the healing of distal radius fractures with volar plate fixation. Methods: We perform concomitant wrist arthroscopy to assess TFCC status for patients who were scheduled for the removal of volar plate after the healing of their distal radius from Aug 2013 to Sept. 2014. Results: 30 patients with an average age of 53 years old were recruited. 10 patients had pre-operative symptoms including ulnar wrist pain and 20 patients had DRUJ instability on examination. The findings of wrist arthroscopies were 20 complete and 5 partial healed TFCC tears. All patients with symptoms and signs had TFCC tears while the 5 patients with intact TFCC tear had neither symptoms nor signs. Nearly 50% of the TFCC tears was arisen from the sigmoid notch and 12% had fovea tears. 12% of the TFCC tears were combined tears. There was no correlation between ulnar wrist pain and the location of the TFCC tears. Conclusion: This study confirmed that a high incidence of TFCC tears was associated with distal radius fractures. Only 20% of tear showed some healing after volar plate fixation. Not all TFCC tears were symptomatic as only 40% of the tears was presented with ulnar wrist pain and 80% of the tears was associated with DRUJ instability.

# Abstract no.: 39733 INITIAL IMMOBILIZATION OF COLLES' FRACTURE IN PATIENTS OLDER THAN 70 YEARS: A RADIAL OR DORSAL BACKSLAB Shakir HUSSAIN, Riaz AHMED, Umer BUTT, Robert SPENCER

INTRODUCTION: Fractures of the distal radius are common in both children and adults. This is the most common fracture encountered in emergency practice. There is no study in the literature to support a preference for using either a dorsal or a radial backslab in the initial management of these fractures. METHODS; Patients above 70 years of age presented with displaced Colles' fracture, with dorsal comminution and needed closed reduction were randomized in to two groups. A dorsal or radial slab was applied with use of three-point moulding following manipulation. Group 1 with a dorsal slab and Group 2 with a radial slab. At one week visit to the fracture clinic, and AP and lateral radiographs were taken to determine whether the reduction had been maintained. Radiologic parameters such as radial height, radial inclination and volar tilt were assessed. Two observers did the measurements. RESULTS; Forty-eight patients were randomized to Group 1 (dorsal slab) and forty-nine, to Group 2 (radial slab). The difference in radial height at one week was analysed with a Mann-Whitney U test. An independent samples t test was applied to check difference in radial inclination and volar tilt. There was no statistically significant difference between the two groups in either of the parameters. CONCLUSION: There is no difference in treatment outcome between dorsal or radial slab, as a non-operative method of treatment of Colles' fracture. Dorsal slab perform as well as Radial slabs in the initial management of distal radius fractures

# Abstract no.: 39102 COMPARISON BETWEEN CONSERVATIVE TREATMENT AND PLATING IN MANAGEMENT OF FRACTURE OF SHAFT OF HUMERUS Boujaylah AQWUYIDIR

45 men and 6 women, 50% of them presented with h/o FD and other 50% presented with H/O RTA. 13 pt discharged in the same day of admission, 2 pt stay 2 days, 36 patients stay one day in hospital. 5 pt left against medical advice. In 50% # is in mid shaft and in other 50% # is in distal third. # were comminuted in 60% and spiral in 40% .radial n inj recorded in 4 cases. Sample treated conservatively and followed for period of 3 to 11 months with mean of 6 months. 4 cases readmitted again, one case due to non union, 3 cases due to malaligment. 17 men and 2 women their age range from 14 to 65 yrs with mean of 35 yrs. Posterior approach used in 8 patients, anterolateral approach used in 11 patients, 6 holes dcp used in 6 pts, 7 holes used 7 times , 8 holes used 3 times, 9 holes used once, 11 holes used once, 12 holes used once. Radial nerve injury recorded in 3 cases , all of them were traumatic due to preoperative trauma. Associated trauma recorded in two patients. Patients followed for 3 to 11 months with mean of 6 months. Only one case readmitted for physiotherapy for preoperative radial nerve injury. Which is not surgical complication.

## Abstract no.: 41666 THE VARIABLE ANATOMY OF THE RADIAL NERVE IN THE BRACHIUM: A CADAVERIC STUDY AND REVIEW Aparna VISWANATH, Andrew MCKEE

Background: Humeral shaft fractures represent 1-3% of all adult fractures. Studies show that the incidence of radial nerve injury is upto 20.7% when looking solely at distal third humeral fractures. Despite this, many surgical texts state that the radial nerve is safe distal to the spiral groove, and that at this distal level only the ulnar nerve must be visualised and protected. Aim: Our aim was to identify the radial nerve in cadaveric specimens and recognise its proximity to the humerus along its course. Methods: 14 human embalmed cadaveric upper limb specimens were dissected to identify the course of the radial nerve. The posterior approach (triceps-splitting) was used to replicate operative conditions. The areas of the nerve in direct contact with the humerus were documented as distances from the centre of the lateral epicondyle. Results: In two specimens, the radial nerve was in direct contact with the humerus along the length of its course. In 8 of the 14 arms dissected, the nerve lay in direct contact with the humerus within 6 cm of the lateral epicondyle. All of these had a portion of the nerve in contact with bone after passing through the lateral intermuscular septum. Conclusions: The variablility in the anatomy of the radial nerve is well recognised. We find no evidence for a reported "safe zone" where the radial nerve need not be visualised. We believe the radial nerve should always be identified and protected throughout its course, particularly as it passes through the lateral intermuscular septum.

# Abstract no.: 41669 THE USE, VERSATILITY AND OUTCOMES OF SPECIALISED HINGED EXTERNAL FIXATOR IN COMPLEX ELBOW TRAUMA. Rasheed AFINOWI, Sandra Janina BONCZEK, Manjit BHAMRA

Introduction: Complex elbow injuries, including fracture dislocations, are associated with poor outcome, persistent instability and significant soft tissue compromise, precluding early definitive internal fixation. Good functional recovery/outcome is dependent on early protected mobilisation. Objectives: To assess the functional outcome in complex elbow trauma following the use of a specialised hinged external-fixator for the elbow as a primary definitive procedure. Methods: Prospective study (Jan-Dec 2014) of cases performed by a single upper limb trauma surgeon, including complex elbow dislocations with elbow instability. Patient follow-up was 2, 6, 12 weeks post-operatively with average final follow up at 6 months. Range of movement and MAYO elbow score were assessed at the 12 week review. Results: Cohort of 11 patients: seven terrible triad injuries, two open fractures, one trans-olecranon fracture dislocation and one elbow dislocation with gross instability. All had an articulated external fixator consisting of an elbow-hinge motion-unit, two ulna and three humeral HA coated pins and linking rods. Six (54.5%) patients had regained an unrestricted range of movement. Two (18%) had a range of 40-120 degrees and two (18%) a range of 60-120 degrees. One patient had significant stiffness following fixator removal at time of presentation. 91% of patients have shown good/excellent elbow function on MAYO elbow performance score (85-100 points). Average MAYO elbow performance score was 90. Conclusion: This case series demonstrates early optimistic data in the use of specialised hinged elbow external fixator as in the management of complex elbow trauma allowing early mobilisation, shortened recovery and good functional outcomes.

#### Abstract no.: 39287 HINGED EXTERNAL FIXATION FOR REGAN-MORREY TYPES I AND II FRACTURES AND FRACTURE-DISLOCATIONS Salvatore D'AMICO, Alberto CASTELLI, Giacomo STRIGINI, Francesco BENAZZO

The purpose of this study is to evaluate the use of hinged external fixation in patients with elbow dislocations associated to Regan-Morrey types I and II coronoid fractures. We treated 11 such patients (8 male and 3 female, mean age 41 years) between 2009 and 2011 by applying a hinged external fixator an average of 2-3 days after the injury. All patients initially underwent pre-operative clinical examination (ROM, lateral pivot shift test, varus-valgus stress test), radiographic examination, and CT scan. Clinical and radiographic examinations were repeated 1 month, 3 months and 6 months after the operation. We evaluated the results by using the Mayo Elbow Performance Score, a functional assessment scale that rates four parameters: pain, ROM, stability and function. The results were 'excellent' in nine patients (8: 100/100, 1: 90/100) and 'good' in two patients (80/100). None of the results were 'fair' or 'poor'. Radiographic examination showed osseous metaplasia involving the anterior medial side in 6 out of the 11 patients. None of the patients had residual compartment instability. The benefit of using hinged external fixation to treat of Regan-Morrey types I and II coronoid fractures is that it avoids the lengthy process involved in Open Reduction Internal Fixation and capsular ligament reconstruction. Indeed, external fixation improves stability, allows for early mobilization, prevents soft tissue retraction and increases the ROM. We therefore consider the use of hinged external fixation of the elbow to be a viable option in the treatment of Regan-Morrey types I and II fracture-dislocations.

# Abstract no.: 41529 CLINICAL, FUNCTIONAL AND RADIOLOGICAL OUTCOMES FOLLOWING HERBERT SCREW FIXATION OF CAPITELLAR FRACTURES

Chirag BHATIA, Srikiran THALANKI, Rajesh GOEL, Avinash RAI, Ashwin GONDANE, Sumer SINGH

Capitellar fractures account for 1% of elbow fractures. As the complex nature of capitellar fractures has become better appreciated, treatment options have evolved from closed reduction, immobilisation and fragment excision to a preference for open reduction and internal fixation with Kirschner wires, cannulated cancellous screws and Herbert screws. Between july 2012 and august 2014, 20 patients with displaced fractures of the humeral capitellum were treated by open reduction and internal fixation of the capitellar fragments with Herbert screws in government medical college, kota. The mean follow-up period was 13 months (range 6-24 months) and the mean age was 35 years (range 20-48 years). All patients were evaluated according to the Mayo elbow performance score. Overall, in sixteen patients results were found to be excellent and that of four were good. All patients were satisfied with the operative outcome and had a stable pain-free elbow with good range of motion at follow-up without any avascular necrosis or arthritic changes. The mean extension of the elbow was 10° (range 0-20°) and the mean flexion was 130° (range 128-135°). They all had full pronation and supination and had good stability; however, none of them had residual pain. Treatment of capitellar fractures by Herbert screw leads to minimal articular damage and rigid fixation with solid union and excellent compression as well as early mobilization. Encountering a free capitellar fragment and nonunion should not discourage the use of internal fixation, as avascular necrosis is less likely to occur with good fixation and early mobilization.

# Abstract no.: 39074 COMPARISON BETWEEN CONSERVATIVE TREATMENT AND PLATING IN MANAGEMENT OF FRACTURE OF SHAFT OF ULNA Boujaylah AQWUYIDIR

5 women and 24 men, 18 patients stay one day, 8 patients discharged in the same day of admission, and last 3 patints stay in hospital for 2 days. 13 fructures were in distal third, 5 fructures were in mid shaft, and 4 fructures were in proximal third. No data found about site of fracture in 7 patients. 9 patients admitted because of fighting, 11 patients admitted due to fall down, 3patients Admitted with history of RTA. Mechanism of trauma was not known in last 6 patients. Mean of follow up period is 6 months. Even though 3 cases have been readmitted, but only one case operated for fracture fixation. In other 2, conservative treatment have been continued. One woman and 14 men operated for fixation of shaft of ulna by plate. Their age range from 21 yrs to 60 yrs, mean of their age is 32 yrs. They stay in hospital 3 to 18 days. Mean of their stay is 8 days. Postoperative duration range from 1 to 13 days Mean of postoperative duration is 5 days. Two fractures are open, remainder are close. Two fractures admitted because of nonunion, other admitted as case of new fracture because of new trauma. Three cases are montegia fractures, remainder are isolated shaft ulna fracture. mean of follow up period is 7 months. Only one case readmitted because of plate failure. Conservative treatment can lead to accepted result in treatment of fracture of shaft of ulna as plate

#### Abstract no.: 41028 VOLAR PLATE FIXATION IN THE TREATMENT OF DISTAL RADIUS FRACTURES

Bruno CORREIA, Álvaro BOTELHO, Maria Miguel CARVALHO, Pedro MARTINS, Filipe MEDEIROS

Volar plate fixation with a meticulous surgical technique achieving a stable restoration of the anatomy and an earlier rehabilitation promotes good functional results and prevents the development of late radiocarpal osteoarthritis. The authors study is about 174 patients treated between January 2009 and January 2013. The main indication was for fractures A3, B3 and C, in the AO Classification. Clinical results were evaluated using the Mayo Wrist Score. AP and lateral radiographs were carried out in the post-operative period, at 6 weeks and then at 3, 6, 12 and 24 months. Every year, the subjective grade of satisfaction was evaluated. The results and complications are presented in our series, with a mean follow-up of 24 months. We think that a low profile locking volar plate provides a good long term function. A sound surgical treatment is mandatory to prevent complications.

# Abstract no.: 42373 CURATIVE EFFECT COMPARISON OF DISTAL RADIUS FRACTURES TYPEC: VOLAR LOCKING PLATE VERSUS EXTERNAL FIXATION AND SUPPLEMENTARY K-WIRES FIXATION Dong WANG

[OBJECTIVE] : Comparison curative effect of two kinds operation modes of distal radius fractures type C (complex joint fracture of AO/ASIF classification): volar locking plate (LCP) versus external fixation and supplementary K-wires fixation. [METHODS] : Patients visit Shanxi Medical University Hospital Second Hospital because of distal radius fractures type C are selected, from 2012 January to 2014 July. Total of 54 patients, 37 cases were treated with volar locking plate, and others were treated with external fixation and supplementary K-wires fixation. All 54 patients were guided for regular function exercise and available at follow up with mean duration of 16 months (13~20months).

RESULTS] : Comparison radial incline, inclination and height, ulna variance of two groups patients, there were no significant differences in X-ray performance(p>0.05).Wrist flexion, extension, ulnar deviation, radial deviation, pronation, supination and Gartland-Werley score compared explain two groups had no significant differences(p>0.05). Four patients occurred postoperative complications in group LCP : two cases of extensor tendon injury , one case of nerve injury and one case of CRPS; Two cases occurred postoperative complication, two groups of patients had no significant differences in the complication rate (c2=0.01, P=0.92). [CONCLUSION] : In the treatment of such fractures, two kinds operation modes both have their advantages and disadvantages, including adapting the special fracture type and postoperative complication modes has no significant difference in the wrist joint function recovery, both can be applied to such fractures. When surgeons planning the treatment prescription, must individual and specific, the type of fracture, bone and soft tissue situation, the willingness of

# Abstract no.: 39607 COMPARATIVE STUDY BETWEEN ANATOMIC SINGLE BUNDLE(ASB) AND ANATOMIC DOUBLE BUNDLE(ADB) ANTERIOR CRUCIATE LIGAMENT (ACL) RECONSTRUCTION Ahmed GAD, Ahmed REZK, Ahmed AZIZ

Purpose: Prospective randomized trial comparing outcome of (ADB) with hamstring tendons to (ASB) ACL reconstruction. Methods: 40 patients with torn ACL divided into two groups. First group underwent ASB reconstruction with femoral and tibial biodegradable interference screw fixation, while second group underwent ADB reconstruction using endobuttons for femoral fixation & interference screws for tibial fixation. Selection criteria: Age: 20 to 40 years, normal contralateral knee, no previous ipsilateral nor contralateral knee surgery, no other associated ligamentous or chondral injuries. Postoperative clinical evaluation using the Lysholm score and International Knee Documentation Committee (IKDC) score & instrumented anterior laxity measurements using KT-1000 arthrometer. Postoperative kinematic motion analysis comparing operated and contralateral limbs regarding knee extension moment and inernal tibial rotation angle using the motion analysis system (Qualisys, Inc, Gothenburg, Sweden). Results: Lysholm score showed no significant differences between both groups. Manual knee laxity testing & KT-1000 measurements revealed better results in the DB group than in the SB group, but with no significant statistical difference. Statistical analysis showed no significant difference regarding all of the modified IKDC between the 2 groups. Postoperative kinematic motion side to side differences analysis of operated and contralateral limbs of both groups revealed a statistically significant difference between both groups regarding the knee extension moment (p=0.04) but not with internal tibial rotation angle (p<0.05). Conclusion: This randomized controlled trial showed no significant differences between ADB and ASB ACL reconstruction techniques regarding anterior and rotational stability, or objective and subjective evaluation on short term follow up period

# Abstract no.: 40919 OUTCOME OF ACL RECONSTRUCTION BY USING BONE PATELLAR TENDON BONE GRAFT THROUGH MINI-ARTHROTOMY TECHNIQUE Irfan MEHBOOB, Zubair KARIM, Muhammad Abdul BASIT

Objective: To evaluate Functional outcome of ACL reconstruction by using bone patellar tendon bone graft through mini-arthrotomy technique. Methods and materials: This descriptive case series study was conducted at Lahore General Hospital, from Jan 2012 to Dec 2014, through non-probability purposive sampling, 50 cases of ACL injury were included. All fifty patients were managed by ACL reconstruction by using bone patellar tendon bone graft through mini-arthrotomy technique. All patients were operated under tourniquet control and knee immobilizer was applied post operatively. Straight leg raise was started at second post-operative day. Function outcome was assessed by using Lysholm score after one year of follow up. Results: The mean age of all patients was 30.28 years (range 18-40years). There were 46(92%) male and 4(8%) female patients. All patients included in this study had grade III ACL injury. Right knee was involved in 27(54 %) patients and left knee was involved in 23 (46 %) patients. Average Lysholm score was 90.8 %. Lysholm score was excellent in 17 (34%) patients, good to excellent in 18 (36%) patients, fair to good in 12 (24%) and fair in 3 (6%) patients. Anterior knee pain was reported by 4 (8%) patients. No infection was seen in our study. After one year, average knee flexion was 128.2 degrees. Only, 2 (4%) patients showed loss of extension greater than 3 degrees .Conclusion: Mini-arthrotomy technique by using bone patellar tendon bone graft is very effective technique for the management of ACL injuries as it has got good functional outcome.

# Abstract no.: 41934 THE AUGMENTATION VERSUS THE STANDARD TECHNIQUE FOR THE RECONSTRUCTION OF PARTIAL ANTERIOR CRUCIATE LIGAMENT TEARS

Stefan MOGOS, Ioan-Cristian STOICA, Nicolae MIHAILIDE, Rudolf VEICHEL, Radu ORFANU, George VISCOPOLEANU

Purpose: To compare short term outcomes of the augmentation technique with the standard ACLR in the treatment of partial anterior cruciate ligament (ACL) tears. Methods: This study retrospectively analyzed 53 pacients, who underwent ACLR in our hospital between January 2012 and December 2013, with a minimum follow-up period of 1 year. There were 26 patients in the study group, who underwent ACL augmentation and 27 patients in the match-paired control group, who underwent standard ACL reconstruction. The International Knee Documentation Committee (IKDC) examination form, the IKDC subjective evaluation form, the Lysholm score, stability assessments (Lachman test, pivotshift test, and Rolimeter side-to-side differences) and range of motion (ROM) were used for evaluating the outcomes both preoperatively and at the last follow-up. Tibial tunnel widening was assessed using lateral knee radiographs. The presence of symptomatic cyclops lesions was noted for both groups. Results: There were no significant differences in the postoperative IKDC forms, Lysholm score, ROM and the incidence of cyclops lesions between the two groups. The stability assessement was statistically significant better in the study group as measured by the Rolimeter testing, the Lachman test and the pivot shift test. Tibial tunnel enlargement was less important in the study group. Conclusions: The current study showed that the short-term clinical outcomes of patients who underwent ACLR using the augmentation technique are superior in terms of stability assessment to those of patients with standard ACLR. Remnant preservation may decrease the enlargement of the tibial tunnel, thus contributing to easier ACL revision surgery.

# Abstract no.: 42129 RELATIONSHIPS BETWEEN STATIC LAXITY AND DYNAMIC KNEE FUNCTION AFTER ACL RECONSTRUCTION Yong MA

Background While static laxity measures are often employed to evaluate function of the anterior cruciate ligament (ACL) reconstructed knee, little is known about the relationships between static laxity and dynamic knee function. This study compared traditional static laxity assessment to high-accuracy three-dimensional knee kinematics during functional activities using dynamic stereo x-ray (DSX) analysis. Methods Twenty-three subjects (37.1±11.2 years old; 8 women, 15 men) were evaluated one year after ACL reconstruction. Knee kinematics were assessed during downhill running using a 250 frame/s DSX system to determine tibiofemoral translations/rotations and functional graft elongation. Residual static laxities of ACL reconstructed knees were measured using a KT-1000 arthrometer using manual maximum force. Subjects were divided into 2 groups according to the side-to-side difference (SSD) in knee laxity. The low-laxity group (n=12) consisted of subjects with SSD laxity less than 3mm. The high-laxity group (n=11) had SSD laxity of 3 mm or more. Results No significant differences were found between reconstructed and contralateral (uninjured) limbs of the low-laxity group for any of the kinematic measures. In the high-laxity group, reconstructed knees were significantly more externally rotated (mean difference 3.7°) across time points in all subjects (p= 0.023). No significant differences were found for the remaining kinematic variables. There were no side-to-side differences in percent graft/ACL elongation (relative to length at footstrike) in either group. No significant correlations were found between absolute knee laxities and maximum values of kinematics data (p-value range 0.102-0.775). Conclusion Static laxity measures (such as the KT-1000) may have some value as a screening tool for identifying subjects more likely to have abnormal kinematics. Static laxity, however, should not be considered as a surrogate measure for dynamic joint stability. anterior cruciate ligament (ACL); reconstruction; kinematics; knee stability; residual laxity; KT-1000

# Abstract no.: 42258 THE CAUSES OF FAILURE OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Chun ZENG, Daozhang CAI, Jianying PAN, Chang ZHAO

Object: To identify the causes of failure of anterior cruciate ligament reconstruction (ACLR) and correct technical errors. Methods: From June 2008 to June 2014, 38 cases of revision ACL reconstruction, including 29 males and 9 females, aged 19-51 years (mean 31 years), were reviewed retrospectively to find factors leading to the failure of primary ACLR surgery. Results: factors leading to the failure include: graft selection, error in surgical technique, infections, improper postoperative rehabilitation, failure of graft incorporation, and recurrent trauma. In 12 cases, the failure is caused by two or more factors. Poor tunnel placement is the most common reason of failure (25 cases). The other factors included: failure of graft incorporation 4 cases, stiffness of joint after open surgery 3 cases, infections 4 cases, stiffness of joint caused by improper postoperative rehabilitation 6 cases, recurrent trauma 3 cases. Conclusion: Technical errors were the main factors leading to instability after primary ACL reconstructions, in which nonanatomic femoral and tibial tunnel placement is the most common reason of failure. Appropriate postoperative rehabilitation has an important impact on the restoration of joint function.

#### Abstract no.: 41675 DOES DISCOID MEDIAL MENISCUS AFFECTS THE LOWER LIMB ALIGNMENT? Ahmed WALY

A discoid medial meniscus is a relatively rare pathology of the knee joint. It is usually bilateral and asymptomatic in children. However when it is torn it usually presents with locking, effusion, snapping and medial joint pain. Methods: A prospective case series study was performed in 5 patients (7 knees) between 2011 and 2014. Their mean age was 13.5 years old. All patients presented with symptomatic discoid medial meniscal tears. All patients were assessed clinically and in all of them there was a flexion deformity between 5-12 degrees. In all patients a long weight bearing whole lower limb view was done, and in all patients there was a valgus deformity (7-9 degrees). Arthroscopic evaluation was done and a central cleavage tear was found in all of them. Subsequent meniscoplasty was done. Patients were followed up to 12 months postoperatively. Results: At 4 weeks follow up, there was no flexion deformity in a single patient (p<0.05). After three months a long weight bearing whole lower limb view was done. In all patients innocent mechanical axis achieved with no residual valgus present. Same results were constant for the whole follow up period. The Lysholm score improved from 64 to 89 at first follow up and to 96 at final follow up (p<0.05). Conclusion: Discoid Medial meniscus does affect the whole limb alignment in both coronal and sagittal planes.

# Abstract no.: 40045 ARTHROSCOPIC ALL INSIDE MENISCAL REPAIR VERSUS INSIDE OUT REPAIR : A COMPARATIVE STUDY

Amr RASHWAN, Ahmed GALAL, Alaa Eldin SOLIMAN

Long term results after major menisectomies were disappointing that is why meniscal repair has become increasingly popular over the past 2 decades due to the better understanding of the biomechanical and functional properties of the intact meniscus in relation to the knee mechanics and patient outcome. A prospective comparative study including 30 patients divided into two groups (A and B) suffering from meniscal tears in the red or the red/white zone with the exclusion of tears associated with ACL injuries or other knee pathologies. For group A all inside repair using fastfix anchors while for group B inside out repair was performed.Both groups had been evaluated clinically using IKDC scoring system and radiologically using MRI at the 10th month postoperatively for evaluation of healing. Results had shown better IKDC scores in group A than in group B yet the results were not statistically significant. regarding the healing of the meniscal repair using MRI on the 10th month postoperatively better results were dtected in group A than in group B yet statistically insignificant.

# Abstract no.: 41380 ARTHROSCOPIC TREATMENT OF THE POSTERIOR ROOT TEARS OF THE LATERAL MENISCUS

Ning LIU, Yuqiang LIU, Xupeng WANG, Bin HU

Objective To discuss the diagnosis and suture techniques of the lesion of the posterior root of lateral meniscus. Methods From March 2011 to December 2014, 27 patients with the lesion underwent arthroscopic treatment which was typed into four. A-type: avulsions of posterior root. B-type: radial tears with meniscofemoral ligament intact. This type was divided into two subtypes, which included Ba-type (tears perpendicular to the longitudinal axis of meniscus) and Bb-type (tears obliquely intersect to longitudinal axis). C-type: radial tears with meniscofemoral ligament injury. D-type: longitudinal tears between meniscus and meniscofemoral ligament. 6 patients underwent partial meniscectomy, while the remaining 21 patients underwent meniscus suture. 5 A-type patients underwent Transosseous pull-out technique. 12 B- and C-types patients underwent edge stitching with shoulder joint suture technique or/and Fast-Fix360. 4 D-type patients underwent vertical mattress suture with suture or Fast-Fix360. Results The periods of follow-up ranged from 3 to 48 months. The degeneration was found in the lateral compartment of the 6 patients who underwent meniscectomy. Satisfactory results were brought in remaining 21 patients. MRI showed positive findings preoperatively. The vertical line was absent in the coronal plane, or ghost meniscus sign was present in the sagittal plane in A-, B- and C-types. The gap was found in the sagittal plane between meniscus and meniscofemoral ligament in D-type. All signs were disappeared during follow-up. Conclusions Root lesion is serious meniscus injury. Transosseous pull-out and edge stitching technique are effective in repairing the lesion.

#### Abstract no.: 39499 THE TREATMENT OF MENISCAL INJURIES USING ARTIFICAL MENISCAL IMPLANT ACTIFIT Ion Bogdan CODOREAN, Stefania TANASE, Florin DIACONU, Eduard

CERNAT

The lack of meniscal tissue increases the risk of early cartilage deterioration. Classic treatment includes suturing and partial menscectomies, total meniscectomies being abandoned. Modern treatments are based on the implantation of special scaffolds that replace some of the lost meniscal tissue. We present the results of a retrospective study, in which a total of 9 patients (6 men and 3 women, mean age: 28.28 (21-38)) were enrolled. All patients had undergone surgery between March 2013- September 2013 and the follow-up period was at least 18 months. All patients have had previous surgery and were subjected to arthroscopic treatment with a biodegradable scaffold (Actifit®). They received KOOS (Knee Injury and Ostheoarthritis Outcome Score), Lysholm and Tegner score. The Tegner score was not very useful in determining the success or failure of the surgery. The Lysholm and KOOS score results improved at the 18 months follow-up. The Actifit® scaffold is safe and effective in treating meniscal defects.

#### Abstract no.: 39325

# ADJACENT SEGMENT DEGENERATION VERSUS DISEASE AFTER LUMBAR SPINE FUSION FOR DEGENERATIVE PATHOLOGY: A SYSTEMATIC REVIEW WITH META-ANALYSIS OF THE LITERATURE Chao ZHANG, Sigurd BERVEN, Michael WEBER

Background: Arthrodesis remains a common intervention for the surgical treatment of degenerative spinal disease. Clinical studies have demonstrated variability in the rates of adjacent segment pathology after lumbar fusion. The objective of this study was to review the published literature and to estimate rates and risk factors for adjacent segment degeneration (ASDeg) and adjacent segment disease (ASDis) after lumbar fusion. Methods: A Systematic review and meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines on the incidence of fusion for lumbar degenerative pathology at the adjacent segment after previous surgery. We searched MEDLINE, EMBASE, Cochrane Library, and CINAHL databases for articles through to May 2012. Thirty one articles with 4206 patients were selected. Extracted data included average patient age, average time to follow-up, type of intervention, potential risk factors and ASDeg and ASDis incidence. Funnel and forest plots were used to describe heterogeneity and meta regression to estimate pooled incidence of ASDeg and ASDis. Results: A total of thirty one articles with 4206 patients were included for analysis. Combining all extractable data, the overall pooled incidence of ASDeg was 5.9% per year (95% CI- 4.8%, 7.2%), and ASDis was 1.8% (95% CI-1.3%, 2.4%) per year. The incidence of ASDeg is higher with more motion segments. Gender, age, segmental sagittal alignment, fusion methods and instrumentation were not associated with an increased risk of ASDeg or ASDis. Radiolographic ASDeg did not show strong correlation to clinical outcomes.

#### Abstract no.: 40328

#### IS FACET JOINT TROPISM DEVELOPMENTAL LUMBAR OR SECONDARY TO REMODELLING CHANGES? AN INTERNATIONAL, LARGE-SCALE MULTICENTER STUDY BY THE AOSAP COLLABORATION CONSORTIUM

Dino SAMARTZIS, Jason Pui Yin CHEUNG, Shanmuganathan RAJASEKARAN, Yoshiharu KAWAGUCHI, Shankar ACHARYA, Mamoru KAWAKAMI, Shigenobu SATOH, Wen-Jer CHEN, Chun-Kun PARK, Chong-Suh LEE, Thanit FOOCHAROEN, Hideki NAGASHIMA, Sunguk KUH, Zhaomin ZHENG, Richard CONDOR, Manabu ITO, Motoki IWASAKI, Je Hoon JEONG, Keith Dip Kei LUK, Bambang PRIJAMBODO, Amol REGE, Tae-Ahn JAHNG, Zhuojing LUO, Warat Anant TASSANAWIPAS, Rohit POKHAREL, Yong SHEN, Takui ITO, Zhihai ZHANG, Janardhana AITHALA, Gomatam Vijay KUMAR, Rahyussalim Ahmad JABIR, Saumyajit BASU, Baojun LI, Vishal MOUDGIL, Ben GOSS, Phoebe SHAM, Richard WILLIAMS

INTRODUCTION: Facet joint tropism is asymmetry in orientation of the bilateral facets. Some studies have shown that tropism may increase the risk of disc degeneration and herniations, as well as degenerative spondylolisthesis (DS). It remains controversial whether FJT is a pre-existing developmental phenomena or secondary to progressive joint remodeling. The following study addressed the occurrence of FJT of the lower lumbar spine (i.e. L3-S1) in a degenerative spondylolisthesis patient model. METHODS: This was an international, multi-center cross-sectional study of 267 patients with single level DS recruited from 33 spine institutes in Asia Pacific. FJT (≥8 degrees asymmetry) was assessed on MRI from L3-S1 and in relation to the level of DS. Patient demographic were noted and assessed in relation to FJT of each lumbar segment. RESULTS: 65% were females (mean age of 63 years; mean BMI: 26 kg/m2). FJT was present in 31.3% to 50.6% of DS levels. FJT involved 33.3% to 58.8% of the one or two non-DS levels adjacent to the DS level. Patient demographics were not found to be significantly related to FJT at any level (p>0.05). CONCLUSION: To the authors' knowledge, this is one of the largest studies conducted, in particular in an Asian population, addressing the "origins concept" of FJT. Although levels with DS were noted to have FJT, adjacent levels with no DS also exhibited tropism and were not related to age and other patient demographics. This study suggested that FJT may have a pre-disposed orientation.

## Abstract no.: 40323 T1 RHO MRI QUANTITATIVE PROTEOGLYCAN PROFILING OF LUMBAR DISC DISPLACEMENT

Dino SAMARTZIS, Henry PANG, Edward Sai-Kam HUI, Cora BOW, Jason Pui Yin CHEUNG, Ari BORTHAKUR, Jaro KARPPINEN, Nozomu INOUE, Keith Dip Kei LUK, Kenneth Man-Chee CHEUNG

INTRODUCTION: Controversy exists whether disc displacement is associated with disc degeneration, and in vivo proteoglycan concentration of disc displacement is speculative. Signal intensity on T2-weighted (T2W) MRI provides a qualitative snap-shot of disc integrity, but is not reliable and lacks quantification. T1-rho MRI of the discs is shown to quantitatively represent proteoglycan concentration. This imaging study addressed the "proteoglycan profile" of lumbar disc displacement and level-specific cut-off values associated with its development in human. METHODS: 76 volunteers (mean age: 50.6 years; 51.3% males) underwent T2W and T1-rho MRI of the lumbar spine. The degree of disc displacement was assessed at each level based on sagittal T2W MRI. T1-rho values were obtained of each disc. Inter-observer reliability was conducted of all MRI assessments. RESULTS: 380 lumbar discs were assessed. High reliability of imaging measurements was noted. Overall, 50% of the discs had disc displacement, most prevalent at L4-S1. The median T1-rho values for overall lumbar non-displaced discs was 77.6ms compared to 64.5ms for displaced discs (p<0.001). Significant median levelspecific and optimal threshold T1-rho values for non-displaced discs vs. displaced discs were identified. DISCUSSION: This is the first study in humans to quantitatively assess the "proteoglycan profile" of lumbar disc displacement. A decrease in proteoglycan concentration on T1-rho MRI was noted in the presence of disc displacement at all disc levels. Level-specific values have been identified that may have predictive utility at the index or adjacent disc levels as well as aid in the classification, etiology and therapeutics of disc displacement.

#### Abstract no.: 40314 NOVEL "UTE MRI DISC SIGN" (UDS) AND ITS CLINICAL RELEVANCE

Dino SAMARTZIS, Henry PANG, Edward HUI, Cora BOW, Jason Pui Yin CHEUNG, Ari BORTHAKUR, Nozomu INOUE, Jaro KARPPINEN, Hai Qiang WANG, Keith Dip Kei LUK, Kenneth Man-Chee CHEUNG

INTRODUCTION: Ultra-short time-to-echo (UTE) MRI assesses short T2 components. Our groupWe identified a new imaging biomarker on UTE - the "UTE Disc Sign (UDS)". This study aims to assessed the UDS prevalence, association with other MRI phenotypes as well as pain/disability profiles. METHODS: 76 Southern Chinese subjects were recruited (51.3% male; mean age: 50.6 years) for T2W, T1-rho and UTE MRI of the lumbar spine (n=380 discs). T2W MRI was used to assess disc degeneration and other phenotypes, and T1-rho MRI was implemented to obtain quantitative proteoglycan disc profiles. UDS was detected on UTE as a hyper- or hypo-intense band across a disc. Subject demographics, pain and disability profiles were obtained. RESULTS: The UDS was noted in 25% subjects (57.9% males; mean age: 52.6 years). 80% UDS occurred at the lower lumbar levels (L3-S1). 26.3% had multi-level UDS. Subjects with UDS had significantly more disc degeneration, disc displacement, spondylolisthesis, and Modic changes (p<0.001). T1-rho values were lower in UDS discs than non-UDS discs (p=0.022). The majority of UDS could not be detected on T2W MRI. 88% of UDS individuals had LBP. Number of UDS disc levels significantly correlated with worse ODI scores (r=0.303; p=0.013), whereas traditional T2W degenerative grading did not (r=0.234; p=0.057). DISCUSSION: This is the first study to report "UDS" in humans. UDS is a novel imaging biomarker highly associated with spine degeneration and negative clinical profile. UDS serves as a new phenotype that broadens our understanding of degenerative disc changes and may have potential clinical utility.

# Abstract no.: 40559 FLUOROSIS AS A CAUSE OF COMPRESSIVE MYELOPATHY DUE TO OSSIFICATION OF LIGAMENTUM FLAVUM - A RARE ENTITY Saurabh SINGH, Hemant BANSAL, Samrat Smrutiranjan SAHOO, Vivek SRIVASTAVA, Kumar PRITESH

Background: Ossification of the ligamentum flavum is one of the main cause of narrowing of the spinal canal in the elderly population, a pathological condition that can cause neurological symptoms due to rigidity and compression of the spinal cord and nerve roots. We reported cases of slowly progressive thoracic spine compression secondary to ligamentum flavum ossification in elderly patient whose outcomes after surgical decompression were found to be favourable. Material and Methods: Diagnosis of our patients were established on the basis of clinical features, neurological examination, and radiological investigations (radiographs, CT scan, MRI). Out of 6 patients, two of our patients have features of skeletal fluorosis. En-bloc laminectomy decompression of the involved thoracic levels was performed in all cases. Preoperative neurological status was documented for the post operative comparison and for follow up by the Nurick grading system and Nurick grade recovery rate. Result: In all our patients there was postoperative improvement in Nurick grades. But the recovery in patients without features of fluorosis showed a dramatic improvent as compared to the patients with features of skeletal fluorosis in views of interval and amout of recovery. Conclusion: To conclude, ossification of the ligamentum flavum as cause of thoracic myelopathy is not a rare entity in Indian population. The pathological correlation with skeletal fluorosis may be done in views of multilevel involvement and association with other paravertebral ligament ossification. Preoperative Nurick grade and extension of involvement are important predictors of surgical outcome.

#### Abstract no.: 39215 RISK FACTORS FOR CHRONIC BACKACHE IN ADVANCED COUNTRIES Vasudeva S PAI, Vishal PAI

Introduction: This study describes the epidemiology of adult backache that are on compensation [ACC] in New Zealand. High-risk factors as recognised in backaches of more than 6 months on compensation. Material: All backaches of over 6 months on compensation in New Zealand from 2008 to 2013 among individuals aged 16-75 years were considered. This study was based on a consecutive 1001 assessed by a single surgeon. Compressive assessment and MRI/CT performed in all the cases. Analysed for 22 different variable and statistical analysed for probability using Chi Square. Results: The study included 1001, of which 636 were males. There were 188 people who has completed diploma or above qualification. Analysis showed statistical significant observations that chronic backache on compensation is related to educational status, smoking, psychological factors [yellow /black flags], number of surgery for back [>2 surgeries] and duration symptoms [>1 year] Conclusions: Back and spine impairments are the most common impairment among young and middle-aged people. Among the factors that do not contribute to long-term disability are: age, sex, residency, drinking, marital status, race, and velocity of injury. Socioeconomic [educational status], psychological factors, smoking and number of surgery for back and duration symptoms can be considered as risk factors associated in Chronic back aches over 6 months in advanced countries where compensation is readily available.

# Abstract no.: 39778 SPONTANEOUS IMPROVEMENT OF LUMBOSACRAL ALIGNMENT IN DEGENERATIVE LUMBAR DISEASE WITH SHORT FUSION: IT HAPPENS AND RELATES TO RECIPROCAL CHANGE Zezhang ZHU

Fail to restore PI-LL match may predispose to adjacent segmental disease after spinal fusion. The aim of this study is to evaluate the radiological improvement of lumbosacral malalignment post-operatively and during F/U in patients with short lumbar fusion. 47 consecutive patients undergoing short lumbar fusion were retrospectively reviewed. Inclusion criteria were as follows: patients undergoing lumbar fixation due to stenosis; with 2 or 3 fusion levels; aged over 45 years old; with follow-up more than 6 months; with longcassette standing films pre-operatively, post-operatively and at 6-month follow-up. Patients with lumbar fracture, spondylolisthesis, severe osteoporosis and hip disease were excluded. Radiological parameters including PI, pelvic tilt (PT), sacral slope (SS), lumbar lordosis (LL), PI-LL, lumbo-sacral angle (LFA) and thoracic kyphosis (TK) were measured. Significantly increased LL were observed immediately after surgery (37.6° vs. 27.7°, P=0.008), while expected normal PI-LL was not found immediately after surgery with an average value of 10.5°. Spontaneous improved LFA was also recorded compared to preoperatively increased value (7.5° vs. 10.6°, P<0.001). There were no significant differences between pre-operative and post-operative TK and PI (P>0.05). At the last follow-up, PI-LL and LFA spontaneously improved to normal with mean values of 6.3° and 3.1°, respectively. A spontaneous increase of TK was observed at last follow-up compared to pre-operative TK, mainly due to reciprocal changes of sagittal alignment. Short lumbar fusion could induce a spontaneous and reciprocal improvement of lumbosacral and thoracic alignment.

# Abstract no.: 39742 A CADAVER AND FINITE ELEMENT ANALYSIS OF NEW ANATOMICAL CERVICAL INTERBODY CAGE BASED ON ENDPLATE CURVATURES Fan ZHANG

Study Design: A finite element analysis of new anatomical cervical interbody cage based on endplate curvatures Objecitive To compare biomechanical properties between traditional cage and new cage. Summary of Background Data: Cage design is a significant factor in decreasing post-operative subsidence. However, none are based on cervical endplate curvature. Methods: A fresh-frozen human cadaveric spines (C2-C7) were studied which was harvested from a 35-year-old male. The observed level was C4/C5. Intact, specimen with two cages implanted were tested to evaluate biomechanical property like range of motion of C4/5, specimen stiffness in conditions of flexion, extension, left and right lateral bending, left and right axial rotation, together with axial loading. A finite element (FE) analysis based on the CT images of the specimen. Result: No significant difference was observed between the cadaver ROM and FE analysis (P>0.05). ROM of C4/C5 in the new cage group was less than in the intact and traditional cage groups in all directions except axial rotation. Implantation of the new cage promoted greater stiffness (e.g., flexion, extension, lateral bending and axial loading) as compared with the traditional cage. The stress on the endplate surface with the new cage was much lower than the traditional cage; furthermore, stress distribution seemed more uniform and much lower than the traditional cage. Conclusion: The new anatomical cage based on endplate curvature provides improved biomechanical properties as compared traditional cages, with the exception of axial rotation. The anterior plate can be eliminated since the new standalone cage provides cervical stability.

# Abstract no.: 40684 IS THE ZERO-PROFILE IMPLANT SUITABLE FOR MULTILEVEL ANTERIOR CERVICAL FUSION: AN INITIAL EXPERIENCE AND ANALYSIS

Lei LIANG, Huajiang CHEN, Wen YUAN

Objective: To investigate the evaluations of the Zero-profile implant in multilevel anterior cervical fusion. Methods: A retrospective study was conducted between June 2011and December 2013. Totaly 42 patients with multilevel (3 or 4-level) CSM who underwent ACDF were divided into either A group (14 patients, ACDF with Zero-profile implant prosthesis) or B group (28 patients, ACDF with traditional cage-plate system). A comprehensive comparison including the clinical, radiological and the economic evaluations were recorded and analyzed. Results: All the patients were followed up for at least 6 months (mean 18.5 months). There was no significant difference between two groups in terms of the JOA scores improvement (8.41±1.59 to 14.06±1.25 and 9.34±2.18 to 14.75±1.53 respectively), the fusion rate at 6 months [85.71%(12/14) and 92.86% (27/28) respectively]. The A group was associated a statistical lower dysphagia rate (42.86% (6/14) compared with 75%(21/28)) and a higher SWAL-QOL scores (55.20±7.23) to 64.17±3.37 compared with 51.09±1.99 to 59.07±4.51) in the first 2 months. However, the rate of lordotic curvature (7.78°±3.4° to 12.30°±5.8° and 8.12°±4.1° to 15.56°±2.9° respectively) and the NDI scores improvement (12.75±3.46 to 5.86±2.87 and 13.26±4.20 to 4.19±1.66 respectively) were evidently lower in A group while as the mean cost of the implants was almost 1.5 times (135000/92000 Yuan) higher than B group. Conclusion: The primary results suggest the Zero-profile implant may be optional but not superior to the additional plate fixation procedure for multilevel anterior cervical fusion because it is helpless for lordosis reconstruction.

#### Abstract no.: 40928 CONSERVATIVE VERSUS SURGICAL TREATMENT FOR SPONDYLOLISTHESIS Abdulrahman ALGARNI

Background: Degenerative spondylolisthesis is a common problem and cause of low back pain that cause restriction of daily activities, Objective: To compare conservative and surgical approaches in the treatment of spondylolisthetic patients and to determine the main indications for surgical treatment. Method: The present study included 40 patients divided into two groups. Group 1 (mean [± SD] age 48.2±6.59 years) followed a physical therapy program of exercise involving stretching exercises for the back, hamstring, gastrocnemius and iliopsoas muscles and strengthening exercises for the abdominal muscles. Patients attended three sessions per week for three months. Group 2 (mean age 47,95+5.12 years) underwent surgery involving only fixation of the slipped vertebra with the above and below vertebrae. Outcome measures were the lumbosacral angle, measured using a lateral loading X-ray view to detect any change in lordotic curve: range of motion of trunk flexion, measured using the fingertip to floor test and tape measurement; and pain severity, measured using a visual analogue scale. Results: There was a significant difference between p-e and post-intervention measures in the group 1, more so than in group 2 (pain, P=0.000000001; range of motion, P=0.00000000001; lumbosacral angle, P=0.0000001). Discussion and conclusion: A therapeutic exercise program may be recommended for sporzdylolisthetic patients as an alternative to surgical intervention, which is indicated only in cases involving bowel or bladder disturbances.

# Abstract no.: 42354 TREATMENT OF KÜMMELL'S DISEASE VIA TRANSPEDICULAR SUBTRACTION AND DISC RESECTION OSTEOTOMY Xuesong ZHANG

Purpose : to present the radiographic and clinical results of transpedicular subtraction and disc resection osteotomy in Kümmell's disease with neurological deficits. Methods: transpedicular subtraction and disc resection osteotomy was performed on 12 patients with Kümmell's disease with neurological deficits. Mean follow-up period was 24 months. Results: The average operation time was 148 minutes (range, 100-220 minutes). The mean intraoperative blood loss was 625 ml (range, 450-850 ml) The Cobb angles decreased from 39±3.48 degrees (range, 33-45 degrees) preoperatively to 2.21±2.73 degrees (rang, -2-8 degrees) postoperatively, the difference was statistically significant (p<0.01). The mean visual analog scale reduced from preoperative 7.17 ±1.27 degrees (range, 5-9 degrees) to 1.17 ±1.03 degrees (range, 0-3 degrees) at final follow-up (p<0.01)(Table2). Solid fusion was achieved in all patients at the final follow-up according to radiological evidence. Conclusions: Transpedicular subtraction and disc resection osteotomy for treatment of Kümmell's disease with neurological deficits is a technically demanding for the procedure. However, it achieves satisfactory kyphosis correction and good fusion than other approaches. Our results suggest it is efficient for Kümmell's disease with neurological deficits.

# Abstract no.: 42353 SELECTIVE DECOMPRESSION OF NERVE ROOT UNDER DIRECT VISION FOR DEGENERATIVE LATERAL LUMBAR SPINAL STENOSIS IN ELDERLY PATIENTS Shiqing FENG

Purpose: The aim of this study was to evaluate the safety and efficacy of selective decompression of nerve root under direct vision in patients aged more than 65 years old with lumbar spinal canal stenosis (LSS). Methods: 161 patients were enrolled, which were divided into two groups: open decompression (80 patients) and selective decompression (81 patients). All patients were followed for at least 1 year and clinical outcomes were assessed using Visual Analog Scale pain scores (VAS), Oswestry Disability Index (ODI), and MacNab criteria preoperatively, 6 months postoperatively, and at the final follow-up. Results: Operation time, blood loss, and duration of hospitalization were significantly lower in selective decompression group (p < 0.05 for each measurement). The VAS and ODI were measured preoperatively, 6 months postoperatively, and at the final follow-up while MacNab criteria was performed at the latter two point-in-time. VAS showed no difference at each point-in-time (p > 0.05 for each point-in-time) between the two groups, so did ODI and MacNab. VAS measured 6 months postoperatively (p < 0.05) and at the final follow-up (p < 0.05) showed significant decrease when respectively compared with pre-operation in each group, so did ODI. VAS presented no difference between the two postoperative point-in-time (p > 0.05 for each point-in-time) in each group, so did ODI and MacNab. Conclusions: Compared with open decompression, selective decompression of nerve root under direct vision provided satisfactory clinical outcomes with significant reduction in operation time, blood loss, and duration of hospitalization.

#### Abstract no.: 41649 THE MODIFIED METHOD OF A LUMBAR-SACRAL SPONDYLODESIS Andrei MAZURENKA, Aleksandr BELETSKIY, Sergei MAKAREVICH

Anterior fusion of the lumbar-sacral spine at heavy displacement of L5 is followed by great difficulties: to allocate the disk L5-S1 technically very difficult, the transplant is placed horizontally, it is affected by the cutting-off forces. We offered the modified fusion of L4-L5-S1. Transplant is established from L4 through L5 vertebra in a sacrum. Anterolateral access at the level of L4-5 is carried out. An iliac artery and a vein settle down out of a zone of work. Removal of the disk L4-5 is carried out. Then the groove through L5 vertebra body to a sacrum is formed. The top plate of a sacrum is cleared of sklerotic bone. The transplant is established in a groove and is densely hammered. The transplant settles down vertically and under the influence of axial loading. From 2007 to 2014 10 patients with a dysplastic spondylolisthesis of L5 are operated: men - 3, women - 7, age of 15-44 years. Displacement: III - 5, IV - 5. Two are earlier operated, the union isn't reached. Fixing of L4 – S1 at 7, iliac-pelvic stabilization at 3 patients was made. Then was carried out anterior fusion by the modified technique. In 8 cases the iliac crest bone, in 2 allobone was used. Results. Complications it wasn't observed. Results are studied in terms from 1 to 6 years. At all the pain syndrome is liquidated. Within 12 months formation of a bone union was observed, in 2 cases the union didn't come (CT-examination).

#### Abstract no.: 40479 A DIAGNOSTIC STUDY OF THORACIC MYELOPATHY DUE TO OSSIFICATION OF LIGAMENTUM FLAVUM Fabo FENG, Zhonggiang CHEN, Chuiguo SUN

Purpose: We set out to establish a MRI and CT-based diagnostic method for determining the responsible segments in thoracic myelopathy due to ossification of the ligamentum flavum (OLF). Methods: Forty-four patients who underwent surgery for treatment of myelopathy due to OLF were enrolled in this study as the myelopathy group. Forty-four patients who were identified through CT and MRI scans to have OLF but no definite neurologic deficits were included as the control group. MRI and CT examination were reviewed, and the degree of spinal canal compromise was graded on axial T2 weighted MRI. Anteroposterior spinal canal diameter were measured at the maximally stenosed level on axial and sagittal CT. The canal grade and the cross-section area-occupying ratio were measured and calculated on the CT scans. The diagnostic coincidence rates for the indices were then compared. Results: Cases of Grade IV were all in the myelopathy group while Cases of Grade II were all in the control group. The canal grade (paramedian) was the most relevant continuous variable with the largest JOA score (r=0.685, P<0.005) . A canal grade(paramedian) of < 60% can be used as a critical value for determining OLFinduced myelopathy (sensitivity and specificity, 95.5%). Conclusion: Canal grade (paramedian) can be used to quantify spinal cord deficits in thoracic OLF cases. Additionally, a canal grade (paramedian) of <60% on axial CT scan can serve as a critical value for diagnosing OLF-induced myelopathy, especially for Grade III compression on T2weighted MRI.

# Abstract no.: 40426 SIGNIFICANCE OF LIGAMENTUM FLAVUM HYPERTROPHY IN DEVELOPMENTAL SPINAL STENOSIS

Jason Pui Yin CHEUNG, Prudence Wing Hang CHEUNG, Dino SAMARTZIS, Vivian TAM, Victor Yu-Leong LEUNG, Kenneth Man Chee CHEUNG

Introduction: Developmental spinal stenosis (DSS) manifests as a narrowed spinal canal. These subjects are potentially at-risk of developing symptoms with smaller degrees of canal pathologies including ligamentum flavum (LF). However, its relationship is currently unknown. This study aims to address the association of DSS with LF hypertrophy in an attempt to better understand its clinical relevance and natural course. Methods: This prospective study consists of 31 patients who had surgical decompression (28 stenosis patients, 3 controls). Preoperative MRIs were used for anteroposterior spinal canal diameter measurement, which classifies patients having either developmental or degenerative spinal stenosis. Ligamentum flavum was collected during surgery for analysis. The degree of fibrosis is evaluated microscopically by Masson Trichrome staining. Results: There were 17 females and 14 males with mean age of 63.9 years. L5/S1 was most frequently degenerative. Spinal canal diameters can vary between the intervertebral levels within the same patient. Degrees of fibrosis vary between levels and between sides. For degenerative spinal stenosis, the degree of fibrosis significantly correlates with LF thickness. In DSS, the most narrowed spinal canal did not associate with thickening of the LF. Conclusions: For DSS, spinal canal can be relatively much narrowed, yet LF may not be greatly thickened with large degrees of fibrosis. This suggests that in DSS, symptoms can occur with a smaller degree of intracanal pathology. Fibrosis within hypertrophic LF is location and site-specific. Further analysis with immunohistochemistry can better delineate the associations between LF and DSS.

## Abstract no.: 40678 THE DIFFERENTIAL EFFECT OF MATRIX ELASTICITY ON CARTILAGE ENDPLATE-DERIVED STEM CELLS BEHAVIOR DURING DISC DEGENERATION Minghan LIU, Yue ZHOU

Despite intervertebral cartilage endplate exerts a pivotal role in disc degeneration, little is known about changes in stem cells derived from cartilage endplate (CESCs) and their regenerative potential with disc degeneration. Biomechanical extracellular matrix cues have recently been shown to play a crucial role on stem cell behavior, but with the process of disc degeneration, the effect of matrix stiffness on CESCs behavior is unknown. This work aims at understanding the CESCs behavior under mechanical cues with the process of disc degeneration. Atomic force microscopy (AFM) detects CEP matrix stiffness with different degeneration degree. In order to better understand the contribution of matrix stiffness to CESCs proliferation and differentiation, a polyacrylamide gels was developed with different Young's elastic modulus(EY) that mimicked the native stiffness of CEP tissue with different degeneration degree. Culturing CESCs on gels that mimicked the stiffness of young CEP tissue (normal, 35.2kPa) expressed highest genes responsible for stem cells than other gels and became guiescent. But as the gels that mimicked the mild degeneration of CEP tissue (72.5kPa), the cells significantly unregulated chondrogenicspecific genes. When the gels that mimicked the severe degeneration of CEP tissue (102.7kPa), the cells upregulated osteogenic-specific genes. As substrate stiffness increased, the cells became more spread and increased proliferation capacity. Together these data imply that with the process of disc degeneration, mechanical cues keep stem cells pools guiescent at early stage, promote repairing and restrain degeneration at middle stage (mild degeneration degree), accelerate degeneration at late stage (severe degeneration degree).

Date: 2015-09-19 Session: Free Papers Lumbar Spine I Time: 14:00 - 15:30 Room: Shenzhen Hall

# Abstract no.: 40981 EFFECT OF CORTICOSTEROIDS INFILTRATION ON THE SEDATION OF THE PAINFUL SYMPTOMATOLOGY IN THE LUMBAGO-SCIATICA: PROSPECTIVE STUDY OF 37 CASES Amine HAMZA, Chanez AIT ALI

Introduction: The lumbago-sciatica is a frequent reason of orthopedic consultation. The corticoids infiltrations represent the last therapeutic option before resorting to surgery. The objective of our study is to measure their effectiveness in the treatment of pain in rebels lumbago-sciatica. Material and methods: Prospective study including 37 patients with a lumbago-sciatica not responding to medical treatment well led. These patients have benefited from an infiltration of corticosteroids and we have evaluated the sedation of the pain by visual analog scale. Results: We noted a significant decrease of the painful symptomatology at Day 15, 30 and 90 respectively 30 %, 27% and 13 %. As well, 67% of patients declare themselves to be relieved by a single injection of corticosteroids and 21% by two injections. Patients facing surgery after failure of the second injection represent 12 %. Discussion: The lumbago-sciatica are commonly treated by the usual analgesics, nevertheless some of them are rebels to these therapies and then require the use of infiltration corticosteroids these may relieve the patient. Conclusion: Lumbago-sciatica is difficult to treat. This study demonstrated that the corticosteroids infiltration may be a good alternative for a sedation of the pain in more than 80% of cases by a simple gesture avoiding surgery.
## Abstract no.: 41349 ROLE OF END PLATE FAILURE IN SYMPTOMATIC LUMBAR DISC HERNIATION

Madan Mohan SAHOO, Sudhir MAHAPATRA, Jitendra SARANGI

Introduction: Classical theory for lumbar disc herniation implicates the rupture of annulus fibrous as the chief cause.But our study aimed to evaluate the role of end plate failure in the symptomatic patients.Material & Method:Classical MRI along with 3D-FSPGR sequence and CT scan were done in patients with symptomatic lumbar disc herniation. They were grouped into 'with bony end plate failure (Group-1)' & 'without (Group-2)'.All patients (single level L3-4/L4-5/L5S1 PIVD) initially treated conservatively for 6 weeks, who didn't respond underwent discectomy. Macroscopic & histologic studies of removed disc materials were also done. All patients were evaluated with SLR, VAS score, ODI at 3, 6 and 12 weeks. Result: Out of 57 patients with single level disc involvement in lumbar level, Group-1 had 39(operated-18, conservative-21) and Group-2 had 18(operated-2, conservative-16).Patients in both groups had no significant difference in terms of age, duration of pain aggravation and canal diameter. Group-1 patients had more pain and disability when treated conservatively(p>0.05). Upon surgery the difference was not significant (p<0.05).Outcome after surgerv was uneventful in almost all.Conclusion: This study shows that the incidence of EPJ failure has been grossly underrated probably because of the difficulty of documentation. Classical MRI sequences(T1&T2) are not very useful for revealing end plate failures. They can be evaluted with 3D-FSPGR Sequence and confirmation by thin slice CT scan, macroscopic and microscopic examination. This revealed the incidence of EP defect to be as high as 94.74% in our series. Pre-operative detection of endplate defect is important as removal of disc alone through fenestration is not enough and endplate needs to be addressed to relieve nerve impingement.

## Abstract no.: 41788 THE IDENTIFICATION OF STEM CELL IN THE DEGENERATIVE HUMAN NUCLEOUS PULPOSUS

Li XUEFENG, Jiang WEIMIN, Yang HUILIN

Introduction: to identify stem cell in degenerative human nuleous pulposus; Methods: we obtain cells from 10 surgical samples of human nucleous pulposus using 0.5% type II collagenase. Morphologic characters of these cells were observed and flow cytometry assaying was used to detect the surface markers such as CD90, CD29, CD105, CD34, CD45 and HLA-DR. By then, cells were induced towards adipose, osteocyte and chondrocyte. After induction, Oil red, Alizarin red and immunofluorescence staining were used to evaluate the differentiation. Results: stem cells can be extracted from human nucleous pulposus through digesting of 0.5% type II collagenase. It will take 7 days for these cells to reach adherence and 15days to reach confluence of 80%. After 3 passages, the polygonal cells gradually transformed into spindle-like cells. They had high expression of CD90, CD105 and low expression of CD34, CD45 and HLA-DR. After an induction of 21days, all the cells had positive Oil red, Alizarin red and immunofluorescence staining. Results: stem cells can be extracted from human degenerative nucleous pulposus by type II collagenase digesting and the study of these cells will provide a basis for further research into the mechanism and treatment of disc degenerative disease.

#### Abstract no.: 42295 A COMPARATIVE STUDY OF FULL-ENDOSCOPIC TECHNIQUE INTERLAMINAR APPROACH DISCECTOMY AND MICROENDOSCOPIC DISCECTOMY FOR THE SURGICAL TREATMENT OF L5/S1 DISC HERNIATION Qun YANG

Objective To compare the clinical outcomes of 2 different minimally invasive methodsfull-endoscopic (FE) technique interlaminar approach discetomy and microendoscopic discectomy (MED)-in the surgical treatment of L5/S1 disc herniation. Methods Data of 102 patients with L5/S1 disc herniation treated with 1 of 2 minimally invasive procedures between December 2010 and May 2012 were retrospectively analyzed. Patients were divided into 2 groups according to surgical method: the FE group (n = 38) and the MED group (n = 64). There were 17 males and 21 females in full-endoscopic technique group, with an average age of 34.7 years old (range; 20~45 years old). Meanwhile there were 30 males and 34 females in MED group, with an average age of 35.4 years old(range;23~44years old). There were no significant differences in the pre-operative data between the 2 groups (P > 0.05). Operating time; blood loss; time spent in bed after surgery; duration of postoperative hospital stay; visual analog scale (VAS) at 1 day and 1, 3, and 12 months after surgery; and oswestry disability index (ODI) at 1, 3, and 12 months after surgery ; intraoperative and postoperative complication were assessed and compared between the 2 groups results All patients were followed for a mean period of 21.1 months (range, 12-30 months). VAS scores at 1 day and 1, 3, and 12 months after surgery and ODI scores at 1, 3, and 12 months after surgery improved significantly postoperatively in both groups (P < 0.05). Operating time was longer in the FE group than in the MED group (P < 0.05). However, the FE group was superior to the MED group, with less blood loss, less time in bed, and shorter hospital stay (P < 0.05). VAS scores at 1 day was lower in FE group (P < 0.

#### Abstract no.: 41936 INTERSPINOUS STABILISATION AN EFFECTIVE AND SURE SURGERY STUDY OF THE FIRST 100 CASES OF "FLEXIS" WITH A FOLLOW UP HIGHER THAN 6 YEARS Sami KHALIFE

Study Design : Study the effectiveness and the stability of a new generation interspinous implant ("FLEXIS") in degenerative lumbar stenosis. Objectives : Understand the mechanism of stabilization and its positive effect on instrumented and adjacent levels Summary of Background Data : a new generation of dynamic interspinous device ("FLEXIS" made of three mobile components) has been developed. We present the first 100 cases implanted by the same team, with a follow up of more than 5 years. Methods : Surgery was performed after more than 6 months of traditional treatments without positive results. 55 men and 45 women with a 58 years middle age were operated between June 2005 and December 2007, and followed in consultation at 3 weeks, 3 months, 6 months, 12, 24, 36, 48 and 60 months after surgery . Functional and radiological results were reported. Results : The post operative outcome were always simple. There were no septic complications. There was 2per cent migration of the implants in the first cases by fracture of a spinous process before six months. The good results after 12 months were still stable after 5 years. All patients had better comfort after surgery. 46 patients resumed their former work ; 18 patients resumed an adapted or reduced work. Other patients were retired or in disability. Conclusion : The "FLEXIS" is a performing device, easy to implant, which ensures a very good stability while preserving a minimum of useful mobility.

#### Abstract no.: 40688 ANALYSIS OF OUTCOME OF TRANSLUMBAR INTERBODY FUSION IN THE MANAGEMENT OF SPONDYLOLISTHESIS Vamsi Krishna KOMMOJU, Dinesh CHOUDARY

Background: Severe low back pain due to spondylolisthesis of the lumbar vertebra is a commonly encountered orthopaedic problem, with an enormous socio economic impact. It is usually treated by spinal fusion together with rigid instrumentation. Several fusion methods have been reported for spondylolisthesis including posterolateral fusion, posterior lumbar interbody fusion, transforaminal lumbar interbody fusion, and anterior lumbar interbody fusion .The purpose of this study was to evaluate the results obtained in patients undergoing TLIF with pedicle screw fixation for the treatment of spondylolisthesis. Patients and methods : We conducted a single center prospective study on fifty patients admitted with spondylolisthesis who were managed with TLIF with pedicle screw fixation between the period of May 2013 and May 2015. Patients have been followed up clinically and radiologically for a period ranged from 12-24 months. Results :The mean VAS for back pain and leg pain decreased significantly and the average pre operative disc and foramen height improved considerably .By level, the posterolateral fusion was judged to be probably or definitely solid in 78% levels, whereas the interbody fusion was radiographically solid in 88% levels, for an overall 93% fusion success/patient (94%/level). Eighty-one percent of these patients reported a >50% decrease in their symptoms. However, a large percentage of patients experienced incomplete relief of their symptoms. Conclusions: TLIF is a safe procedure providing us with an useful alternative to the traditional PLIF. Complications resulting from the procedure are uncommon and generally minor and transient but frequently results in incomplete relief of symptoms

#### Abstract no.: 39300 LENKE 5C CURVES IN ADOLESCENT IDIOPATHIC SCOLIOSIS: ANTERIOR VS POSTERIOR SELECTIVE FUSION Dong YULEI, Zhao HONG, Weng XISHENG

Background: The optimal treatment of Lenke 5C curves in adolescent idiopathic scoliosis is still unclear. Objective: To compare the outcome and the spontaneous correction behavior between anterior and posterior selective fusion technique in a large case series.Methods: Demographic and surgical data for patients with Lenke 5C curves treated with anterior or posterior fusion was collected from July 2002 to September 2011. Cobb angles were measured pre- and postoperatively and at a minimum of 2 year follow-up. These parameters were compared between anterior and posterior fusion using a ttest.Results: 53 Lenke 5C adolescent idiopathic scoliosis cases with an average follow-up period of 4 years (range: 2-9.6 years) were included. Postoperative major thoracic curvature changes were similar between two groups. The minor thoracic curve demonstrated a higher spontaneous correction rate in the posterior group. At follow-up, The minor thoracic curve showed a greater loss of correction in the posterior group and finally both groups were comparable with regard of major and minor curve. Factors including surgical time, intraoperative blood loss, and complications were comparable between the two groups.Conclusion: Selective fusion of the major thoracolumbar/lumbar curve in Lenke 5C adolescent idiopathic scoliosis can be achieved by anterior and posterior technique. Although the posterior group demonstrated higher spontaneous correction of the unfused thoracic curve just after the operation, after an average of 4 years follow up, two groups were comparable for the major and minor curve.

#### Abstract no.: 41738 A REVIEW OF THE SURGICAL MANAGEMENT OF SACRAL METASTASES OVER A 10 YEAR PERIOD IN A TERTIARY INSTITUTION AND REVIEW OF THE LITERATURE

# Evelyn MURPHY, Sudarshan MUNIGANGAIAH, Mutaz JADAAN, Aiden DEVITT, John MCCABE

Background:Sacral metastases are an uncommon presentation of metastatic disease in the spine however they represent about half of all sacral tumours. Breast, lung, renal, thyroid and prostate tumours contribute the predominant primary sources. Radiotherapy is the mainstay of treatment of sacral metastases. Surgery is considered when lumbopelvic instability is present, progressive neurological deficit or intractable pain. Objectives: The aim of this review was to retrospectively identify patients who underwent surgical management of sacral metastases in Galway University Hospital which is a tertiary referral centre for spine surgery for the catchment area. Methods: A review of the theatre log books for the last ten years of the respective surgeons was undertaken. 4 patients were identified. Histopathology, surgical fixation methods, complications both major and minor were elicited. Survival and quality of life was determined post-operatively.Results:4 patients were identified. 3 male and 1 female. Ages ranged from 48-60. Two rectal carcinomas with metastasis to the sacrum were identified. One patient had metastatic breast malignancy and the other had metastatic renal carcinoma. Surgical fixation methods were reviewed. Modified Galveston technique was employed in three patients with poly axial lumbosacral pedicle screw fixation in the remaining patient. Preoperative angioembolisation was utilized on a case by case basis. Two patients had complications pertaining to their wound. All patients required blood transfusions. All patients self reported a decrease in pain and increase in quality of life post surgery. Conclusion:Sacral metastases are uncommon. The mainstay of therapy is radiotherapy. However surgical intervention is warranted when specific indications exist.

#### Abstract no.: 39121 OUT COME OF SINGLE LEVEL DISC PROLAPSE TREATED WITH TRANSFORAMINAL STEROID VERSUS EPIDURAL STEROID VERSUS CAUDAL STEROIDS

Ayush SHARMA, Vijay SINGH, Tarun CHABRA, Prashant KAMBLE, B NATRAJ, Darshan DEVANI

Purpose: Epidural steroid are commonly used for the management of the single level lumber disc prolapse. Lumbar transforaminal steroid injection commonly used for management is found to be more effective than caudal steroid versus epidural steroid.OBJECTIVE : To determine the efficacy of fluoroscopic guided transforaminal steroid versus epidural steroid versus caudal steroid.MATERIAL AND METHOD : Total 90 patients studied with low back pain and MRI evidence of disc pathology without stenosis selected out of that 30 patient received transforaminal steroid injection.30 patients received caudal steroid injection, 30 patients received epidural steroid. All patients were followed up for one year and results were compared by using VAS score and Oswestry disability index.RESULTS : Transforaminal group had statistically significant improvement VAS score from before injection(mean 7.0667) to immediately on after injection(mean1.9333).Interlaminar group had improvement on VAS score from before injection(mean 7.0000) to immediately after injection(2.2333). Caudal group had improvement on VAS score from before injection(mean 7.2000) to immediately after injection(mean 2.4333).CONCLUSION :In current study transforaminal steroid injection group has better symptomatic improvement for short and long term compared to interlaminar and caudal steroid injection group.

#### Abstract no.: 40356 THE ASSOCIATION OF MODIC CHANGES WITH SEVERE AND DISABLING LOW BACK PAIN: A LARGE-SCALE POPULATION-BASED STUDY

Dino SAMARTZIS, Juhani MÄÄTTÄ, Jaro KARPPINEN, Markus PAANANEN, Cora BOW, Keith Dip Kei LUK, Kenneth Man-Chee CHEUNG

Objective: There is lack of information about severe or disabling low back pain (LBP) and Modic changes (MC). Our aim was to study the relationship of prolonged severe or disabling LBP with lumbar MC focusing on morphology of MC. Methods: Our crosssectional study comprised of Southern Chinese volunteers. MC and disc degeneration (DD) were assessed from axial T1- and sagittal T2-weighted lumbar MRIs (3T). Prolonged severe LBP (LBP lasting ≥30 days in the past year and intensity ≥6 out of 10-cm VAS) and disabling LBP (Oswestry Disability Index ≥15%) were used. Logistic regressions (adjusted for age, gender, lifestyle covariates, and DD) were used. Results: There were 1,546 subjects (63% females, mean age 53 years) and 21.9% had MC (29.0% 'Type I', 71.0% 'Type II'). Subjects with MC were older (p=0.002) and had greater DD (p<0.001). In the fully adjusted models, MC in general (OR 1.48; 95% CI 1.01-2.18), MC affecting whole anterior-posterior (AP) length (1.62; 1.04-2.51) and 2/3 posterior length (2.79; 1.17-6.65) were associated with prolonged severe LBP. MC in general (1.47; 1.04-2.10), 'Type II' MC (1.56; 1.06-2.31), MC affecting 2/3 posterior length (2.96; 1.27-6.89) and extensive MC (1.95; 1.21-3.15) were associated with disabling LBP. The number of (large) MC strengthened both results. Conclusions: We found MC to be independently associated with prolonged severe and disabling LBP in this large-scale study. The number of MC and larger size (both horizontal and vertical plane) of MC increased the strength of associations. These findings support the hypothesis of clinical importance of MC.

Abstract no.: 39935

#### AN INTERNATIONAL, LARGE-SCALE MULTI-CENTER STUDY ASSESSING THE ROLE OF FACET JOINT ANGULATION AND TROPISM WITH THE DEVELOPMENT OF LUMBAR DEGENERATIVE SPONDYLOLISTHESIS - A STUDY FROM THE AOSAP RESEARCH COLLABORATION CONSORTIUM

Dino SAMARTZIS, Jason Pui Yin CHEUNG, Shanmuganathan RAJASEKARAN, Yoshiharu KAWAGUCHI, Shankar ACHARYA, Mamoru KAWAKAMI, Shigenobu SATOH, Wen-Jer CHEN, Chun-Kun PARK, Chong-Suh LEE, Thanit FOOCHAROEN, Hideki NAGASHIMA, Sunguk KUH

INTRODUCTION: Degenerative spondylolisthesis (DS) mainly occurs at L4-L5. The phenotype and critical values of facet joint (FJ) angulation and tropism (FJs angulation asymmetry) in relation to DS remain controversial. The study addressed the role of FJ angulation and tropism in relation to L4-L5 DS in the Asia Pacific region. METHODS: An international cross-sectional study was performed in 33 institutions of single level DS. Imaging assessment consisted of identifying the DS level and left/right L4-L5 FJ angulations. Patients were stratified to those without (Group A) or with L4-L5 DS (Group B). ROC and multivariate analyses were performed, assessing the FJ angulation profile and tropism in relation to DS. RESULTS: The study included 349 patients (63% females; mean age: 61.8 years). Group B had greater sagittal FJ angulation than Group A (p<0.001). 58 degrees or greater significantly increased the risk of DS (unilateral FJ: OR:2.5; 95% CI:1.2-5.5; bilateral FJ: OR:5.9; 95% CI:2.7-13.2; p<0.001). FJ tropism was found to be relevant between 16-24 degrees angulation difference (OR:5.6; 95% CI:1.2-26.1). CONCLUSIONS: To the authors' knowledge, this is one of the largest studies to address the role of FJ angulation and tropism in relation to L4-L5 DS. Greater FJ angulation was associated with DS, with a critical value of ≥58 degrees increasing DS risk for unilateral and bilateral facet involvement. Specific FJT ranges were related to DS. This study further broadens the understanding of the phenotype of facet joint orientation in relation to DS.

#### Abstract no.: 39566 ANATOMIC POSITION OF L5 VERTEBRA RELATIVE TO THE ILIAC CRESTS MAY INFLUENCE THE ACCURACY OF PERCUTANEOUSLY PLACED PEDICLE SCREW IN LUMBOSACRAL JUNCTION Jing GUO, Lian-Jin GUO, Ju-Zhou GAO, Zhi-Xun YIN, Zhi-Yong GUO, Er-Xing HE

INTRODUCTION: Significant prominence of the iliac crests with a deep seated L5 vertebra can potentially obstruct the screw trajectory when placing percutaneous pedicle screw (PPS) at the lumbosacral segment. The objective of this study was to investigate the influence of L5 position in relation to the iliac crests on the accuracy of lumbosacral PPS placement. METHODS: From Oct 2012 to Sep 2014, 54 patients undergoing PPS placement at L5-S1 segment were recruited. Patients were divided into 2 groups: the L5-Seated Group (n=34) included patients with intercrest lines passing through the L4 vertebra or L4/5 intervertebral disc; whereas the L5-Non-Seated Group (n=20) included patients with intercrest lines passing through the L5 vertebra. PPS accuracy was evaluated by grading pedicle breach. Screw intersection angle (SIA), defined as the angle subtended by the axes of bilateral screws, was also recorded. RESULTS: In the L5-Seated Group, 82.4% (56/68) screws were within the pedicle wall at L5, and 66.2% (45/68) at S1; meanwhile, in the L5-Non-Seated Group, 77.5% (31/40) and 75.0% (30/40) screws had no pedicle breach at L5 and S1, respectively. Misplacement rate was numerically higher at S1 in the L5-Seated Group (P>0.05). Additionally, the S1 SIA was significantly smaller in the L5-Seated Group (29.0°±9.4°) when compared with the L5-Non-Seated Group (38.6°±7.3°) (P<0.05). CONCLUSION: A deep seated L5 vertebra with respect to the iliac crests might compromise the accuracy of PPS placement at S1 vertebra. Severe iliac prominence may obstruct the screw trajectory and limit the medial angulation of pedicle screw for S1 fixation.

## Abstract no.: 41097 WHAT IS THE CLINICAL RELEVANCE OF NONUNION AFTER LUMBAR ARTHRODESIS? A META-ANALYSIS OF THE YODA PROJECT DATABASE

Evalina BURGER, Andriy NOSHCHENKO, Emily LINDLEY, Christopher CAIN, Vikas PATEL

Introduction: The clinical relevance of successful fusion after lumbar arthrodesis has recently been questioned in the literature. Thus, the purpose of this study was to specifically investigate whether patients who achieve fusion after lumbar spine surgery have better clinical outcomes than patients with pseudarthrosis. Methods: Individual patient-level data of 4 RCTs were obtained from the Yale University Open Data Access Project (YODA) and analyzed with meta-analyses. Clinical outcomes (Oswestry Disability Index (ODI); Numeric Rating Scales (NRS) for back and leg pain) were compared between patients with radiographically confirmed fusion and those with radiographic nonunion 1 and 2 years postoperative. Results: A total of 496 patients with complete clinical and radiographic data were identified. Of these, 5.5% [95%CI: 3.7; 8.3] had nonunion which did not require reoperation. Patients with fusion had significantly better improvements in ODI (P<0.001) and NRS back pain scores (P<0.001), and a trend towards better NRS leg pain scores (P=0.078). Significantly more patients with fusion also had ODI and NRS back pain scores that exceeded the criteria for minimal clinically important differences (MCID) (ODI, OR=2.7, P=0.019; NRS back pain, OR=3.5, P=0.033). However, the predictive values of fusion for clinical outcomes were poor, with low specificity and low negative predictive values. Conclusion: The presence of radiographic fusion is clinically significant, as patients with fusion had better clinical outcomes at 1 and 2 years postoperative than those with nonunion. However, patient-centered clinical outcomes should also be taken into consideration as independent, complimentary variables when assessing treatment success.

## Abstract no.: 39152 PREVALENCE OF TARSAL TUNNEL SYNDROME IN THE PATIENTS WITH LUMBOSACRAL RADICULOPATHY

Chao Jun ZHENG, Jian Yuan JIANG, Fei Zhou LU, Xiang JIN

Objective: The TTS is easily missed diagnosed in patients with LR since the symptom of tarsal tunnel syndrome (TTS) is always confused by lumbosacral radiculopathy (LR). Unfortunately, no studies exist to determine the prevalence of TTS in patients with LR. However, the concomitant occurrence of these two diseases may be common because of the possible existence of "double crush syndrome (DCS)". The aim of this study was to identify the prevalence of TTS in patients with LR. Methods: Medial and lateral plantar motor and mixed studies, peroneal motor studies and deep peroneal sensory studies were performed in 81 normal subjects (control group) and 561 patients with LR (radiculopathy group) bilaterally. The Tinel's test and provocative tests (dorsiflexion and eversion of foot for posterior TTS, plantar flexion of foot for anterior TTS) were performed in all radiculopathy group patients bilaterally. Result: Concomitant TTS were found in 27 (4.8%) radiculopathy group patients. Abnormal sensory/mixed conduction tests were found in 25/27 (92.6%) patients, and 8/27 (29.6%) patients had abnormal motor conduction tests. The positive Tinel's test and special provocative tests were found in 15/27 (55.6%) and 17/27 (63.0%) patients, respectively. Discussion: The prevalence of TTS is significant higher in radiculopathy group patients. Therefore, we must be careful in the diagnosis and management of patients with LR due to the possible existence of TTS. A combination of both sensory/mixed and motor conduction studies with Tinel's test and provocative test may yield the highest level of diagnostic information for evaluating TTS in patients with LR.

#### Abstract no.: 41396

#### A COMPARISON OF POSTERIOR LUMBAR INTERBODY FUSION AND TRANSFORAMINAL LUMBAR INTERBODY FUSION: A LITERATURE REVIEW AND META-ANALYSIS

Yongxin REN, Qunhu ZHANG, Zhen YUAN, Min ZHOU, Huan LIU, Yong XU

Abstract Background We compared the perioperative results and complications associated with PLIF and TLIF, and collected evidence for choosing the better fusion method. Methods A literature survey of the MEDLINE and EMBASE databases identified 7 comparative observational studies that met our inclusion criteria. Checklists by Cowley were used to evaluate the risk of bias of the included studies. A database including patient demographic information, perioperative results, and complications was established. The summary odds ratio and weighed mean difference with 95% confidence interval were calculated with a random-effects model. Results We found that PLIF had a higher complication rate (P < 0.00001), and TLIF reduced the rate of durotomy (P = 0.01). No statistical difference was found between the two groups with regard to clinical satisfaction (P = 0.54), blood loss (P = 0.14), vertebral root injury (P = 0.08), graft malposition (P = 0.14)0.06), infection (P = 0.36), or rate of radiographic fusion (P = 0.27). The evidence indicated that PLIF required longer operative time (P = 0.03). Conclusions The evidence indicated that TLIF could reduce the complication rate and durotomy. Neither TLIP nor PLIF was found superior in terms of clinical satisfaction or radiographic fusion rate. PLIF might result in longer time in surgery.

### Abstract no.: 40211 CLINICAL STUDY OF MINIMAIIY INVASIVE TRANSFORAMAL LUMBAR INTERTERBODY FUSION WITH UNILATERAL OR BILATERAL PEDICLE SCREW FIXATION

Yu LIANG, Wenjian WU, Xinkai ZHANG, Hongwei TANG, Peng CAO

Objectives: To compare the clinical, radiographic outcomes and costs between unilateral and bilateral pedicle screw fixation in minimally invasive transforaminal lumbar interbody fusion (MIS-TLIF) for single-level lumbar degenerative disease. Methods: 42 cases of single-level lumbar degenerative disease were treated with MIS-TLIF. Among which 20 cases were treated with unilateral pedicle screw fixation (UPS group), and 22 cases with bilateral pedicle screw fixation (BPS group). The pre- and post-operative visual analogue scale (VAS) scores, Oswestry Disability Index (ODI) scores, operation time, intraoperative blood loss, postoperative bedtime, complications, fusion rate and costs were assessed. Results: The mean follow-up period was 26.9±5.9 months (ranged, 17~39months) in UPS group and 34.6±11.2 months (ranged, 12~46 months) in BPS group. The VAS and ODI scores of two groups were significantly improved after surgery for both group, with no deference between two groups (P>0.05). UPS was superior to BPS regarding operation time (151.3±25.5min vs. 181.6±35.8min), intraoperative blood loss(117.5±61.3ml vs. 209.1±157.8ml), postoperative ambulation (3.6±1.5d vs. 6.4±4.3d) and surgical costs (36359.0±4081.4 ¥ vs. 57058.4±7169.1 ¥). There were no statistically significant differences in the fusion rates, and complication rates between two groups. Conclusions: Both unilateral and bilateral pedicle screws fixation for MIS-TLIF have good clinical and radiographic outcomes for selected single-level lumbar degenerative disease. Unilateral pedicle screws fixation has more advantages on operation time, intraoperative blood loss, postoperative ambulation and surgical costs.

#### Abstract no.: 41141 FACET JOINT ORIENTATION AND SAGITTAL SPINOPELVIC ALIGNMENT IN PATIENTS WITH DEGENERATIVE LUMBAR SCOLIOSIS Xuhua LU

The purpose of this study was to evaluate the association between lumbar spine facet joint orientation and tropism, sagittal spinopelvic alignment, and rotational deformity, identified by radiographic and computed tomography (CT) measurements, in degenerative lumbar scoliosis (DLS). Standing whole-spine sagittal radiographs and CT scans, including the pelvis, were performed and analyzed in 60 DLS patients (16 males, 44 females; mean age 65 years). Cobb angle, pelvic incidence (PI) and lumbar lordosis (LL) were measured on standing lumbar radiographs. Facet joint orientation on both sides at L3/4, L4/5, and L5/S1 was determined from transverse-plane CT. Facet joint tropism was defined as a difference in symmetry of more than 10 degrees between the orientations of the facet joints. There were significant differences in the incidence of facet joint tropism between the two groups at L3/4, L4/5, and L5/S1 (P = 0.011, P = 0.043, and P = 0.004, respectively). LL was significantly smaller in type II DLS (P = 0.049). Facet joint orientation, pelvic incidence, and Cobb angle did not differ between groups. No significant correlation between LL and PI was observed in either group. This study provides a reliability analysis of rotational deformity in patients with DLS. In conclusion, we observed a significant relationship between facet joint tropism and rotational deformity in patients with DLS. Furthermore, the different types of DLS demonstrated significant differences in LL that may induce spinal symptoms.

#### Abstract no.: 41674 3D MORPHOMETRIC ANALYSIS OF NORMAL SACROILIAC JOINTS: A NEW CLASSIFICATION OF SURFACE SHAPE VARIATION

Evalina BURGER, Christopher KLECK, Mary JESSE, Damian ILLING, Adam WILLIAMS, Brian PETERSEN, Kenneth MILLIGAN, Deborah GLUECK, Kimberly LIND, Vikas PATEL

Introduction: The purpose of this study was to establish a baseline of normal sacroiliac joint morphology through the utilization of 3D surface rendered imaging of the SI joint, as well as devise a novel classification system of SI joint articular surface morphology. Methods: 3D surface rendered images of the SI joint were acquired in 223 normal controls. Morphologic 3D assessment of the articular surface morphology, and measurements of sacral tilt, inclination and sacral and iliac surface area were performed. SI joint morphologies were further classified into three types based on shape (Types 1, 2 and 3). Results: Average sacral tilt, inclination and surface areas were established in this healthy, control group. Visual morphologic variant (70% of joints), while Type 1 appeared in 15% of the joints and Type 3 variants were seen in the remaining15% of joints. Conclusion: Our study provides a new look at SI joint morphology with insight into visual morphologic differences in articular surface shape and variability in articular surface area, and provides a novel classification system of articular surface shape (Type 1, 2, and 3).

#### Abstract no.: 41153 ILIZAROV APPLICATIONS TO BENIGN BONE TUMORS Md Mofakhkharul BARI

Introduction: The usefulness of Ilizarov external fixator was investigated for the treatment of benign bone tumors. Materials and Methods: We treated 29 limbs27 patients with deformity and different LLD due to benign bone tumor. There were 20 males and 7 female with a mean age of 11 years. We used Ilizarov of different bone tumors. The etiologies were osteochondroma in 9 patients, Olliers disease in 5 patients, fibrous dysplasia in 8 patients and GCT in 5 patients. Result: The outcomes of the results were satisfactory in case of all these benign bone tumors. Conclusion: Preservation and bone degeneration by means of distraction of osteogenesis constitutes a highly conservative limb saving surgery. Patients with good defects of less than 10cm, a great deal of preserve healthy tissue and good prognosis are good candidates for these methods.

#### Abstract no.: 39889 OUTCOME OF ANEURYSMAL BONE CYSTS TREATED BY EXTENDED CURETTAGE, CRYOSURGERY AND BONE GRAFTING Osman Abd Ellah Mohamed MOHAMED

Aneurysmal bone cyst has a variable radiological appearance and should be considered in the differential diagnosis of any uni-locular or multi-locular radiolucent lesion. No role for conservative management. ABC in the extremities can be managed by curettage and different kind of bone grafts. Recurrence rate is high especially in a young age with open growth plates. Use of liquid nitrogen as an adjuvant measure after extended curettage decrease recurrence rate. Patients and Methods: 25 patients with aneuryismal bone cyst involving different locations who evaluated and staged according to Enneking et al. system as 20 active benign and 5 aggressive benign lesions. Extended curettage achieved the patients followed by application of liquid nitrogen for 2 cycles and lastly reconstruction of the cavity by bone graft. Mean age at surgery 14. 7 years at operation (3 - 35 years). Average follow-up 48 months (24-72 months). Results The Musculoskeletal tumor Society (MTS) score described by Enneking et al. was used to assess functional outcome. Followup the functional score ranges from 70% to 94%, with an average of 86%. One case developed local recurrence and managed by second operation. 2 cases developed superficial post-operative infection and treated conservatively. Conclusion Extended curettage of aneurismal bone cyst with adjuvant cryotherapy had similar results to those of marginal resection and no major bony reconstruction was required. We recommend use of cryotherapy as adjuvant to surgical treatment of aneurismal bone cysts with bone grafting achieved consolidation of the lesion in all our patients with no major complications.

#### Abstract no.: 41137 THE IMPACT OF LONG BONE CHONDROBLASTOMA SURGERY ON THE DEVELOPMENT OF EPIPHYSIS IN TEENAGERS Hong DUAN

Methods This study retrospectively reviewed 18 cases of long bone chondroblastoma in patients with open physis plate at time of treatment in our hospital during the period March 2004 to October 2011.All patients were treated with intralesional curettage and inactivity with alcohol followed by bone grafting. The function of the involved articular and complication was observed, length of the limb was measured at the time of follow up. Results All cases were followed up from 18 months to 98 months (54 months on average).The length of troubled limb were shorten from 2mm to 16mm (5±2.13mm mean).

The shorten length have no obvious relativity with the area of the pathology and age (

P>0.05). The shorten length in 14 patients with mild to moderate epiphysis defect less than 10mm ,while 4 severe patients more than 15mm ,but the later can be corrected by compensatory. The ISOLS functional grade was 28.5 on average. All have no local recurrence, distance metastasis, limp and deformity. Bone graft fused good in 12 patients, but left 6 happened bone resorption partly. Conclusion Surgery of aggressive curettage,inactivity and bone grafting can induce to limb shorten for teenagers whose chondroblastoma located in growth plate of the long bone, but have no clinical symptom. The surgery can control tumor progression and recurrence effectively.

# Abstract no.: 41917 FUNCTIONAL OUTCOME OF ENDOPROSTHETIC RECONSTRUCTION FOR OSTEOSARCOMAS OF THE DISTAL FEMUR

Jeya Venkatesh PALANISAMY, Rishi Ram POUDEL, Shah Alam KHAN, Shishir RASTOGI

Introduction: Endoprosthetic reconstruction is now the standard surgery following wide excision of osteosarcomas of distal femur. The aim of our study was to objectively analyze the various factors, which affected functional outcome for endoprostheses in distal femoral osteosarcomas. Methods: Ours was a retrospective analysis of 54 cases of distal femoral Osteosarcomas, which underwent endoprosthetic reconstruction between January 2004 and January 2007. The inclusion criterion was patients with distal femoral osteosarcomas who had undergone endoprosthetic reconstruction with a minimum follow-up of 5 years. Patients who developed metastatic disease were not included in the series. A total of 41 endoprosthesis were available for evaluation. Records were analyzed for MSTS Score, follow-up period, age, gender, time between primary surgery and failure and activity status of the patient following surgery. Results: The average follow-up in our study was 62 months. The average age in the series was 17.6 years. The mean MSTS score at the end of five years was 23. There were 14 patients who were classified as failures and required a second surgery. The average time between primary surgery and failure was 21.6 months. Statistical analysis showed that the relative risk of patient death was 2 times higher than prosthesis failure in our series. Discussion & Conclusion: Endoprosthetic replacement in salvageable distal femoral osteosarcomas remains the standard method of treatment. The main complications are infection and aseptic implant failure. Implant failure is independent of age, gender or activity status. The results of endoprosthetic replacement in distal femoral osteosarcomas remain encouraging.

## Abstract no.: 41324 LIMB SALVAGE WITH TUMOR ENDOPROSTHESES FOR MALIGNANT TUMORS OF THE KNEE Yong ZHOU

ObjectiveThis study is to assess the functional outcome, the prosthetic survival, and their influencing factors of knee tumor resection and cemented endoprosthetic reconstruction. Methods Between January 2001 and January 2009, 86 patients were treated with knee tumor resection and cemented endoprosthetic reconstruction for malignant tumors of the knee. And 65 patients were followed up (75.6%) with a meanfollowup time of 49.5 months (range, 4~108 months). The prosthetic survival was analyzed with Kaplan-Meier method. Factors(including age, gender, tumor location, resection length, infection, with or without pathologic fracture, prosthesis typeand tumor stage) that may affect prosthesis survival were analyzed with log-rank test and variables significant at the p<0.20 level were includedin the multivariate Cox model. P-values of < 0.05were considered significant. ResultsForty-seven of the 65 patients (72.3%) survived. Local recurrenceoccurred in 5 patientsProsthetic complications occurred in 10 patients(21.3%), including 6(12.8%) with infection, 2(4.3%) with locking mechanism failure of dislocation, 1(2.1%) with locking mechanism failure of rotation shaft fracture associated withall-polyethylene(PE) wear and 1(2.1%) with simple PE wear. The Kaplan-Meier prosthetic survivorship of all implants was 96.3% at 1 years, 88.9% at 3 years, 88.9% at 5 years, 83.8% at 7 years with a mean prosthetic survival time of 97.6±4.43months. Cox regression showed that infection of the prosthesis affected the survival rate (P = 0.005). ConclusionLimb salvage with cemented tumor prosthesis of the kneegotacceptable prosthetic survival rate and good limb function.

#### Abstract no.: 41185 IMPACT ANALYSIS OF FIBULAR HEAD RESECTION FOR TUMOR TIBIA PROSTHESIS IN LIMB SALVAGE RECONSTRUCTION Zhaoming YE

OBJECTIVE: To investigate the influence of the fibular head resection prosthesis reconstruction of tibia tumor salvage treatment. Methods 76 cases of tibia bone tumor patients undergoing limb salvage surgery, underwent tumor resection, artificial joint reconstruction, medial gastrocnemius head muscle flap mulching, surgery simultaneously fibula head resection (A group) 38 cases, retain fibular head (group B) 38 cases. Analysis of the two groups after surgery and related treatment efficacy. Results intraoperative skin grafting 13.16% in group A, group B 21.05%, the difference was statistically significant (P <0.05), the incidence of infection 5.26% in group A, group B 10.53%, the difference was statistically significant (P <0.05), knee instability 5.26% in group A, group B 10.53%, the difference was statistically significant (P <0.05), postoperative knee function MSTS 93 score 86.84% in group A, group B 84.21%, the difference was not statistically significance (P> 0.05); tumor line of artificial limb salvage surgery on the joint reconstruction of the concluding line of the tibia while fibular head resection surgery in favor of soft tissue coverage, skin grafting can reduce trauma and related complications, reduce postoperative infection, postoperative joint stability, range of motion is good.

#### Abstract no.: 40612 RECONSTRUCTION WITH MODULAR HEMIPELVIC ENDOPROSTHESIS AFTER PELVIC TUMOR RESECTION: A REPORT OF 50 CONSECUTIVE CASES

Jingnan SHEN, Bo WANG, Xianbiao XIE, Junqiang YIN, Jin WANG, Gang HUANG, Changye ZOU

Purpose. To evaluate the effectiveness of reconstruction with a modular hemipelvic endoprosthesis after pelvic tumor resection. Methods. We retrospectively studied 50 consecutive patients diagnosed with pelvic tumor from 2003 to 2013. All patients received limb-salvage surgery and reconstruction with modular hemipelvic endoprosthesis. Results. Patients were followed for an average of 54 months. At the most recent follow-up, 32 patients were alive with an estimated three-year and five-year survival rate of 66.3% and 57.5% according to the Kaplan-Meier survival analysis. Eighteen patients died from the tumor, with a mean survival of 28 months, and 9 patients experienced local recurrence at an average of 19.6 months after surgery. Patients with marginal or intracapsular surgical margins had a significantly higher recurrence rate than those with wide margins (p=0.02). Metastasis occurred in 12 cases at an average of 16 months after surgery. The perioperative complication rate was 48.0%, and the most common complications were wound healing disturbance (28.0%) and deep infection (14.0%). The endoprosthetic complication rate was 16.0%, and breakage of the pubic connection plate was the most common complication. The mean Musculoskeletal Tumor Society score was 61.4%. Conclusion. Reconstruction with a modular hemipelvic endoprosthesis after pelvic tumor resection can improve function, with an acceptable complication rate.

#### Abstract no.: 41809 THE ROLE OF AUTOGRAFT AND ALLOGRAFT IN SPINAL COLUMN RECONSTRUCTION AFTER TOTAL EN BLOC RESECTION OF SPINAL TUMOURS

Yat-Wa WONG, Kenny KWAN, Kenneth Man-Chee CHEUNG, Dino SAMARTZIS, Keith LUK

INTRODUCTION: Reconstruction and stabilization after total en bloc resection of spinal tumours often requires adjunct of allograft/bone substitutes. However, the efficacy of both graft substrates to obtain solid fusion remains unclear. This study assessed the role of autograft in comparison to allograft for spinal reconstruction following total en bloc spondylectomy in a rather large series of patients. METHODS: This study included fourteen spinal tumor patients (mean age: 28-years; range: 12-61 years) underwent total en bloc spondylectomy and reconstruction using autogenous bone graft (n=7 iliac crest (ICBG)); allograft bone alone (n=4) or a mixture of local bone and allograft bone (n=3). The minimum follow-up was 2 years (mean: 5 years; range: 2-13 years). Bony fusion was determined on X-ray or CT-scan. Spondylectomies involved one (57%), two (14.3%), three (14.3%), four (7.1%) and 5 levels (7.1%) from T1 to L5. RESULT: In patients with ICBG, all patients demonstrated solid fusion at final follow-up. Of the allograft alone patients), none achieved fusion. In patients with mixed autograft and allograft fusion was achieved in 66.7% cases with single level resections. Instrumentation failure was noted only in the allograft alone group (25% of allograft cases). 80% of the patients without solid fusion maintained normal daily activities. CONCLUSIONS: In this large series, our study noted that autogenous bone graft remains superior to allograft for spinal reconstruction following en bloc spondylectomy. When the use of allograft becomes inevitable in long reconstruction, the patients should be alerted of the possibility of delayed union, non-union and instrumentation failure.

# Abstract no.: 41721 GIANT CELL TUMOR OF BONE IN EXTREMITIES-AN ANALYSIS OF 272 CASES

Chongqi TU

Objectives The goal of the present study was to investigate the effectiveness of giant cell tumor of bone in extremities in a retrospective study. Methods 152males and 120 females were got followed. The median follow-up was 64.6 months (range,18 ~ 234 months). The most common primary treatment was curettage (170 patients) usually followed by adjuvant local therapy. The effects of bone cement (PMMA), high speed burring, electroscalpel cauterization, liquid nitrogen and phenol on the recurrence rate, were statistically analyzed. Results The recurrence rate of patients who received first treatment was 9.2%. Recurrences seen in 25 cases were multiple in 5 cases. Treatment included intralesional curettage (13.5%), marginal excision (0%), wide excision (2.1%), or radical resection (0%). Metastases largely to the lung were recorded in 6 cases(2.2%). Campanacci grading was as follows: Grade I, 9 patients; Grade II, 113 patients; Grade III, 127 patients; and unknown in 23 patients. The difference of recurrence rate reached statistical significance between intralesional curettage combined with other adjuncts except burring (p = 108) and intralesional curettage combined with other adjuncts except burring (p = 108) and intralesional curettage combined with other adjuncts except burring (p = 108).

0.002). Conclusions High-speed burring is an essential adjunct when the intralesional curettage is used to treat GCTB. When the lesions locate adjacently to the articular surface, both liquid nitrogen and electroscalpel cauterization can be used as adjuncts instead of high-speed burring. The combination of all adjuncts (burring, liquid nitrogen, electroscalpel cauterization) should be recommended as a standard treatment.

#### Abstract no.: 41191 CLINICAL RESEARCH OF BONE CEMENT IMPACT ON THE ARTICULAR CARTILAGE OF THE KNEE AFTER CURETTAGE FOR GCT Zhaoming YE

Objective To investigate the giant cell tumor of bone around the knee after curettage inactivated filled with bone cement for articular cartilage damage. Methods from January 2000 to December 2011 hospitalized patients, the clinical, radiological and pathological diagnosis of giant cell tumor of total 322 cases. Methods Retrospective study follow-up, follow-up to the 53 cases, 42 cases filled with bone cement scrape, scrape after autologous bone graft subchondral bone cement and then filled in 11 cases, the average age at surgery 33.9 ± 11.5 years (16-69 years old), 31 males and 23 females. 28 cases of distal femur, proximal tibia in 25 cases. Campanacci grade: I grade five cases, II grade 39 cases, grade III 9 cases. The results of follow-up time of 25-158 months, average 65 months, the subchondral bone thickness and residual tumor occupied the host bone crosssectional proportion of statistically significant differences, this study found that the residual bone less than 5mm (an average of  $2.46 \pm 0.57$ ) and tumor size more than 50 proportion arthritis% (average 47.61 ± 4.08) was significantly increased when, reaching 53.8%, showing that the bone cement directly exposed in the joints. Bone arthritis patients was 9.1%, significantly lower than those without bone graft. One case of infringement of the distal femoral lesion around the joints due to severe joint degeneration and joint replacement. Conclusions Knee subchondral bone giant cell tumor of bone cement filling caused a significant correlation.

## Abstract no.: 40540 TREATMENT OF PRIMARY SARCOMA OF BONE IN THE LOWER LIMB, ENDOPROSTHETIC REPLACEMENT VERSUS BIOLOGICAL RECONSTRUCTION

Awad Abdel-Moniem A. RAFALLA

Limb salvage surgery is the main line of treatment of primary sarcoma of bone. Different methods of reconstructions either by using endoprosthetic replacement, or biological. This depends on expertise, equipment and the local tumor extension. Each method has its advantages and disadvantages. Patients: This study included 22 cases, 13 were males. Mean age was 21 year, range (8 to 55) years. Ninteen cases diagnosed as osteosarcoma, 2 cases diagnosed as chondrosarcoma, and one case was Ewing sarcoma. Distal femur was affected in (12) cases, proximal tibia was affected in (6), and proximal femur was affected in (4) cases. 14 cases was treated by endoprosthesis after wide resection (first group). The other cases (8) were treated biologically using either reimplantation of bone tumor segment after pasteurization or using autogenous fibula (vascularized or non vascularized) or combination of both (second group). Results ; follow up ranged from (25) to (1145) with mean of (108.5) months. The mean functional outcome of the first group was (82) % and of the second group was (63) %. Some cases were re-operated more than one time for several reasons with mean (1.4) surgeries of each case of the first group and 2 surgeries of the second. Several complications were faced in both groups. To conclude: although the results of biological reconstruction is lower than that of endoprosthetic reconstruction, it is still has its indications.

## Abstract no.: 39520 INTERCALARY CUSTOM-MADE COMPRESSIVE® IMPLANTS FOR THE RECONSTRUCTION OF MALIGNANT FEMORAL DIAPHYSIS TUMORS----CASES REPORT AND THREE-DIMENSIONAL FINITE ELEMENT ANALYSIS

Chunlin ZHANG

Introduction: The purpose of this study was to answer the following questions: (1) What is the survival rate for this technique (CPS) at short term follow-up? (2) Is there any prosthesis-related failure? (3) With extra cortical plates, is it better at avoiding early aseptic failures? Patients and Methods: en bloc resection with reconstruction of CPS implants with extra cortical plates at either end was used. Three-dimensional finite element analysis was used to evaluate the stress distribution and interfacial stress of intercalary prosthesis with and without extra cortical plates. Results: A total of 3 patients were available at a mean follow-up of 31.3 months. All patients achieved primary healing. No early CPS implant failures were observed at the last follow-up. No tumor recurrences, infections, or periprosthetic fractures were observed during follow-up. At the time of the final follow-up, 3 patients were alive and free of disease. The mean MSTS for 3 patients evaluated at the last follow-up was 25.3. The stress peak of prosthesis with extra cortical plates is approximately 45.98% of the prosthesis without extra cortical plates in cortical bone conditions, but the stress concentration were at the same location. Conclusions: Intercalary custom-made CPS implants with extra cortical plates are effective and safe for malignant tumors of the femoral diaphysis in the short term. The extra cortical plates may theoretically reduce the possibility of early aseptic failure since they can provide extra fixation and reduce the high stress on the interface between the bone and implant junction.

#### Abstract no.: 40626 LIMB SALVAGE SURGERY WITH THE EXPANDABLE PROSTHESIS IN THE SKELETALLY IMMATURE CHILD OF MALIGNANT BONE TUMORS Jingnan SHEN, Jin WANG, Gang HUANG, Jungiang YIN, Changye ZOU

Objective To evaluate the effect of expandable prostheses in the skeletally immature children with malignant bone tumor after limb salvage surgery. Methods From Jan.2002 to Jun.2007, clinical records of our center were reviewed retrospectively. Totally 32 children who underwent limb salvage with the expandable prostheses were included: 20 cases with osteosarcoma,2 cases with Ewing's sarcoma. Twenty patients evenly divided between males and females. The mean age at diagnosis was 10.7 years. Eighteen distal femurs, three proximal tibiae and one proximal femur were involved. All of them were defined as stage II B according to Enneking classification. Results Patients were followed in an average of 37.63 months (range, 24 to 86) months.Local recurrence was 4.55% (1 in 22), lung metastasis was 18.8% (4 in 22) and one patient died of postoperative chemotherapy complication. Fourteen cases underwent limb lengthening for 34 times, 1cm for each time and equal lower extremities were basically achieved in all 14 cases. The limb-length discrepancy was in the average of 0.4cm after lengthening. The longest followup time was 86 months with six lengthening procedures. The mean Musculoskeletal Tumor Society functional score was 76.67%. There was no significant difference in the functional score of the patients before and after the limb lengthening surgery. The prostheses related complications were as follow: 1 periprosthesis infection, 1 oblique of the knee surface (one case), 1 prosthesis subsidence, 1 loosening, and 1 subcutaneous infection.Conclusion The expandable prostheses could not only reconstruct the bone defect after wide resection, but also offer functional limbs without limb-length discrepancy after the epiphysis resection.

#### Abstract no.: 39417 NATIVE-JOINT-PRESERVING LIMB SALVAGE SURGERY AFTER EXCISION OF JUXTA-ARTICULAR OSTEOSARCOMA AROUND THE KNEE: CLINICAL OUTCOMES AND RECONSTRUCTION METHODS Xiuchun YU

Objectives : To study the failure factors of native-joint-preserving limb salvage surgery of osteosarcoma around knee and to choose appropriate reconstruction methods for bone tumor defects clinically.Methods:21 patients with osteosarcoma around knee underwent native-joint-preserving in our hospital from Jan, 1999 to Dec, 2012.12 males and 9 females with the mean age of 14.05 years old (5-24ys).19 lesions located at the distal femur and 2 at the proximal tibia. 17 patients underwent alcohol-inactivated autograft replantation with epiphyseal preservation(7), and with articulation preservation(10),two underwent intraepiphyseal excision and reconstruction with distraction osteogenesis.two underwent intraepiphyseal excision and reconstruction with allograft (1 with vascularized fibula graft). The initial graft fixation were intramedullary needles in 14 patients and steel plates in 5 cases and 2 with external fixations.Results:All were done follow-up with the mean time of 46.47 months (12-150 months). Two patients had local recurrence at 12 months and 8 years after the operation, 7 patients died of systemic metastases (12-108 months).14 patients were alive (12-150 months). The mean time of healing at diaphyseal location was 14.4 months (6-36 months) and at epiphyseal location was 6.95 months (3-36 months). There were 1 patient with screw loosen and 8 with fracture.7 patients underwent 10 operations of open reduction and bone grafting with internal fixation. The mean MSTS score was 23 points (88.9%) in 12 patients. Conclusion: Age, lesion charaterasitics and location bone destroying extent and internal fixation are the main factors leading to failure. The deferent reconstructions was selected according to the above factors as the indications are strictly mastered.

## Abstract no.: 41350 LARS RECONSTRUCTION IMPROVES THE OUTCOME OF SHOULDER TUMOR JOINT REPLACEMENT SURGERY

Rui SHI, Chongqi TU, Hong DUAN

Introduction: Soft tissue attachment reconstruction remained challenging after tumor shoulder joint replacement surgery, which plays a key role in joint stability and flexibility. Methods: From 2013 to 2015, five cases, with malignant bone tumor in the proximal humerus, accept shoulder joint replacement followed LARS ligament reconstruction around the shoulder joint capsule and ligaments. The male to female ratio of 3: 2, with an average age of 21 ± 4.5 years. Three cases were left, and two were right. neoadjuvant chemotherapy of doxorubicin were proceeded for two cycles. Pre-operative radionuclide bone scanning and MRI determined surgical margin. Intraoperative frozen biopsy confirmed tumor-free borders. LARS ligament was sutured to the labrum glenoidale and Swaddled around the prosthesis. Rotator cuff and other ligament stumps were reattached to the humeral prosthesis on LARS. Passive movement was initiated within 7 days after surgery, yet active movement after two weeks. Routine chemotherapy began after one month. Results: Five cases were osteosarcoma, including four IIa, one IIb. Mean follow-up time of  $13 \pm 8.8$  months. The average length of tumor resection  $11.5 \pm 3.1$  mm. The average operative time was 167 ± 23min. The mean blood loss 480 ± 58ml. Postoperative drainage 150 ± 96ml. Shoulder active abduction was 75.4 ± 38.1 degrees, extend was 83.2 ± 18.7 degrees. No loosening or local recurrence occurs during follow-up. Conclusion: In the tumor shoulder joint replacement surgery, LARS reconstruction of the joint capsule and ligaments attachment could increase the soft tissue adhesion to improve shoulder stability and motor function.

#### Abstract no.: 39451 AN ANALYSIS OF EPIDEMIOLOGY AND PROGNOSTIC FACTORS FOR CHINESE PATIENTS WITH OSTEOSARCOMA--13-YEAR EXPERIENCE IN 365 PATIENTS TREATED AT A SINGLE INSTITUTION Wei WANG

Background: The aims of this analysis were to investigate features of epidemiology and prognostic factors for outcome of Chinese patients with osteosarcoma.Method: A homogeneous group of 365 Chinese patients with osteosarcoma received neoadjuvant chemotherapy or/and surgery in a single institution between December 1999 and December 2012 were entered into a retrospective analysis of demographic, tumor-related, and treatment-related variables, prognostic factors for histological response and survival.Results: There were 231 male patients (63.3%; median age 20.8±10.3y) and 134 female patients (36.7%; median age 20.0±9.8y). 62% osteosarcomas were detected in the second decade of life. More than 97% tumors were located in an extremity, among them, 60.8% were situated in femur. 319 patients (87.4%) presented no primary metastases while 46 (12.6%) presented primary metastases. More than 97% patients received neoadjuvant chemotherapy. The rate of amputation was 13.4%. Actuarial 3-year and 5year survival rate was 69% and 65% respectively. Upon univariate analysis, tumor located in limb, no presence of primary metastases, limb-salvage surgery, no local recurrence or metastases after treatment and good tumor response were associated with higher 5-year survival rate. Male sex, amputation surgery and nonconventional subtype of tumor were associated with a higher likelihood of poor response. Conclusions: Except there was no bimodal age distribution, the distribution of demographic and tumor-related variables of 365 Chinese patients with osteosarcoma in this study was typical for this disease. We confirmed that no presence of primary metastases, no presence of local recurrence or metastases after treatment and good response to chemotherapy are prognostically favorable variables.

#### Abstract no.: 40930 IMPORTANT VARIABLES IN MUSCULOSKELETAL TUMOR STUDIES Dariush SAVADKOOHI, Ehsan PENDAR, Mohammad SAVADKOOHI, Babak SIAVASHI

Aim: the aim of this study is designing a variable table in the Statistical Package for the Social Sciences (SPSS) software with relevant values that contains important variables be used in the most orthopaedic oncology studies. Rational for study: one of the most difficult parts of the planning in research study is identifying the research variables and research design. Considerable time and thought needs to be given to this step. Once the key variables have been identified, then the research study can be developed. On the other hand if the researcher has a complete database of variables, it would be possible to consider the correct and rational relationship between variables. Collecting the data of each patient through the first visit and subsequent follow-ups on the basis of specific preset format, would collect that complete database. Methods: with through review on orthopaedic oncology articles, we collected, determined and considered a complete variable database that could be used in the musculoskeletal (MSK) tumor studies. We assigned the specific values to each variable on the basis of SPSS format and studied articles. Discussion It is a database which was designed for a specialized practice in MSK tumor studies and thus is fairly constrained in application to other orthopaedic specialties. however with some modification of variables; it could be used in other studies. This database is originally designed for SPSS, however it is possible to use these variables in any other statistical software.

#### Abstract no.: 39345 A STUDY ON EFFICACY OF CORECUT BIOPSY IN BONE LESIONS Jyothiprasanth M, Gopakumar T S, Khan PRINCE, Nambiar AKHIL R

Introduction: Bone tumours and tumour mimicking conditions are always a challenge to the treating orthopaedician. Corecut biopsy is easy and convenient with low anesthetic and surgical morbidity. The present study deals with histopathological assessment of core cut biopsies of bone lesions, its adequacy and efficacy. Aims and objectives: To study the histopathology of bone lesions received as corecut biopsies .To assess the efficacy of corecut biopsy as an aid in diagnosing bone lesions. Materials and methords: Study period: One year from June 2012 to May 2013. Study sample: 90 Core cut percutaneous bone biopsies for histopathological assessment were included in the study. Clinical and radiological findings were obtained from the patient records. Biopsy was done under local anesthesia, except in very young. Spinal lesions were sampled under CT guidance. These were all decalcified, paraffin embedded, Haematoxylin and Eosin stained and studied. Exclusion criteria: Trucut biopsies of soft tissue lesions without a bony component, radiologically. Trephine biopsies taken as part of hematological workup. Discussion and conclusions: In this study, 80% of bone biopsies could be diagnosed in closed biopsy specimens. More than half the diagnosed cases were malignancies, majority being metastasis from adenocarcinoma or poorly differentiated carcinoma, followed by plasmacytoma. In tuberculosis and chronic infections, a definitive diagnosis can be reached, where therapy can be directed accordingly. In disseminated malignancy, palliative care can be ensued. In Osteosarcoma, limb salvage surgery can be advised. Corecut biopsy, is convenient and cost effective and can be done for tissue diagnosis and needs a close association between the orthopaedician, radiologist and the pathologist.

#### Abstract no.: 42383 PHYSEAL DISTRACTION DURING SURGICAL TREATMENT OF OSTEOSARCOMA OF THE FEMUR Weitao YAO

Background In pediatric patients with osteosarcoma affecting the leg bones, tumor excision and prosthetic replacement may result in considerable limb-length discrepancy. In such patients, the Caadell technique of physeal distraction can be used to preserve the uninvolved epiphysis and avoid the above complication. But in some special cases such as the tumor occupying most of the medullary cavity of the femur, with a normal physis and epiphysis, the Caadell technique was inappropriate. Objective To evaluate the feasibility and short term effect of a new method-physeal distraction during operation in the treatment of growing patients with osteosarcoma who are not suitable for Caadell technique. Method We treated a 9-year-old girl with tumor of the diaphysis and metaphysis of her left femur which left an intact epiphysis and growth plate. After neoadjuvant chemotherapy, she received tumor resection, physeal distraction, the involved femur inactivation and re-implantation sequencely. Regular evaluation of surgical effect was taken in 2 year period during follow-up. Result The whole operation lasted for about 3 hours, with a totle blood loss of less than 600 ml. The epiphysis was separated in 30 minutes. Radiographs showed excellent reduction and fixation of the femur after surgery. During 24 months after operation, limb discrepency reached 6 cm with no tumor relapse or metastasis, and the range of knee joint movement was 90° in flexion and 0° in extension. The revised Musculoskeletal Tumor Society score increased from 46% of preoperative value to 83% postoperatively. Screws fixed in the epiphysis were taken out in order to aviod epiphyseal arrest at 12 months. Nonunion of subtrochanteric junction was observerd and treated with reimplantation of autogenous iliac bone at 16 months. Nonunion of metaphyseal junction and bone resorption happened at the medial metaphysis at 24 months and treanted by another operation of autologus fibia bone replantation
# Abstract no.: 42382 LIMB PRESERVATION OPERATIONS IN THE TREATMENT OF GROWING YOUNG PATIENTS Weitao YAO

Background Limb saving operations in growing young patients with malignant tumor is difficulty because of physis involved by tumor or destroyed by metaphysis resection may cause great limbs discrepancy after surgery. Nowadays, epiphysis non-invasive expandable prosthesis is not commonly used on account of it's expensive price, scarce lengthening equipment and high rate of complications such as distracted neurovascular injuries, deep infection and loosening. So tumor prosthesis or biological reconstruction is the main methods after tumor resection in these patients. Objective To access four limb sparing procedures for the treatment of malignant bone tumors in growing young patients. Methods Between January 2007 and January 2015, 26 patients, fifteen males and eleven females with a mean age of 10.75 years (range, 7 - 15), underwent limb saving operations. There were eighteen osteosarcomas, three Ewing's sarcomas and five fibrosarcomas. Sixteen tumors were in the distal femur and ten in the proximal tibia. Chemotherapy was administered pre- and post-surgery. A transepiphyseal resection was performed in nine patients (group 1) and an epiphysis section after physeal distraction in six (group 2). The affected bones were substituted with massive allograft bone and fixed with intramedullary nails or plates and screws in the two groups. Involved total metaphysis resected with epiphyseal preserving metal prosthesis transfer, termed the knee arthroplasty in nine (group 3) and rotation plasty in two (group 4). Follow-up assessment included tumor control, limb length discrepancy, range of movement (ROM) of the knee and functional outcome of lower limb (Musculoskeletal Tumor Society, MSTS) score and the Toronto extremity salvage score (TESS). Results Four patients died from lung metastases (including two in group 1, one in group 2,3 respectively) and three patients had local tumor recurrence (including one in group 1, 2, 3 respectively) in 9 - 48 months post-surgery. Surgical complications

# Abstract no.: 42381 TREATMENT AND CLINICAL RESULT OF PATIENTS WITH DEEP INFECTION AFTER LIMB SALVAGE OF OSTEOSARCOMA Changye ZOU

Objective: Comparing the result of different operations for infection of patients with osteosarcoma after limb salvage and study the effect of deep infection on the prognosis. Methods: we retrospective reviewed and follow up the osteosarcoma patients registered in our hospital from January 2003 to December of 2008. Patients suffered from the deep infection around the prosthesis were included in the current study. The results of different methods of treatment were compared and Kaplan-Meier survival analysis was used to

determine the effect of infection on the prognosis of the patients Results : 183 patients

#### with osteosarcoma at Ennecking

suffered from the deep infection after limb salvage. The median interval from operation to infection is 8.9 months (range from 2.3 to 31.5 months). 70.6% of the infected patients were positive for bacteria culture, most of them are staphylococcus. 76.5%(13/17) patients with infection were successfully cured with 25 operations. The rate of limb salvage is 82.4%(3/17). the successful rate for debridement, one-stage revision, two-stage revision and amupation were 33.3%,50%, 100% and100% respectively. According to Kaplan-Meier survival analysis, five year survival of patients with and without infection were 79% and 55% (p=0.04) respectively. Conclusion: Two-stage revision was the best choice for treatment of infection. For the aspect of prognosis, patients with infection on the prognosis of the patients with osteosarcoma should be considered when option of treatment was determined.

IIB were

# Abstract no.: 42380 THE WAY OF THE PELVIC REGION II RESECTION AND RECONSTRUCTION Cheng LI

Objective: To investigate of the way of the pelvic region II resection and reconstruction. Methods: To analysis from January 2001 to January 2011 respectively. The part II area of pelvic malignant tumor resection and reconstruction underwent surgery clinical data. In 26 patients, 14 males and 12 females, aged from16 to 72 years, mean age 42 years. Among them, 11 cases of chondrosarcoma, Ewing's tumor one case, three cases of osteosarcoma, malignant fibrous histiocytoma one case, 10 cases of giant cell tumor of bone. All patients underwent acetabular resection, pelvic reconstruction, including artificial semipelvic eight cases, seven cases of saddle-type joints, inactivated replantation + hip replacement three cases. Eight patients underwent tumor curettage + bone cement filling +

hip replacement. Results : 26 cases of tumor resection

II area, a

patients, six patients had local recurrence, including 3 cases of pelvic line inactivated replantation patients. Three cases of osteosarcoma in 2 deaths; 12 cases in six cases of patients with chondrosarcoma tumor-free survival. 3 months after surgery, 19 patients can normally sit, and lifted cane to walk. Conclusions: Tumor resection of acetabular region viable allogeneic transplant or artificial pelvic repair, or inactivation of tumor segment replantation rebuild bone shell

# Abstract no.: 42379 TRANSPEDICULAR LATERAL DEBRIDEMENT, BONE GRAFTING AND POSTERIOR INSTRUMENTATION FOR PRIMARY SPINAL TUMOR Jianzhong HU

PURPOSE: In our paper, we hope to evaluate the efficacy of posterior instrumentation after transpedicular lateral debridement and bone grafting in patients with primary spinal tumor at a single institution. METHODS: A retrospective study was performed in 21 patients (13 males and 8 females, average age 32 years) with primary spinal benign tumor underwent transpedicular lateral debridement, bone grafting, and instrumentation between 2007 and 2014. The average follow-up period was 29.5 months (range 12–47months). The medical records and radiographic findings of the patients were reviewed. The clinical outcomes of deformity, pain, and neurologic function were evaluated using kyphotic angle, visual analog scale pain score, and Frankel grade, respectively. RESULTS: Before surgery, there were one patients with Frankel grade B, three with grade C, six with grade D, and eleven with grade E. During the last follow-up examination, in ten patients with neurological deficit, seven patients improved one grade, one patients improved two grades, and two patients remained unchanged. Stable bone union was observed in all cases and the average time required for fusion was 6.5 months. The kyphosis Cobb angle improved from the preoperative average of 12.46 (range 0-48) to a postoperative average of 5(range 20 to 3). During the follow-up period, there were no grafts or instrumentationrelated stabilization problems. There was no other recurrence of tumors. CONCLUSIONS: transpedicluar lateral debridement ,bone grafting ,and posterior instrumentation are safe and effective methods in the surgical management of primary spine benign tumor

# Abstract no.: 42378 ADAMANTINOMA OF THE LONG BONES – A RETROSPECTIVE STUDY OF 18 CASES Zhiping DENG

Background: Adamantinoma of long bones is an extremely rare tumor. The purpose of this study was to evaluate the characteristics as well as the oncological outcome of this tumor. Methods: Eighteen cases were enrolled from 1999 Dec to 2014 Mar. The median age was 23 years old (range 15-46). The tumor located at tibia in 14 cases, at both ipsilateral tibia and fibula in 3 cases and at fibula in 1 case. Eleven cases were original and 7 cases had surgical history. Eleven tibia cases were resected. Three tibia cases were curetted. In three multicentric cases, two were resected, one was curetted in tibia and resected in fibula. The fibular case was resected. Results: The wide margin was achieved in 12 cases, marginal margin in 2 cases and intralesional margin in 4 cases. The median follow-up was 40 months (range 12-128 months). The local recurrence rate was 22% (4/18), which was related to margin and previous surgical history significantly. The metastasis rate was 16.6% (3/18) which was not related to the surgical margin, but related to the local recurrence and previous surgical history significantly. At the end of follow-up, 15 patients were disease-free. Three patients were alive with disease. Three cases were amputated because of the local recurrence. Conclusions: Wide surgical margin is essential to adamantinoma of long bones. This tumor should be treated at the orthopaedic oncology referring center. The local recurrence and lung metastasis can occur. Long term follow-up is necessary to these patients.

# Abstract no.: 42377 RISK FACTORS OF POSTOPERATIVE NEUROLOGICAL DEFICITS AFTER NERVE ROOT RESECTION IN THE TREATMENT OF SPINAL INTRADURAL SCHWANNOMA LOCATED BELOW THE Fei ZOU

Objective To investigate the risk factors of postoperative neurological deficits after nerve root resection in the treatment of spinal intradural schwannoma by clinical features and immunostaining of tumors. Method Clinical and pathological data were selected from patients underwent total resection of the tumor with the affected nerve root in our institute from November 2005 to July 2013. Including criteria was solitary non-dumbbell spinal schwannoma from T11 to S1. A total of 56 patients who were divided into two groups were included in this study. The postoperative neurological deficits positive group (PND group) and postoperative neurological deficits negative group (non-PND group). Clinical features including age, sex, preoperative symptoms, duration of the disorder, diabetes, smoke, preoperative VAS, preoperative SF-36 score, tumor length, tumor-occupied ratio, and immunostaining including NF, CD34, CD68, SMA, Ki-67 were compared between the two groups. P<0.05 was considered as statistical significance. Result For general conditions, age (48.60±2.26y vs. 49.60±5.63y), sex (M/F: 6/4 vs. 21/25), pathogenesis (21.70±11.33) months vs. 16.70±4.09 months), diabetes (1/10 vs. 6/46), smoke (1/10 vs. 2/46), preoperative VAS (3.20±0.60 vs. 3.07±0.23) and SF-36 score (61.30±1.65 vs. 60.76±0.74) were not significantly different between PND group and non-PND group (P> 0.05). For tumor size, the tumor length was 2.72±0.41 cm in PND group and 2.02±0.12 cm non-PND group, which was not significantly different between two groups (P=0.108). The tumoroccupied ratio was 69.93±2.80% in PND group and 68.10±1.99% in non-PND group, which was not significantly different (P=0.694). For preoperative symptoms, 2 of the 10 patients (20.0%) had lower extremity

### Abstract no.: 42376 CHONDROBLASTOMA OF BONE IN THE EXTREMITIES: A MULTI-CENTERED RETROSPECTIVE STUDY Hairong XU

Background: Chondroblastoma is a rare benign cartilage tumor that occurs in children and adolescents. To date no multi-centered research has been reported on this disease. The current research was designed to review the epidemiological characteristics and outcomes of surgical management in a large series of patients with extremity chondroblastoma. Methods: We performed a multi-centered retrospective analysis of 199 patients with extremity chondroblastoma. Clinical data, radiographic images, histological findings, treatment and outcome were analyzed. Results: This series included 145 male and 54 female patients with a mean age of 18.0 years. The most commonly involved location was the proximal tibia (55, 27.6%), followed by the proximal femur (52, 26.1%) and distal femur (38, 19.1%). Prior to presentation, 73.4% (146/199) of the patients suffered from pain for a mean of 8.7 months. The physis was open in 25.7%, closing in 22.2%, and closed in 52.1% of the patients at the time of diagnosis. The treatment and outcome of 126 patients with a mean follow-up of 62.1 months (range, 24-190) were evaluated. 119 (94.4%) of 126 patients were initially treated with curettage and 7 with en bloc resection. The local recurrence rate of curettage and resection was 5.0% and 0% respectively. The only significant factor related to recurrence was the location of the lesion in the proximal humerus (P=0.001). Eleven of 126 patients had complications postoperatively other than local recurrence. The overall MSTS score was 29.2 (range, 22 to 30) for patients 19 years old or more, and the mean global PODCI score was 98 (range, 94 to 100) for patients less than 19 years old. Conclusions: Chondroblastoma is most frequently encountered in the proximal tibia and the proximal femur with significant male predilection. In this series,

## Abstract no.: 42375 IMAGE-GUIDED RADIOFREQUENCY ABLATION (RFA) OF OSTEOLYTIC SPINAL TUMORS Xiaoguang LIU

During the recent years. Radiofrequency Ablation (RFA) therapy is a rapidly developing non-vascular interventional treatment method. It is widely used particularly in minimally invasive treatment of cancer. It emits radio waves through the RF electrode causing ions around the electrode to generate heat through friction. This leads to thermal damage and coagulation necrosis of tumor tissue at certain distance around the electrode resulting in killing of tumor cells. Current applications focus on liver, kidney, lung, and other solid organ tumors. Our institute applied RFA for the treatment of spinal tumors since 2010 and mainly concentrate on three areas: 1) CT-guided percutaneous RFA for benign spinal tumors such as osteoid osteoma; 2) intraoperative application to reduce blood lost and improve tumor resection rate; 3) image-guided percutaneous RFA for painful spinal metastasis. From January 2010 to January 2012, 4 patients with spinal osteoid osteoma received RFA in our institute. All the patients were male with an average age of 33.5 years old. The tumor locations were odontoid in one case, left sacral foramina of S2 in one case, L2 transverse process in one case, and C2 lateral mass in one case. Treatments were performed with a 64-slices helical CT (GE, USA). The radiofrequency Cool-Tip ablation system (Tyco, USA) RFA equipment was used. The procedure was carried out under CTguidance with local anesthesia. The RFA generator monitored the real-time heating temperature of the tip to maintain constantly at 90°C. The procedure lasted for 4 minutes. No RFA related complications occurred. 3 patients achieved complete pain relief (VAS score reduce to 0) and 1 patient achieved partial pain relief (VAS score reduce to 2 from 9) 24 hours after the procedure. During the last follow-up review, the effect of the therapy still persisted. We concluded that CT-guided percutaneous radiofrequency ablation of spinal

# Abstract no.: 42374 DOES INTRA-EPIPHYSEAL RESECTION LEAD TO LIMBS DISCREPANCY IN SKELETALLY IMMATURE PATIENTS OF DISTAL FEMUR OSTEOSARCOMA?

Xu Songfeng XU

Background We tried to determine whether intra-epiphyseal resection for epiphysis preservation could lead to limb discrepancy without increasing the risk of local recurrence or death in patients with osteosarcoma in distal femur. Methods We retrospectively reviewed 5 children of osteosarcoma in distal femur in our institution, who underwent limbsalvage surgery of intra-epiphyseal resection for epiphysis preservation with inactivatedautograft or allograft reconstruction. They were one boy and four girls with an average age of 9.2 years (range 6-14 years). We tried to analyze the lower limb length and the complications. MSTS scores were used to analyze the functional outcomes. Results After a mean follow-up of 100 months (80 - 167months), all children were alive. Four patients continued to be disease-free and one experienced late postConclusions As for epiphysis preservation, intra-epiphyseal resection without the preservation of the chondrocytes layer followed biological reconstruction in distal femur lead to limb discrepancy. The chondrocytes layer of physeal growth cartilage (physis) is the most important site for limb growth. This limb salvage procedure does not increase the risk of local recurrence or death in patients with osteosarcoma in distal femur. Keywords epiphysis preservation, intra-epiphyseal resection, osteosarcoma, limb discrepancy, alcohol-inactivated autograft replantation

#### Abstract no.: 40943 THE PREVALENCE AND FACTORS ASSOCIATED WITH NECK, SHOULDER AND LOW BACK PAINS AMONG MEDICAL STUDENTS AT UNIVERSITY HOSPITALS Abdulrahman ALGARNI

Aim: To determine the prevalence of neck, shoulder and low back pain, and factors associated with MSP among medical students at university hospitals in central Saudi Arabia. Method: This cross-sectional study conducted among 469 medical students enrolled at a government institution in Central Saudi Arabia using an online selfadministered questionnaire in the English language adapted from the Standardized Nordic Questionnaire. Results: Four hundred and sixty nine students responded to our survey. Mean age was 21.4 ± 1.3 years. Majority were females (60.6%), all were Saudis. The prevalence of MSP (at least in one body site) was 85.3% at any time. The prevalence of MSP in the past week was 54.4% and 81.9% in the previous year. The prevalence of neck pain was 24.1% in the past week and 56.5% in the previous year. The prevalence of back pain was 40.5% in the past week and 67.0% in the previous year. The prevalence of shoulder pain was 25.6% in the past week and 45.6% in the previous year. More than half (58.6%) of the participants experienced depressive symptoms. A higher prevalence of MSP among students in the clinical years. MSP was correlated to a positive history of trauma but not to BMI, age, gender. Frequency of exercise, caffeine and smoking. Conclusion: MSP among Saudi medical students is high particularly among medical students in the clinical years. Students who suffer from MSP are prone to develop depressive symptoms and experience a low quality of medical students life.

# Abstract no.: 40902 UTILIZING WEIGHTBEARING CT TO EVALUATE SYNDESMOTIC RECONSTRUCTIONS

Boyko GUEORGUIEV, Jennifer HAGEN, Geoff RICHARDS, Mark LENZ, Paul SIMONS, Kajetan KLOS

Purpose: There is evidence that both incomplete treatment and malreduction of injuries to the syndesmosis can lead to poor clinical outcomes. This study's aim is to compare the ability of two reconstructive techniques to restore anatomic positioning of the syndesmosis. Methods: 14 paired, fresh frozen human cadaveric limbs were mounted in a weightbearing simulation jig. CT scans were obtained in the simulated foot-flat loading (75N) and in single-legged stance (700N), in five foot positions: neutral, external rotation, internal rotation, dorsiflexion, and plantarflexion. The elements of the syndesmosis and deltoid ligament were sequentially sectioned and rescanned following each resection. One of each pair was then reconstructed via two methods: Achilles autograft and peroneus longus ligamentoplasty. Results: Multiple measurements were made to define the position of the fibula in the incisura. The deformity at the incisura was consistent with clinical injury, and the degree of displacement in all ligament states was dependent on the foot position. Statistically significant differences between the intact and reconstructed states were found with all measurements, specifically when the foot was in external rotation and dorsiflexion. (p<.05) There was no significant difference with direct comparison of the reconstructions. Conclusion: This study has detailed the motion of the fibula in the incisura and its variation with foot position. Neither reconstruction was clearly superior, and both techniques had difficulty in the externally rotated and dorsiflexed positions. This study design can serve as a model for future ex vivo testing of reconstructive techniques.

# Abstract no.: 39530 WEAR AND DUAL MOBILITY CUP (DMC). EXPERIMENTAL STUDY AND CLINICAL RESULTS

Jacques, Henry CATON, André FERREIRA, Jean Louis PRUDHON, Thierry ASLANIAN

Introduction : Hip dislocation and polyethylene wear remains one of the major short and long term complications after THA. DMC is an effective method to prevent dislocations but its specific design can raise, with a "large head functioning" and two articulations (small and large), the suspicion of an increase "double wear" with two consequences: osteolysis and loosening. Method : We have conducted an experimental study to measure the gravimetric wear (loss of material) ant the penetration rate of 2 different implants on hip simulator (AMTI). The goal was to compare loss of mass and penetration rate for fixed and DMC in the same experimental conditions. Results : The head penetration and the polyethylene loss are respectively 0.005 mm to 0.11 mm and a gravimetric wear of 10.3 mg to 51.5 mg by million cycles. Discussion : Adam showed by surface analysis of 40 retrived DMC, a volume wear of 28.3 mm3/year for the large articulation and 28.9 mm3/year for the small articulation giving a mean annual total volumetric wear of 54.3 mm3/year. This wear was to the same order as reported for a metal/polyethylene bearing with a 22.2 mm head as in Charnley THA. For low cross-linked polyethylene liner, the use of finite element analysis permit to predict a wear rate between 13.7 and 27.9 mm3 /million cycles as Stulberg (2010) with a reported wear of 20.9 mm3/ million cycles. Conclusion : Experimental studies and clinical results are in agreement and show not an increased wear with DMC.

#### Abstract no.: 39630 RECIPROCAL ACTIVATION OF PLATELETS AND CD4+ TREGS FOLLOWING TRAUMA

Marc HANSCHEN, Christian BERGMANN, Friederike HEFELE, Marina UNGER, Stefan HUBER-WAGNER, Peter BIBERTHALER, Martijn VAN GRIENSVEN

CD4+ T regulatory cells (Tregs) have been shown to be key players of the antiinflammatory host response following trauma. Knowledge about the mechanisms leading to Treg activation following injury are missing so far. Recent evidence suggests platelets to play a protective role after trauma. Here we test the hypothesis that trauma induces reciprocal activation between platelets and Treas. Depletion of platelets or Treas was conducted in a murine burn injury model. Draining lymph nodes, blood and spleen were harvested early (2h) and late (7d) following trauma. Treg activation was measured using phospho- and conventional flow cytometry. Platelet activation was analyzed using thromboelastometry and flow cytometry. Trauma differentially activates CD4+ T cells, early after trauma only Tregs, but not non-Tregs, are activated. Following burn injury, platelets augment the activation of Tregs. This effect could only be seen early after trauma. While Tregs influence hemostasis as seen by ROTEM early following trauma, platelet activation markers were unchanged. Beyond their role in hemostasis, platelets are able to modulate the immune response following trauma. Our observations indicate for the first time that reciprocal activation of platelets and Tregs is part of the protective immune response following trauma. Platelets modulate the immunologic host response to trauma-induced injury. Our data suggests, that reciprocal activation is taking place following trauma. Tregs are capable of modulating the hemostatic function of platelets. The newly described interaction between Tregs and platelets might be a suitable clinical target for the development of immunomodulatory drugs following trauma.

# Abstract no.: 40035 PREDICTING MEDICAL COMPLICATIONS IN SPINE SURGERY TO ENHANCE PATIENT SAFETY

Maximilian KASPAREK, Petra KREPLER, Anna RIENMÜLLER, Reinhard WINDHAGER, Grohs JOSEF

Introduction: The preoperative evaluation of medical complications prior to spine surgery is gaining in importance nowadays. Lee et al. (Spine 2014;14:291-299) created the first validated model for predicting medical complications after spine surgery. This model offers the user an absolute percentage likelihood of complications after spine surgery based on the patient's comorbidity profile and invasiveness of surgery. This new tool was tested within the daily clinical practice in order to improve patient safety and to assess whether the forecasted evaluation would prove to be correct. Materials and Methods: All patients, who underwent spine surgery, were assessed prospectively. The risk of medical complications was estimated with the online calculator, which is named SpineSage<sup>™</sup>, prior to surgery. Results: 100 patients have been assessed since April 2014, with an average age of 59.3 years (range 15 - 86) and a BMI of 27.5 (range 18.6 - 40.1). The mean Surgical Invasiveness Score was 7,9 points (range 1 to 31). The mean risk for all patients for major complications was 7,2%; for minor complications 20,8%; for infection 7,0% and for dural leak 9,1%. In total medical complications were reported in 23% of the patients and in 4% a major complication occurred. Infection was seen in 4% and dural leak in 1%. Conclusion: In conclusion, the prediction of medical complications assists in the preoperative decision making process as well as in counselling patients about their medical complications risk.

# Abstract no.: 41222 A STUDY EVALUATING THE AUTOLOGOUS PLATELET RICH PLASMA (PRP) AS A MONOTHERAPY IN MANAGEMENT OF INFECTED COMPLEX WOUNDS

Sandeep SHRIVASTAVA, Pradeep SINGH, Shounak TAYDE

It is not uncommon to come across the infected complex wounds associated with fractures , exposed bones / tendons ; Pressure and tropical ulcers etc which are resistant to healing. Management of such wound is a big challenge and delay in healing leads to further complications inviting larger morbidities. An effective simple solution still remains a challenge under such conditions. In this prospective study such complex infected wounds, were treated with autologous infiltration of Platelet rich plasma (PRP), as mono therapy . The mono therapy has been standardised after establishing the scientific evidences of its benefits over last 3 years, including study on rabbit model. A 4-6ml of PRP is prepared from Patients own blood (20 ml) and injected at equi-distance in the wound's edges. They were injected at the interval of 3 days, till wound has healed or have been grafted, The wounds responded dramatically to this management, healed promptly and showed accelerated healing rate with infection control. None of them were given antibiotics and only normal saline soaked dressings were applied. The cultures of initially infected wounds in 95% cases become sterile after this therapy. No infection progressed further and become life /limb threatening. The PRP has immense biological potentials towards healing through growth factors, lysozymes and antimicrobial properties. It is a low cost, safe and very effective solution for wound management. The Autologous PRP Monotherapy is an office procedure, which has potential to revolutionise the management of infected wounds. forever.

# Abstract no.: 41603 EFFECT OF STORAGE TEMPERATURE ON POLYMETHYL METHACRYLATE (PMMA) BONE CEMENT POLYMERIZATION IN JOINT REPLACEMENT SURGERY

Bryan Thean Howe KOH, Jonathan Jiong Hao TAN, Amit Kumarsing RAMRUTTUN, Wilson WANG

Introduction: Polymethyl Methacrylate (PMMA) Bone Cement is an integral part of joint replacement surgery. The setting time of PMMA cement is of clinical importance to surgeons as it dictates the amount of working time before the implant is irreversibly set in place. Our objective was to find out the extent to which storage temperature of PMMA cement affects its setting time. Methodology: SmartSet High Viscosity (HV) cement packs were split into 5 groups and stored for 24 hours based on storage temperature: 1) 20°C (control) 2) 22°C 3) 24°C 4) 26°C and 5) 28°C. 30 minutes of equilibration time was allowed at 20°C before the cement packs were mixed. The doughing, setting and working time of the cements were measured. Results: At storage temperatures of 20°C, 22°C, 24°C, 26°C and 28°C, doughing time of the PMMA cement was reduced correspondingly: 132s (20°C), 130s (22°C), 128s (24°C), 127s (26°C) and 120s (28°C). Setting time was reduced correspondingly: 537s (20°C), 530s (22°C), 520s (24°C), 516s (26°C) and 490s (28°C). Working time was reduced correspondingly: 395s (20°C), 390s (22°C), 390s (24°C), 382.5s (26°C) and 375s (28°C). Conclusion: Our study suggests that at 30 minutes of equilibration, increasing the storage temperature reduces the doughing, setting and working time of PMMA cement. However, the reduction is gradual, consistent and predictable. The peak exothermic temperature (Tmax) of bone cement was shown to have reached temperatures above 100°C. This could potentially increase the chance of thermal necrosis in vivo.

# Abstract no.: 41174 THE INHIBITORY EFFECT OF MAGNESIUM DEGRADATION PRODUCTS ON OSTEOCLAST FORMATION AND BONE RESORPTION VIA BLOCKING CA2+/CN/NFATC1 SIGNALING PATHWAY

Zanjing ZHAI, Xinhua QU, Haowei LI, Xuqiang LIU, Zhengxiao OUYANG, Guangwang LIU, Qiming FAN, Tingting TANG, An QIN, Xiaodong CHEN, Kerong DAI

Purpose: magnesium is expected to be a new generation of orthopedic implant with superior mechanical properties and biodegradability. Previous studies mainly focus on the effect of magnesium degradation on osteoblast and mesenchymal stem cell. As osteoclast is the unique cell that can absorb bone, its critical role can never be neglected. Strangely enough, up to now, research involving the effect of magnesium on osteoclast metabolism is lacking. Therefore, this study aims to fill in this gap. Methods: in vitro, we investigated the effect of magnesium degradation on osteoclast formation and revealed the potential molecular mechanisms. In vivo, wear particle-induced osteolysis model was established, micro-computed tomography scanning, H&E staining and elisa tests were used to examine the effects of magnesium degradation on bone mass and inflammatory reaction. Also, we evaluated the influence of magnesium degradation on osteoclastogenesis and bone remodeling in vivo by TRAP staining and serum bone turnover makers test. Results: magnesium degradation severely inhibited osteoclast formation and bone resorption in vitro though attenuating Ca2+/CN/NFATc1 signaling pathway, and this was the contribution of both magnesium ions and alkalosis. In vivo magnesium degradation showed bone protective effect by preventing wear particle-induced osteolysis and increasing bone mass. What's more, magnesium degradation significantly reduced levels of wear particle-induced inflammatory factors and TRAP+ osteoclasts in vivo. Conclusion: magnesium degradation showed anti-osteoclast formation and bone resorption activity both in vitro and in vivo. These results fill in the blank of magnesium degradation induced osteoclastic reaction, and are expected to enlighten new application of magnesium.

### Abstract no.: 40929 COMPARISON OF A LOCAL ORTHOPEDIC RESIDENCY TRAINING PROGRAM WITH A NORTH AMERICAN PROGRAM Abdulrahman ALGARNI

The primary aim of the present study was to assess the quality of the local orthopedic residency training program in Saudi Arabia. As a comparator, a cross-sectional survey involving 76 local residents and 15 Canadian-trained residents at McGill University (Montreal, Quebec) was conducted. The results showed that Canadian residents read more peer-reviewed, scholarly articles compared with Saudi residents (P=0.002). The primary surgical role for residents was to hold retractors during surgery. The survey respondents strongly supported the ability to recommend removal of incompetent trainers. Saudi trainees were more apprehensive of examinations than Canadian trainees Most residents preferred studying multiple-choice questions (P<0.0001). before examinations. Saudi and Canadian participants considered their programs to be overcrowded. Unlike Canadian participants, Saudi trainees reported an inadequate level of training (P<0.0001). In conclusion, educational resources should be readily accessible and a mentorship system monitoring residents' progress should be developed. The role of the resident must be clearly defined and resident feedback should not be ignored. Given the importance of mastering basic orthopedic operative skills for residents, meaningful remedial action should be taken with incompetent trainers.

## Abstract no.: 40563 NANOFIBROUS HEPARIN-CONJUGATED GELATIN SCAFFOLDS WITH CONTROLLED RHBMP-2 RELEASE FOR ENHANCED BONE REGENERATION Chen DING, Hao LIU

In tissue engineering, the spatially and temporally controlled delivery of growth factors is essential fortissue regeneration. The objective of this study was to developnovel heparinconjugated gelatin scaffolds with three-dimensional (3D) nano-structured architecture and the capability of controlled releasing recombinant human bonemorphogenetic protein-2 (rhBMP-2)to enhance bone regeneration. Through a chemical crosslinking process, heparin was efficiently conjugated with gelatin to form heparin-gelatin. Usinggelatin and heparin-gelatin in proper proportion, the composite scaffolds withgood mechanical strength, high surface areas and porosities, well-interconnected macropores and biomimeticnanofibrous wall structureswere fabricated by combining a thermally induced phase separation (TIPS) technique and a porogen-leaching process. This novel composite scaffoldallowed the binding of rhBMP-2 viaelectrostatic interaction. In vitro release profiles indicated that the release of rhBMP-2 from composite scaffolds could be temporally controlled, depending on the amounts of heparin incorporated into the composite scaffolds.A rat critical-size calvarialdefect model was used to evaluate the capacity of the scaffolds to enhance in vivo bone formation. 6 weeks after implantation, the radiography, microcomputed tomography and histological staining all showed that rhBMP-2- loaded composite scaffolds regenerated a higher amount of bone than either rhBMP-2-loaded unmodified gelatin scaffolds or unloaded composite scaffolds. Immunohistochemical stainingalso confirmed a higher content of bone mineralization in the rhBMP-2-loaded composite scaffolds.We concluded that the novel scaffolds is suitable for bone tissue engineering.

#### Abstract no.: 40025

## THE USE OF COMPOSITE MATERIAL COLLAPAN-S (CONTAINING SILVER NANOPARTICLES, COLLAGEN AND NANOSTRUCTURED SYNTHETIC HYDROXYAPATITE) FOR REPLACEMENT OF BONE DEFECTS AND ACTIVATION OF REPARATIVE OSTEOGENESIS Gennady BERCHENKO

The aim of this work was experimental morphological and clinical substantiation of the possibility of applying the material Collapan-S (containing silver nanoparticles, collagen and nanostructured synthetic hydroxyapatite) for replacement of bone defects and activation of reparative osteogenesis. Materials and methods: an experimental research was conducted on 60 male rats. In the first group of animals the bone defect healed on its own, in the second group Collapan-G (contains antibiotic Gentamicin) was injected into the bone defect, in the third group - Collapan-S. Materials were implanted into metaepiphyseal defect of the tibia. The material from the bone defects was investigated histologically at the 7, 14, 30 and 60 days after surgery. The antimicrobic activity of Collapan-G and Collapan-S were examined by means of microbiologic methods in vitro. Collapan has been applied in the clinic for more than 170 patients with complex treatment of the slowly consolidating fractures and false joints. Results: results of morphologic examination showed that implanted into defects of bone Collapan-S was gradually subjected to lysis and substituted by newly formed bone. On the surface of Collapan-S granules osteoid bone was formed, which gradually transformed into mature lamellar bone. According to microbiologic examinations, Collapan-S induced the stable delay of growth of microorganisms in the test-culture. Using Collapan-S in the clinical practice, especially in combination with PRP (Platelet-Rich Plasma), has allowed obtaining a positive effect in 97.8% of cases among 62 patients with slowly consolidating fractures and 114 patients with false joints.

# Abstract no.: 40878 BMP-7 COULD INDUCE THE CHONDROGENIC DIFFERENTIATION OF HUMAN MESENCHYMAL STEM CELL ON TRICALCIUM PHOSPHATE-COLLAGEN SCAFFOLDS He AISHAN

Bone morphogenetic protein-7 (BMP-7) is one of the most promising growth factors in cartilage tissue engineering, the effect of exogenous BMP-7 on human bone marrowderived mesenchymal stem cells (hMSCs) cultured on tissue engineering scaffolds is still not clear. This study aims to evaluate the role of BMP-7 in the chondrogenic differentiation of hMSCs cultured on tricalcium phosphate-collagen (TCP-COL) scaffold in vitro. hMSCs were isolated and seeded on the scaffolds. The hMSCs-seeded scaffolds were cultured in the absence or presence of BMP-7 (50ng/mL, 100ng/mL) for 2 weeks. hMSCs distribution and matrix formation were monitored by histological staining and scanning electron microscopy analysis. Gene expression and protein appearance involved in the chondrogenic differentiation were investigated by sulfated glycosaminoglycans (GAGs) quantification, immunohistochemical staining, histological staining and RT-PCR. The cell death rate of hMSCs was assessed with TUNEL assay. The results were compared to the untreated group. Our results demonstrated that BMP-7 could induce the chondrogenic differentiation of hMSCs on the TCP-COL scaffold, and the concentration of 100ng/mL BMP-7 was superior than 50ng/mL with regard to the chondrogenic inductive effect. No obvious toxicity of BMP-7 has been detected in our research. The TCP-COL scaffold combined with BMP-7 might be a useful tool for cartilage tissue engineering.

#### Abstract no.: 40695

# USE OF BIOREACTORS IN AUTOLOGOUS CHONDROCYTE CULTURE OVER THREE DIMENSIONAL BIODEGARADABLE SCAFFOLDS TO REPAIR ARTIFICIALLY CREATED CHONDRAL DEFECTS IN RABBIT. Kumar PRITESH, Amit RASTOGI, Pradeep SRIVASTAVA, Gyanendra JHA

Background: The study evaluates the role of autologous cultured chondrocytes impregnated on three dimensional PGA and PLA biodegradable scaffolds and grown over a bioreactor system in resolution of problems like dedifferentiation of chondrocytes during culture and washout into joint space of transplanted cells. Material and methods : 12 animal models(rabbits) were studied that were divided into three groups based on the follow up period of 4, 8 and 12 week. The distal femur was injured by a drill bit of 2.5 mm not extending upto the bone. Bits of cartilage obtained were transported in DMEM media to the laboratory where they were processed, centrifuged & isolated. The isolated chondrocytes impregnated over 3-dimensional biodegradable scaffolds of PGA and PLA were grown over in an air-lift bioreactor system for two weeks which were implanted into the defect created in one of the limb and followed up for 4-weeks, 8-weeks and 12-weeks with other limb as control. Implant and control limbs were preserved in formalin. Gross and histopathological examination of the specimens with Haematoxylin and Eosin stain and electron microscopy of scaffold structure was done.Results :At 12-weeks, except one subject which showed fibrotic healing, all control limbs showed no healing while the implant group showed regular as well as proliferative growth with uptake of graft at the bed and coalition at the junction lesser fibrosis & evidence of nodulo-proliferative growth.Conclusion : The results showed differentiated fibrohyaline cartilage tissue, less fibrosis, better merging with the surrounding epithelium, and uptake at the bed.

# Abstract no.: 39832 TISSUE ENGINEERING STRATIFIED SCAFFOLDS FOR ARTICULAR CARTILAGE AND SUBCHONDRAL BONE DEFECTS REPAIR Ming LIU

Background: Numerous scaffold architectures and formation methods for articular cartilage and subchondral bone defects repair have been developed and tested, but the ideal scaffold design is still controversial. Moreover, scaffold fixation has a significant influence on repair and regeneration after implantation. Materials and Methods: We analyzed relative studies to address the latest scaffold designs and the intrinsic properties of them, including biphasic scaffold, multilayered scaffold, and continuous nonstratified scaffold, and this article compares their advantages and disadvantages. In addition, we introduce a novel modified method for scaffold fixation known as magnetic fixation. Results: Disadvantages of biphasic scaffold include a lack of interface composites and relatively lower cell migration rate. Multilayer scaffolds with an intermediate layer known as a tidemark more closely mimics the real biological relationship between the cartilage and subchondral bone and has better interface differentiation and proliferation. Furthermore, the osteoblast related protein expression induced by the bony phases do not affect the quality of the extracellular matrixes in the chondral phases due to the intermediate layer.After the discovery of the gradients of bioactive signals between the bony and chondral phases, modified multilayer scaffolds characterized by a continuous, gradually varied interface that may lead a region-specific coculture have been developed to achieve a more interconnected and biomimetic structure. Conclusion: Continuous nonstratified scaffolds are more biomimetic compared with the native osteochondral structures, and they lead to a better regeneration of hyaline-like cartilage and structured bone tissue.

# Abstract no.: 41253 SYNTHESIS OF A NOVEL CLAY-BASED NANOCOMPOSITE HYDROGEL WITH SUITABLE MECHANICAL PROPERTIES AND ITS APPLICATIONS IN TISSUE ENGINEERING

Xinyun ZHAI, William Weijia LU, Wenguang LIU

A novel nanocomposite hydrogel (NC gel) was successfully prepared by in situ free-radical photo-polymerization of the acrylic acid derivatives in the presence of exfoliated clay platelets in aqueous systems with different clay contents. Although N-isopropylacrylamide (NIPAM) and N, N-dimethylacrylamide (DMAA) have already been used as monomers in the clay-based hydrogel, this was the first time to add this kind of acrylic acid derivative into clay system and hydrogel could form without using an organic cross-linker. The obtained hydrogel not only exhibits dramatic improvements in mechanical properties but also has drug loading and release behaviors. Unlike conventional physically cross-linked hydrogels, this kind of clay-based hydrogel was insoluble in PBS or hot water even water was 80~90 ac.testecshow that the obtained clay-based hydrogel has the best tensile strength (about 400 kPa) and excellent stretch ability (higher than 5000%) when clay content and solid content are 5% and 20% respectively. The compression strength of the hydrogel is higher than 8 MPa and can recover to its original shape when compression ratio is less than 80% which will be very attractive for tissue engineering. Besides mechanical properties, crosslinking density, crosslinking mechanism and swelling will be tested by Raman spectroscopy, FTIR, XRD and SEM methods. More interestingly, the obtained hydrogel has good biocompatibility and high viscosity before photopolymerization, which means that this kind of hydrogel is a very suitable bioink candidate of the layer-by-layer bioprinting method for the fabrication of stratified tissues.

# Abstract no.: 41520 BIOCOMPATIBILITY OF POLYVINYL ALCOHOL/NANO-HYDROXYAPATITE+POLYAMIDE66 COMPOSITE MATERIAL IN REPAIRING ARTICULAR CARTILAGE IN VIVO Yang LIU, Tian-Fu YANG

Introduction: This study observed the biocompatibility of a novel biological composite material in repairing articular cartilage and subchondral bone in animal bodies. METHODS: Acute general toxicity test: SD rats were randomized into two groups, and received peritoneal injection of 20% diffusion solution and 1 mL saline respectively. Change of activity and weight in experimental animals were observed. Haemolysis test: Anticoagulant rabbit blood was added into the composite material powder to work out the rate of haemolysis. Subcutaneous implantation test and chronic toxicity test: The back of SD rats were implanted with composite materials. Samples were harvested to observe the tissue reaction at 2, 4, 8 weeks. Liver and kidney functions were determined at 12 weeks to assess whether the material had long-term toxicity.RESULTS: The rats' activity was normal in the acute toxicity test on the whole body. Animal's weight in experimental group was growing and there was no significant differences compared with the control group .Haemolysis rate of rats to different concentrations of diffusion solution was < 5%, under the standard criteria. In chronic toxic reaction, rat's liver and kidney function was not different compared with the control groups at 12 weeks and the index before operation (P > 0.05). Histological sections revealed that, the fibrous tissue and some blood vessels grew into the porous materials and became the whole structure with the composite materials, without rejecting reaction.

# Abstract no.: 40152 OSTEOGENIC ACTIVITY IN VITRO AND VIVO OF THE NOVEL VANCOMYCIN-LOADED BONE-LIKE HYDROXYAPATITE/POLY AMINO ACID SCAFFOLD

Zhidong CAO, Dianming JIANG

Introduction: Local implantation treatments of antibiotics loaded carriers were developed due to the abilities of dead space elimination and delivery antibiotics in local sites. But currently the most common used antibiotic carrier---PMMA---has many inevitable shortcomings, such as heat production, non-absorbable nature and lack of bone regeneration or conduction. Vancomycin loaded Bone-like hydroxyapatite/poly amino acid (BHA/PAA) scaffold was successfully fabricated by homogeneous system method of diffusion control system, and good bone regeneration was observed in this research. Methods: In vitro tests, MG63 cells were incubated together with this Vancomycin loaded scaffold to observe whether and how this scaffold affect activities of osteoblasts. In vivo tests, this scaffold was implanted into rabbit model with chronic osteomylitis including standard S.aureus and MRSA. Effects were evaluated by the method of gross observation, X-ray, histology and calcein fluorescent labeling. Results: After incubating with this scaffold, MG63 was observed keeping good activities of proliferation and calcium or ALP synthesis. In vivo tests, experimental group was observed better bony growth than control groups in infectious bony defects whether in standard S.aureus or MRSA. Conclusion: Vancomycin loaded BHA/PAA scaffold has a good potential to repair infectious bony defects due to capacities of antibiotics delivery and bony regeneration.

# Abstract no.: 40325 CONTROLLED RELEASE OF RHBMP-2 AND VANCOMYCIN FROM NHAC/α-CSH SCAFFOLD FOR TREATMENT OF CHRONIC OSTEOMYELITIS Kezheng MAO

The treatment of contaminated and infected bone defects remains an intractable problem, and the ideal approach consists of simultaneously controlling the infection and repairing the bone defect. Thus, the development of an osteoconductive bone graft composite with antibiotic and growth factor release capabilities as well as osteogenesis-matched degradation properties is necessary. A new nano-hydroxyapatite/collagen/a-calcium sulfate hemihydrate (nHAC/α-CSH) composite consisting of vancomycin and recombinant human bone morphogenic protein-2 (rhBMP-2) was developed. The present study assessed its efficiency in vitro and in a rabbit femur defect model both in vitro and in vivo for treating chronic osteomyelitis induced by methicillin-resistant Staphylococcus aureus in a rabbit model. When immersed in phosphate-buffered saline, the pellets showed sustained vancomycin release over 15 days. The implants converted to a bone-like HA graft and supported the ingrowth of new bone into the femur defects within 12 weeks of implantation. Micro-computed tomography and histological analysis showed that the implants provided a cure for the bone infection. The results indicate that the rhBMP-2vancomycin-loaded nHAC/a-CSH implant, which combines sustained drug release and the ability to support new bone ingrowth, could provide a method for treating chronic osteomyelitis. This composite is a potential therapeutic agent for contaminated or infected bone defects due to its concomitant osteoinductive and antibiotic properties.

# Abstract no.: 42340 BILAYERED ECM/HYDROXYAPATITE SCAFFOLD WITH LOW PERMEABILITY FOR OSTEOCHONDRAL INTERFACE IN SITU REGENERATION Haoye MENG

Objective: Osteochondral interface regeneration is challenging for functional and integrated cartilage repair. A variety of layered scaffolds have been used to reconstruct the complex interface. However, the permeability of the layered structure, which determines the ease of molecules penetrating through matrix, has not been widely considered in the scaffold designing. In this study, a novel bilayered scaffold with low permeability was developed and the effects of various permeability were evaluated through in vitro and in vivo assessment. Methods: Bilayered scaffolds were fabricated using articular cartilage extracellular matrix (ACECM) and hydroxyapatite (HAp), involving a porous, oriented upper layer and a dense, mineralized lower layer. Various porosity distribution and low permeability was achieved in the layers by adjustment of content of HAp and ECM. Biomechanical properties were also evaluated. The osteochondral defects were created in the trochlear groove on the unilateral femur of New Zealand white rabbits. After operation 1, 4, 12, 24 weeks, the specimens were evaluated mechanically, biochemically, and histologically. Results: Morphological observations demonstrated that a gradual interfacial region was formed with pore size varying from 128.2±20.3 to 21.2±3.1 µm. The permeability of the bilayered scaffold decreased with increasing compressive strain and HAp content. Accordingly, the optimum HAp/ACECM ratio (7w/v %) in the layer to mimic native calcified cartilage was found. This architecture have the ability to guide cellular distribution. Chondrocytes could not penetrate the interface and resided only in the upper layer, where they showed high cellularity and abundant matrix deposition. Histological results showed that hyaline-like cartilage formed and well integrated with subchondral bone. The scaffold mechanical properties were well-suited for surgical handling, fixation, and bearing osteogenic loads during bone regeneration. Conclusion: The permeability was identified as a determining factor for chondrocytes distribution in the cartilage tissue engineering. This bilayered construct with

## Abstract no.: 41783 TISSUE ENGINEERED 3-DIMENTIONAL BIOIMPLANT FOR TREATMENT OF LARGE TENDON DEFECTS Abdolhamid MEIMANDI PARIZI, Ahmad ORYAN, Ali MOSHIRI

Variation in surgical techniques for repairing a large tendon defect is remarkable and it is therefore difficult to determine the method of choice. Several surgical techniques exist, only a few of them have been validated in a strict scientific manner. Tendon transplantation could be a potential method of choice; however due to the large size of the harvesting autograft, the donor site morbidity is a major concern and the allografts due to many reasons such as disease transmission, rejection and ethical concerns, have not been widely accepted as yet. Tendon healing has its own limitations such as development of peritendinous adhesion and muscle fibrosis and in those tendon injuries with significant tissue loss the natural healing response may not be able to replace the damaged tissue. Tendon tissue engineering has been recently investigated for improving the repair of tendon defects. Tissue engineering technologies used specific molecule(s) such as collagen to produce new scaffolds. Such scaffolds can be designed according to the tissue engineering goals in order to be biocompatible, biodegradable and effective in tissue restoration. Most of the tissue engineered scaffolds for tendon healing are manufactured as a film, sheath or membrane in which the scaffold has bidimensional architecture. For reconstruction of a large tendon defect, the scaffold should have tridimensional architecture to fill the defect area and mimic the native tissue. Production of bioimplants with help of tissue engineering is still in initial stages, several questions exist to be applicable in clinical practice.

## Abstract no.: 41512 STEPWISE DIFFERENTIATION OF HIPSCS FOR TENOGENESIS BY CHANGE OF PHYSICAL SUBSTRATE Xiao CHEN, Can ZHANG

Tendons connect muscles to bone and transmit the force generated during muscle contraction to the skeleton, which are highly prone to injury. Surgical repair is common but natural healing is extremely slow and inefficient. Human-induced pluripotent stem cells (hiPSCs) are highly promising cell source for realizing personalized treatments in regenerative medicine. Nevertheless, the utility of these cells for tendon tissue engineering has yet not been adequately explored. This study developed a stepwise strategy to induce hiPSCs differentiation into tenocytes and assessed the efficacy of this tissue-engineered construct in promoting tendon regeneration hiPSCs were first induce to mesenchymal stem cells (hiPSC-MSCs) as confirmed by differentiation into three mesenchymal lineages. Flow cytometry and CFU assay showed the expression of characteristic MSC surface markers and clonogenicity. Subsequently, hiPSC-MSCs were differentiated into tenocytes by cultivation on the chitosan-based well-aligned ultrafine fiber scaffold. SEM micrographs and immunofluorescence assays showed that hiPSC-MSCs exhibited tenocyte-like morphology and significantly high expression of tendon-specific genes in the hiPSC-MSCs on well-aligned fiber scaffold. ALP and alizarin red staining showed that the random fiber scaffold induced osteogenesis, while the aligned fiber scaffold hindered the process. In rat Achilles tendon repair model, aligned cells treated tendon had superior structural and mechanical properties. Moreover, the transplanted hiPSC-MSCs contributed directly to tendon regeneration. No teratoma was found in any samples. These findings present a strategy combining well-aligned fiber scaffold with iPSC-MSCs for tendon regeneration and may assist in clinical regenerative medicine to treat tendon diseases.

# Abstract no.: 42337 FUNCTIONAL EVALUATION ON THE MODEL OF RADIAL NERVE DEFECT IN PRIMATE Xijun HUANG

Objective Observe the anatomical characteristics of the radial nerve and explore the functional evaluation methods after repairing radial nerve defect in primates. Methods 3 adult rhesus ms were selected for dissecting radial nerve from axilla to the elbow, recording their position and branches. On this basis, 5 healthy adult rhesus ms were selected to establish the model of bilateral radial nerve 25mm long defect proximal to first muscular branch of extensor carpi radialis longus (ECRL); and bridge nerve defects with autologous nerve (Group A) and acellular porcine nerve (Group B) respectively. Wrist extension and general conditions were observed after operation. Postoperative cumulative maximum wrist angle (DEmax) and wrist angle recovery rate (R) were measured and calculated to evaluate the effect of restoration of neurological function by a special fixed chair 7 days before operation, 7 days and 5 months after operation respectively. Results 1st ECRL of radial nerve in rhesus ms was issued 9 ~ 14mm proximal to the lateral condyle of the humerus. The radial nerve can be exposed proximal to the issued point with the length of 52 ~ 62mm, diameter 3.3 ~ 4.1mm, which can create 25mm radial nerve defect. Wristdrop and fingerdrop were observed immediately for Rhesus ms after surgery. But it does not affect eating, with good general conditions and wound healing. After 5 months, the mean of DEmax and R in Group A and B were 96°, 120° and 69%, 99% respectively. Conclusion The radial nerve defect model in the lower arm with safe operation, dynamicobservation, quantitative description of the recovery of neurological function, can be used as the standard model of peripheral nerve repair in primate.

#### Abstract no.: 42336

# A TRAIL OF THREE-DIMENSIONAL VISUALIZATION TECHNIQUE TO OBSERVE INTRANEURAL MICROVESSELS OF SCIATIC NERVES IN SD RATS

Zhaowei ZHU

Background: The blood supply of peripheral nerve grafts is one of the important factors that affect nerve regeneration. Many investigators have studied how intraneural microvessels are distributed and ways to promote the angiogenesis of grafts. However, there still does not exist an ideal intraneural microvascular model. The purpose of this study was to compare the three-dimensional (3D) reconstruction of microvessels of the sciatic nerve in Sprague-Dawley (SD) rats after systemic perfusion with Evans blue (EB) or lead oxide. Methods: Ten adult SD rats were randomized to a fluorography group (EB) or radiography group (lead oxide). After administration of the perfusion agents, imaging information was obtained by fluorescence microscopy and micro-computed tomography (mCT). Three-dimensional reconstruction was performed, and the diameter of microvessels at a constant distance (a cross-section was taken every 1 mm), the vascular index, and volume were measured. Two-dimensional (2D) images were obtained by serial sectioning and mCT scanning using the two methods described. Results: In the EB group, the diameter, vascular area, and vascular index of microvessels were 11.79 for smaller microvessels with diameters ,20 mm, it is more suitable for studying a large sample volume. Evans blue, Sprague-Dawley, Three-dimensional reconstruction, Angiography, Lead oxide, Peripheral nerve, Sciatic nerve, Intraneural microvessels, Micro-computed tomography, Fluorography

# Abstract no.: 42335 DENDRITIC CELLS OF SYNOVIUM IN EXPERIMENTAL MODEL OF OSTEOARTHRITIS OF RABBITS Xiaogiang E

Aims: Dendritic cells (DCs) are critical initiators of immune responses, however, its distribution and role in osteoarthritis (OA) remains largely unknown. This study is to investigate the distribution of DCs in the rabbits' synovium of experimental OA. Methods: Model of OA was established by excising the medial meniscus of both hind knees in New Zealand white rabbits. The grades of synovium and articular cartilage were assessed and scored by hematoxylin eosin stain after 2, 4, 8, and 12 weeks of operation. The distribution of DCs was investigated by immunohistochemistry staining in the synovium from OA rabbits. The levels of IL-1 $\beta$  and TNF- $\alpha$  in synovial fluid were measured by ELISA kits. Results: Molecular markers for DCs, such as DC-LAMP, CD80, CD83, and CD86 were detected in lymphoid aggregations and perivenular infiltration areas in the synovium from OA rabbits. Large numbers of DCs were observed in the synovium in the early stages (2 or 4 weeks) after operation. The number of DCs was significantly increased with the progression of inflammatory grade in synovium in the same early stages. Expression of IL-1 $\beta$  and TNF- $\alpha$  were also increased in the early stages, then decreased with the inflammatory regression in synovium. Conclusion: The data from this study strongly suggested that DCs may play a key role, at least in part, in inflammation of the OA pathogenesis, especially in the early stages of OA.

## Abstract no.: 42334 THE IMPROVEMENT OF DIFFERENTIATION FROM ADIPOSE DERIVED STEM CELLS TO SCHWANN CELLS THROUGH INTERMITTENT INDUCING Yun ZHU

Object: In clinical application, SCs face to difficulty of isolation, proliferation and immunoreaction of allogenic SCs and the autologous SCs will take several weeks to activate them before harvested and another several weeks to expand in vitro. Considering about clinical benefits of easy accessibility, little invasiveness, rapid proliferation, ASCs have been concerned as a promising cell source for differentiation toward SCs. Among ordinary techniques of mesenchymal stem cells (MSCs) differentiated towards SCs such as Dezawa method and Kingham method, the induction result was unsatisfactory. In our study, we use intermittent inducing method to enhance the differentiation. Method: On the basis of Dezawa method, cells are maintained in induced medium as usual at the prophase of the induction period, and then ASCs are allowed to rest for some days in maintenance medium without induction. Then the same induced medium is applied to culture cells to the end. Test the morphology, cell markers, expression of nerve growth factor (NGF) and neurotrophic factors of induced cells by flow cytometry, immunofluorescence, RT-PCT and Western blotting. Conditional medium culture dorsal root ganglion neurons to evaluate secretory protein of induced cells. Result: Immunofluorescence and Western blotting result reveal that induced cell express SCs surface markers. RT-PCT and ELISA result shows the higher expression of NGF, brain derived neurotrophic factor (BDNF) and CNTF in intermittent inducing group. Result of dorsal root ganglion (DRG) neurons culture reveals that intermittent inducing Schwann-like cells remarkably promotes DRG growth. Conclusion: We prospect this "intermittent inducing" can push ASCs differentiate towards more developed SCs with high expression of different growth factors and this may provide a promising way to peripheral nervous regeneration in clinical application.

## Abstract no.: 41029 SENSORY AND SYMPATHETIC NERVE RELEASE OF NEUROPEPTIDES PLAYS AN IMPORTANT ROLE IN THE RAT FEMUR FRACTURE HEALING PROCESS Meng GUOLIN, Tang PENG, Liu JIAN, Duan CHUNGUANG, Wang

CHUNMEI

Abstract : After a fracture, nerve fibers often release neurotransmitters, such as nerve peptides (NPY, SP, CGRP, etc.), that influence the fracture healing. We chose male rats that were 6-8 months old and established a closed fracture model. We were determined usina ELISA. scanning electron microscopy (SEM) Bielschowshv staining. immunohistochemical staining and immunofluorescence staining after we mercy killed the rats. The results showed that the sympathetic neurotransmitters in serum were expressed higher than sensory neurotransmitters (p < 0.0001). In serum, in all stages of fracture healing, sensory and sympathetic neurotransmitters were increased (mean SD, p < 0.0001). Morphological changes were used to detect the early fracture healing that was not localized to nerve fibers. During the original callus formation, the local sensory and sympathetic nerve fibers express high levels of neurotransmitter. During the bone plate forming stage, the sympathetic nerve fibers and SP expression was lower than the expression of the sympathetic nerve neurotransmitter NPY. However, CGRP was expressed. During the shaping stage, the sympathetic and sensory neurotransmitters are expressed, although new bone tissue is found around the nerve fibers. Through the analysis of the results, we clarified the healing phase distribution of the nerve through scanning electron microscopy (SEM) and Bielschowshy staining. Second, we found that during the process of fracture healing, sympathetic nerves play an important role. Finally, we found that the sympathetic nerve enters the fracture mainly through the epineurium and by releasing neuropeptide during the entire period of healing.

#### Abstract no.: 40452

# INTRATHECAL INJECTION OF 3-METHYLADENINE REDUCES NEURONAL DAMAGE AND PROMOTES FUNCTIONAL RECOVERY VIA AUTOPHAGY ATTENUATION IN A RAT MODEL OF SPINAL CORD ISCHEMIA/REPERFUSION INJURY

Wei XING, Zhou XIAO-ZHONG

To assess autophagy expression after rat spinal cord ischemia reperfusion injury and inhibition of autophagy contributes to neural tissue damage and locomotor impairment.Methods: The rat spinal cord I/R model was induced by occlusion of the descending thoracic aorta for 10 min with a systemic hypotension (40 mmHg) on a rat. 3-MA was intrathecally administrated. Transmission electron microscopy (TEM) and immunofluorescent double-labeling were applied to observe ultrastructural changes in the spinal cord. Changes of expression of autophagy-related proteins including microtubuleassociated protein light chain 3 (LC3) and Beclin 1 were evaluated by Western blots.Results: After spinal cord I/R injury, autophagy was activated, which was detected by the significantly increased expression of LC3 and Beclin 1 than sham group(p < 0.05) from 3 h to 48 h. Further, transmission electron microscope images confirmed the existence of autophagosomes and autolysosomes in the injured spinal cord. Such effects were significantly inhibited by intrathecal administration of 3-MA. In addition, 3-MA dramatically decreased expression of LC3 and Beclin 1and the number of LC3 positive cells in the spinal cord of the model rats(p < 0.05). The 3-MA-treated rat showed better higher neurobehavioral scores than the vehicle control rats.Conclusions: These results suggested that autophagy was activated in I/R injured spinal cord, which attributed to neuronal cell death. Intrathecal administration of 3-MA inhibited autophagy to protect neurons against I/R injury. 3-MA treatment may represent a novel therapeutic strategy after spinal cord I/R injury.
# Abstract no.: 39109 AUTOLOGOUS TRANSPLANTATION OF MESENCHYMAL STEM CELLS FOR REGENERATIVE RESTORATION OF ARTICULAR CARTILAGE INJURY (EXPERIMENTAL RESEARCH)

Dzmitry BUKACH, Alexandre BELETSKY, Oleg EISMONT

Introduction: Transplantation of mesenchymal stem cells (MSC) seems to be an effective method for cartilage lesion treatment. However, there is no common approach for stem cells source selection, surgical method of transplantation, MSC graft differentiation degree. Methods: An experiment by developed method was performed on dogs. In 10 knee joints full thickness cartilage lesions were performed. All knees were divided on 3 groups. In I group the defects were treated with MSC, taken from bone marrow, isolated and expanded in vitro. For II group the bone marrow MSCs were differentiated with growth factors (TGFß and IGF) into chondral direction. In both groups Sodium hyaluronate was used as a graft matrix. In III group - the control one - the defects were left without treatment. For transplantation a local adherent technique was used: the knee was positioned so that the refreshed cartilage defect was upward, the MSC graft was then slowly dripped onto the cartilage defect and the knee was held stationary for 10 minutes. The knee position then was changed and the MSCs were adhered to the cartilage defect. The results were evaluated 6 months after surgery. The three groups were explored macroscopically and histologically and compared by histological scale. The results revealed the chondrogenic differentiated MSCs graft achieves regenerative recovery of cartilage injury - the defect cavity filled with mostly hyaline cartilage. In other groups very poor recovery was observed. The developed method seems to be safe, low-impact and effective, and can be performed in humans.

## Abstract no.: 40993 SYNOVIAL FLUID AS A POTENTIAL NEW SOURCE OF MESENCHYMAL STEM CELLS TO TREAT OSTEOCHONDRAL DEFECTS AND OSTEOARTHRITIS

Eduardo BRANCO DE SOUSA, Gabriel CORREA DE FARIAS, Maria Eugenia LEITE DUARTE, Diego PINHEIRO AGUIAR, Vivaldo MOURA NETO

Purpose: Mesenchymal stem cells (MSCs) have the ability to differentiate into osteoblasts. chondroblasts, adipocytes, and even myoblasts. Its application in OA treatment has been studied. Recently MSCs have been described to be present in the synovial fluid, although its origin remain unclear. We have focused on investigating MSCs in synovial fluid to create new cell therapy strategies for treatment of osteochondral defects and OA. Our goal was to characterize the MSCs identified in the synovial fluid of patients with and without osteoarthritis and modulate their induction in vitro to determine their differentiation potential. Material and Methods: Synovial fluid was collected from patients submitted to knee arthroscopy and knee replacement and centrifuged to isolate cells form the synovial fluid. Cells were cultured and identified with markers specific for MSCs. Then, cultures were exposed to specific substances to induce chondro, osteo and adipo differentiation. Results: Our preliminary results showed that cells from synovial fluid of patients with osteoarthritis formed more colonies, with a higher diameter than the ones from patients without osteoarthritis, indicating tha there are more synovial fluid MSCs in osteoarthritic patients. Most of the cells were positive for CD73 and CD90, but none was positive for CD140. Few cells were concomitantly positive for the four mesenchymal markers CD105, CD146, CD90 and CD73. Besides, no cells were positive for the haematopoietic markers CD34 and CD45. Under appropriate conditions, cells differentiated into chondro, osteo and adipo phenotypes. Conclusion: Synovial fluid contains a MSC population, which is more prominent in osteoarthritic patients.

## Abstract no.: 40952 IN VITRO AND IN VIVO GENERATION OF CHONDRAL DIFFERENTIATION OF MESENCHYMAL STEM CELLS IN NOVEL HYALURONATE-COLLAGEN-TRICALCIUM PHOSPHATE SCAFFOLDS FOR KNEE REPAIR

Fangang MENG

Partial-thickness cartilage defect do not repair spontaneously, and there is no clinically effective treatment for these injuries. In this study, the capacity of a novel hyaluronate-collagen-tricalcium scaffold (HA-COL-TCP) to promote the growth and differentiation of rabbit mesenchymal stem cells (rMSCs) into chondrocytes and its application in articular cartilage repair were evaluated. Cell viability and proliferation were assessed by the CCK8 test. The chondrogenic differentiation was evaluated by glucosaminoglycan (GAG) quantification, alcian blue staining, type

PCR. Mechanical strength was evaluated by compression test. Firstly, the HA-COL-TCP scaffolds were shown to be more efficiently accommodate cells and enhance chondrogenic differentiation of rMSCs, compared with collagen-tricalcium phosphate scaffolds with different collagen/tricalcium phosphate ratios (COL-TCP and COL-TCP (50/50) and 75/25) (control groups) in vitro. The HA-COL-TCP scaffolds also supported a higher-quality cartilage regeneration than the control scaffolds in an ectopic implantation nude mouse model. Finally, in a critical-size rabbit osteochondral defect-repair model, the rMSCs seeded HA-COL-TCP scaffolds achieved substantially better cartilage regeneration and better integration with surrounding, similar to natural cartilage, than the control groups. These results indicate that the HA-COL-TCP scaffolds may promote cartilage regeneration and be potentially usable for cartilage tissue engineering in the future.

-II collagen

#### Abstract no.: 39875 AUTOGENUS CULTURED GROWTH PLATE CHONDROCYTES TRANSPLANTATION IN TREATMENT OF PHYSEAL INJURY IN RABBITS Ryszard TOMASZEWSKI

The aim of this experimental study on New Zealand's white rabbits was to investigate the transplantation of autogenous growth plate cells to treat the injured growth plate. They were assessed in terms of measurements of radiographic tibial varus and histological characteristics. The 14 New Zealand white rabbits at the age of 5 weeks were selected. An experimental model of plate growth medial partial resection of tibia at 14 New Zealand white rabbits was created. During this surgical procedure the plate growth cells were collected and then they were cultured. While the second surgery(3 weeks after the first)was being performed the autologous cultured growth plate cells were grafted at the right tibia, whereas the left tibia was used as a control group. Histological examinations showed that grafted right tibia presented regular shape of the plate growth with hypertrophic maturation, chondrocyte columniation and enchondral calcification. XR of the tibia at A-P and lateral view presented regular visible growth plate at the site of grafting at right tibia. Radiographic study shows that the average tibial deformity at the left angle was 20,29 degrees and in the right one it was at the level of 7,21 degrees. This study has demonstrated that grafting of an autogenous cultured growth plate cells into a defect of the medial aspect of the proximal tibial physis can prevent bone bridge formation, growth arrest and the development of varus deformity.

#### Abstract no.: 40632 STEM CELLS IN NONUNION OF FRACTURES Satish Chandra GOEL, Kumar V SENTHIL

Introduction: Stem cells have the capacity for self renewal and capability of differentiation into various cell lineages. Non union remains a clinically important problem in orthopaedic surgery. Method: We randomly assigned 45 patients into 3 groups. Test group: 15 patients in which mesenchymal stem cells prepared by conventional density-gradient centrifugation using ficoll-hypague solution were injected (n=15), control A: 15 patients in which autogenous bone marrow aspirate were injected (n=15), control B: 15 patients in which neither the stem cell nor bone marrow injection given, symptomatically treated(n=15). Ultra sound and x rays were performed at follow up of 6,12,18,24 weeks and comparison done. Results: Stem cell group: 12 patients out of 13 followed showed excellent results and 1 patient showed good result. Control A bone marrow injection group: 6/15 patients showed excellent results and 3 patients showed good results. Control B: only 2/15 patients showed excellent results. In fracture gap 4-5mm the stem cell group showed union in most of the patients. In control A and control B patients with same fracture gap failed to unite. Conclusion: In fracture situations, in which a manipulation or augmentation of natural healing mechanisms is needed to regenerate larger quantities of new bone Stem cells play a part. This technique of percutaneous stem cell injection provides a very safe, easy, non immunogenic, non invasive and reliable alternative to open bone grafting.

meniscal regeneration.

#### Abstract no.: 39678 ISOLATION, CHARACTERIZATION AND MULTIPOTENT DIFFERENTIATION OF MESENCHYMAL STEM CELLS DERIVED FROM MENISCAL DEBRIS Wei FU

The purpose is to characterize and culture mesenchymal stem cells derived from meniscal debris of patients with meniscal injury. Cells in meniscal debris from patients with meniscal injury were isolated, cultured in vitro to the third passage and analyzed by light microscopy to observe morphology and growth. Third-passage cultures were also analyzed in detail for immunophenotype and ability to differentiate into osteogenic, adipogenic and chondrogenic lineages. After 5-7 days in culture, cells in meniscal debris showed a long fusiform shape and adhered to the plastic walls of the culture dish. After 8-10 days, cell clusters and colonies were observed. Third-passage cells showed uniform morphology and good proliferation. They expressed surface markers CD29, CD90, CD105, but not surface markers typical of hematopoietic stem cells (CD34, CD4). Cultures were induced to differentiate into bone, adipose and cartilage and at 21 days, cells showed positive staining for Alizarin Red as well as for alkaline phosphatase activity for formation of mineralization nodes and early osteogenic marker, Oil Red O for lipid vacuoles, Toluidine -Bipenifion prhatmix clicentisciss lost attending for the blue and Col and cultured from meniscal debris were identified to be mesenchymal stem cells and found to be capable of differentiating along three lineages. Meniscal debris-derived mesenchymal stem cells may prove a valuable source of cells to seed meniscal regeneration. The existence of MSCs in meniscal debris and showed that they can be

cultured and differentiated, opening the door to studies examining their potential for

## Abstract no.: 39674 BASIC RESEARCH AND CLINICAL APPLICATION OF THE MSCS FORM PERIPHERAL BLOOD FOR ORTHOPEDICS RESEARCH Weili FU

Bone marrow (BM) has been considered as the major source of MSCs, but it has many disadvantages in clinical application. However, peripheral blood (PB) MSCs could be obtained by a less invasive method and more beneficial for autologous transplantation than BM-MSCs. This study is to assess whether MSCs from mobilized PB have the similar biological characteristics in vitro and chondrogenesis in vivo as BM-MSCs. PB-MSCs were successfully mobilized by the method of the combined drug administration, isolated, expanded and identified in vitro. No significant difference was found concerning the morphology, immune phenotype and antiapoptotic capacity between PB-MSCs and BM-MSCs. Although there are some differences in the proliferation and differentiation aspects, PB-MSCs share certain similar biological characteristics in vitro and chondrogenesis in vitro and chondrogenesis in vitro and chondrogenesis in vitro and differentiation aspects, used in the field of the articular cartilage repair.

## Abstract no.: 42338 COMPARATIVE RESEARCH OF BONE MARROW- AND SYNOVIUM-DERIVED MESENCHYMAL STEM CELLS FROM HUMAN WITH OSTEOARTHRITIS OR RHEUMATOID ARTHRITIS Li JIANG

Cartilage formation is driven by mesenchymal stem cells (MSCs) that can proliferate, condense and differentiate into chondrocytes. This objective comparative evaluated synovium-derived MCSs (S-MSCs) and bone marrow derived-MSCs (BM-MSCs) from the patients with rheumatoid arthritis (RA) and osteoarthritis (OA) in cell yield, proliferation capacity, phenotypes and growth in acellular dermal matrix (ADM). Chondrogenic differentiation was studied using micromass culture and analyzed by histology, immunohistochemistry and electron-microscopy. This study showed that BM-MSCs and S-MSCs could be differentiated into the chondrogenic lineage under the stimulation of suitable chondrogenic factors. MSC growth kinetics and colony number were higher in S-MSCs than those in BM-MSCs. They expressed mesenchymal markers, and lack the expression of hematopoietic markers. Chondrogenesis study showed that both MSCs to be larger and more cartilage matrix stained, particularly, S-MSCs showed greater ability for chondrogenesis. Both MSCs from RA or OA shared characteristics with those from healthy donor. In vitro studies showed that MSCs inhibit collagen-II-induced cell proliferation in a dose-dependent manner, up-regulate T regulatory cells and secretion of collagen, IL-10 and sICAM, but not pro-inflammatory cytokine IFN-g. When MSCs were seed to ADM with transforming growth factor-beta and insulin-like growth factor, S-MSC-ADM constructs showed higher cell numbers and up-regulated expression of collagen proteins compared with that of BM-MSC-ADM constructs, but both numbers were significantly higher than those of initially seeded. In conclusion, these results proved feasibility of MSC therapy, either S-MSCs or BM-MSCs; from either RA or OA, for various degenerative joint diseases including RA, OA and cartilage defect in humans.

## Abstract no.: 41566 PATTERN OF SECTARIAN ASSAULT INJURIES IN KANO, NIGERIA Kabir ABUBAKAR, Okoh NDUBUISI

BACKGROUND: Sectarian violence is an unfortunate recurrent problem in Nigeria. It can be triggered by religious, ethnic or political factors. Many lives and property are lost, but our concern as Trauma Surgeons is about taking care of the injured. Evacuation is problematic in this setting when the population suddenly divides into hunters and the hunted. This study describes the circumstances and injuries during one such incidence. OBJECTIVES: To describe the patient population, circumstances of injury, pattern of injuries, ease of getting medical attention and treatment offered. METHODOLOGY: Review of case records and interview of victims. RESULTS: The mean age of the twenty victims was 31 years. 50% were attacked on the streets, while 30% were attacked in their homes. 84.6% were brought to the Hospital by the Police. 13 of the victims had lacerations from sharp instruments, usually machetes. Most of the lacerations involved the scalp and forearm. 3 of those with forearm lacerations had severed tendons. 12 had fractures, three involved forearm cuts transected through to bone with sharp machetes. 2 of the victims had traumatic amputations. An eighteen year old girl was sexually assaulted. CONCLUSION: Sectarian violence is a man made disaster that creates an array of injuries; physical, emotional and economical. Those in authority need to think of ways of prevention and hospitals in the zones of violence should have the facilities to cope with large number of injured people while ensuring the safety of hospital staff.

#### Abstract no.: 40494 CO- MORBIDITIES IN ORTHOPAEDICS AND TRAUMATOLOGY IN DEVELOPING NATIONS Arindam BANERJEE

While affluent nations are greving guickly, developing nations often have a younger population. However this information hides the true picture. The middle classes of developing nations such as India are also greving fast and in addition have one of the largest disease loads in the world. Diabetes, rising obesity and its sequels- hypertension, renal and cardiac disease are rampant. Lack of sporting culture and forced inactivity due to rapid and unplanned urbanization has compounded the situation. The average middle class Indian is therefore physiologically older than his chronological age suggests. Inadequate traffic management has led to a rising spiral of trauma and polytrauma. Trauma is therefore no longer a disease of the young and fit- rather the middle aged and unhealthy. The rising co-morbidities in Orthopaedics and trauma are a daily challenge for the Indian surgeon, the medical planner and hospital administrator. This paper examines 4200 patients admitted over 5 years (2009-14) at a Calcutta hospital for trauma and knee replacement surgery and discusses disease profiles, the co-morbidities faced, the preoperative precautions and well as the post-operative problems encountered. It discusses a flow scheme of management as well as the importance of active critical care management. The increase of cost and in-patient stay was 1.8 and 1.6 times respectively over those without significant co-morbidities. In addition, mortality and patient dissatisfaction is also higher in this group. Counselling, physiotherapy, damage control orthopaedics as well as joint care by physicians and surgeons are cornerstones which reduce mortality and morbidity.

## Abstract no.: 39722 EPIDEMIOLOGY & IMPACT OF EARLY REHABILITATION OF SPINAL TRAUMA AFTER THE 2005 EARTHQUAKE OF KASHMIR, INDIA Sanjay KESHKAR, Nirmal DEY

Purpose: Though Spinal injury is less common as compared to limb injuries in disasters but is most disabling due to secondary neurological deteriorations and hence care of spinal injury and its early rehabilitation is on priority. This study is an attempt to get epidemiology of spinal injuries and the impact of the early rehabilitative services offered to them. Method: Earthquake victims of spinal injury admitted in various hospitals of Srinagar (The capital city of Kashmir, India) & around it were taken as material for study. Immediately after history & examination early rehabilitation care was provided by means of rehabilitation orthoses (aids/ appliances), physiotherapy, psychotherapy etc. Results: Out of the 266 cases, 38 cases (12.33%) received spinal injuries of which 20 cases (52.7%) had dorsolumber segment involvement with 12 cases (31.5%) having cervical and 6 cases (15.8%) sacrococcigeal injury. 15 cases (39.5%) had associated head or body injury along with spinal injury. Males outnumbered females, 73.7% to 26.3%, of the injured. Most of them (79%) were adolescents, young adults and adults (16-50 yrs). Out of 38 patients of spinal trauma, 32 (84.2%) patients received spinal orthoses, 24 (63.1%) patients received mobility aids (wheel chairs, axillary / elbow crutches) and 8 (21.0%) patients received other orthoses like Ankle foot orthosis (AFO) & wrist hand orthosis (WHO). Conclusion A collective effort by rehabilitation team for providing supportive / assistive devices along with physiotherapy & psychotherapy has significantly helped in bringing back the functional and psychological status of the spinal trauma victims.

# Abstract no.: 41175 EXTERNAL FIXATOR AS DEFINITIVE TREATMENT FOR OPEN FEMUR FRACTURE –SYRIAN WAR EXPERIENCE

Abduljabbar ALHAMMOUD, Bakry MAAZ, Zakwan SHAHHOUD

Background: A civil war occurred in Syria after revelation. A lot of field hospitals opened to provide primary care and first aids for those people injured from the war with very limited resources. A very little number of specialized physician were available in those hospitals. This study describes the use of external fixator frames for orthopedic damage control for open femur fracture to achieve bone stabilization and better soft tissue care. Methods: Data were collected from patients' files, generated by effort of one orthopedic surgeon Results: During around three years of one field hospital's activity, a total of 334 patients were admitted for open femur fracture ; 334 surgical procedures were performed under general or regional anesthesia and all open femur fractures were stabilized operatively by application of a x-fix with different type (AO,OR,SYRIAN,Hoffman) and by one orthopedic surgeon . All procedures were performed in a field-style operating room. Sterile technique was possible only for elements actually inserted into the patient. Limb alignment was based on manual palpation: intraoperative fluoroscopy was not available in all the cases. Conclusions: We describe "orthopedic damage control" using external fixator frames for only open femur fracture for bone stabilization and soft tissue care as a viable approach in the context of a mass casualty scenario. Because of the mess 178 patient loss follow up and 156 patient followed for period around 6 months and 96 patient (61.53%)x-fix was definitive treatment ,60 patient (38.47) failed to continue on x-fix for different reasons (infection ,nonunion,malunion,refracture).

#### Abstract no.: 40482 REVISION TOTAL HIP REPLACEMENT IN A RESOURCE LIMITED ENVIRONMENT. A REVIEW OF 22 CASES Lieven DOSSCHE, Jan NOYEZ, Windemi OUEDRAOGO, Eustache KALMOGHO

Total hip replacement (THR) is increasingly performed in many developing countries, often in a resource limited environment. This may cause additional challenges when a THR fails, necessitating revision surgery. From 2006 until 2014, 22 THR-revisions were performed in 19 patients in a district hospital in Ouagadougou, Burkina Faso. One patient had a bilateral revision. One had three revisions on the same hip. Mean time to revision was 52 months (12 to 240 months). Revisions were 12X acetabulum, 4X femur, 6X acetabulum and femur. Mean operation time was 158 minutes. A blood transfusion was necessary in 7 cases (31,8%). On the acetabular side a cemented component was used in 5 cases, an uncemented in 13 cases. In eleven cases additional fixation with screws was used. In one case it was noted that a cemented component was used because an uncemented component of appropriate size was unavailable. On the femoral side, all components were cemented with uncemented revision components not available. Cerclage wiring was used in two cases, use of a plate in two cases. Indication for revision was component loosening 18X, periprosthetic fracture twice and chronic dislocation once. None of the cases showed clear prosthetic infection but it was not possible to formally rule out low grade infection. We conclude that when a THR program is initiated, revision indications will eventually develop. Revisions can be challenging in any setting but even more so in a resource limited environment. Preparations should be initiated from the early start.

#### Abstract no.: 40775 COST REDUCTION FOR KNEE ARTHROPLASTY IN A DEVELOPING COUNTRY

Mahmoud HAFEZ, Hazem YASSIN, Ahmed NABEEL

Aim: To compare between TKA using conventional technique and patient-specific templates (PST) in terms of cost calculation with an application in Egypt as a developing country. Patients and methods: We estimated the cost of TKA using conventional technique and PST for 1000 patients. Cost elements included imaging, preoperative planning and templating, template fabrication, instrumentation, operative-theatre setup, technical observer or assistant, sterilization, training, transportation as well as potential additional expense for bilateral simultaneous procedure and postoperative rehabilitation. Results: PST required CT scanning and computerized planning, templating and manufacturing with almost 266\$ as an additional cost for each TKA. PST had less costly instrumentation system by 94%, less theatre preparation by 80% and less sterilization by 84%. The cost of training has reduced in PST by 85%, and transportation cost in conventional technique was 13\$ which was eliminated in PST technique. Patients undergoing bilateral TKA were more favorably managed through PST procedure with shorter rehabilitation time and faster productivity of affected individuals. Conclusion: The overall procedure of PST was estimated to be less costly than the conventional technique. PST required fewer assistants/personnel and eliminated the need for transportation and sterilization of surgical kits or existence of technical assistant(s). PST for patients undergoing bilateral TKA was more applicable with more cost reduction.

#### Abstract no.: 39177 PREVALENCE OF SKELETAL DEFORMITY DUE TO CLINICAL NUTRITIONAL RICKETS IN CHILDREN 1 TO 18 YEARS IN TEA GARDEN COMMUNITY IN DIBRUGARH DISTRICT (ASSAM,INDIA).

Tarun CHABRA, Ayush SHARMA, Pranjal TAHBILDAR, Chirag PARSANA, Amrut RAJE, Rajat MAHAJAN, Chatterjee RUPAK, Tarun CHABRA

Background: Clinical nutritional rickets, most having associated skeletal deformities, is a fairly common disease. Most of these patients are from the tea garden community and history revealed that the majority of these patients or their attendants were unaware of the cause of the disease and of its curable nature. Enquiry has also revealed that there are many other such patients in the tea gardens who have not attended any hospital for the affliction. Up to now the true prevalence of nutritional rickets among tea garden community in this part of the country is unknown. This study is an attempt to find out the prevalence of this disease to provide some benefit to this community in future. Material and methods: Out of 160 tea gardens in Dibrugarh District 20 tea gardens were selected through random number table randomization technique. All children in the age group 1 to 18 years were screened clinically as per performa during visits to these twenty tea gardens. These records along with photographs and follow-up laboratory and radiological investigations were then analyzed to arrive at the conclusions. Results: A total of 16274 children with clinical nutritional rickets, with 44 amongst them having skeletal deformities were detected in the study. Conclusion: Nutritional rickets along with its attendant skeletal deformities is a fairly common problem amongst children of the tea estates of Dibrugarh District.

#### Abstract no.: 41828 PATTERN OF MUSCULOSKELETAL TUBERCULOSIS IN A DEVELOPING COUNTRY

Udo Ego ANYAEHIE, Omolade Ayoola LASEBIKAN, Obidiche Solomon OLEWE, Valentine Ogochukwu OGBU

Musculoskeletal tuberculosis remains a common finding in our nation possibly because of the high poverty level and poor socioeconomic standard of living of majority of the populace. We therefore sought to study the pattern of presentation of patients with musculoskeletal tuberculosis, the management given and outcome of treatment. A retrospective study of patients that presented with musculoskeletal tuberculosis over a ten year period from January 2001 to December 2010 was analyzed. The biodata, presenting symptoms and deformities present, the site of occurrence, xray findings, laboratory findings, treatment given and outcome of treatment were obtained from their records. A total of 118 cases of musculoskeletal tuberculosis were recorded. The highest age group involved was in the sixth decade with 25 cases. The mean age of patients was 41.5 years. A total of 91 patients (77.1%) had spinal involvement with the lumbar spine involved in 74 patients (62.7%). A total of 21 (17.8%) patients had joint involvement with the hip affected in 12 patients. At the end of eight months of anti - tuberculosis therapy, 57 (48.3%) patients had significant improvement in symptoms, 23 (19.5%) were lost to follow up and 27 (22.9%) had symptoms persisting or had relapsed. The spine still remains the commonest site for musculoskeletal tuberculosis. More objective means of making this diagnosis need to be established in our environment and more aggressive approach by way of surgery considered.

## Abstract no.: 40297 TOPICAL INJECTION AND INFUSION FOR PAIN MANAGEMENT OF POST-LUMBAR SPINE SURGERY Chi-Huan LI

Postoperative pain management is an important issue for patients care. Several anesthesia methods have been used to decrease the wound pain and discomfort during the period of admission. Topical injections and infusion for postoperative pain management in orthopedic procedure were reported but few reports in spine surgery. Between July, 2012 and June, 2014, we performed topical injection and infusion on 70 patients who received posterior laminectomy and spinal fusion. The regiments are bupivacaine hydrochloride 10 mg, tromethamine 30 mg, morphine 10 mg and adrenalin 0.2mg. The other 70 patients who received the same procedure without topical injection and infusion are included for control group. The number of usage of patient controlled anesthesia (PCA) and the visual analogue score (VAS) were recorded in post operation 12 hours, 24 hours, 48 hours and 72 hours. The results showed significant pain relief in first 12 hour and 24 hour, but no difference in second and third days. The patients who received the management also decrease the dependence of PCA and hospital cost. It would be another alternative for postoperative pain management.

## Abstract no.: 40667 STUDY OF ROOT BLOCK PROCEDURE AS A DIAGNOSTIC AND THERAPEUTIC AID IN LUMBOSACRAL RADIOCULOPATHY Yuvraj HIRA

Introduction: Backache and Sciatic pain are routinely seen in day-to-day practice. In all urban settings with changed lifestyle, lack of exercise, bad posture, excessive use of vehicles and disturbed nutrition; problem of discogenic backache and sciatica is on the rise. The treatment modalities varies from conservative to surgical methods but they predominantly provide relief to leg pain and not back pain. Nerve root block acts at these inflammatory processes, by the action of the steroid & thus decreasing the chemical irritation to the nerve roots. Also there is decrease in sensitization of dorsal horn neurons by Bupivacaine. Aims & objectives: To evaluate diagnostic and therapeutic efficacy of root block procedure. To study relief in terms of pain alleviation, Activities of Daily Living and Straight Leg Raising restriction. MATERIALS AND METHODS: Retrospective study of 50 patients of sciatic radiculopathy between the ages of 20 and 60 years were evaluated under this study at Dr.D.Y.Patil medical college and research centre, Pune from August 2013 to December 2014. All the patients had radicular pain with or without back pain, restricted spinal mobility, positive active and passive straight leg raising test and other nerve tension signs. Results: Out of 50 patients, selected after thorough clinical and radiological examination, 45(90%) enjoyed complete pain relief, 31 (62%) of which were completely symptom free at end of 1 year. CONCLUSION: Spinal nerve root block may provide lasting therapeutic benefit, allowing the patient to participate in physical therapy and early return to routine activities saving working man power hours.

## Abstract no.: 40110 EFFICACY OF POSTOPERATIVE PAIN MANAGEMENT OF THE ILIAC CREST BONE GRAFT HARVESTING SITE IN ADOLESCENT IDIOPATHIC SCOLIOSIS PATIENTS: A PARALLEL, DOUBLE-BLINDED, RANDOMIZED CONTROLLED TRIAL

Dino SAMARTZIS, Cora BOW, Jason Pui Yin CHEUNG, Phoebe SHAM, Kin-Cheung MAK, Wai-Yen CHEUNG, Yat-Wa WONG, Keith Dk LUK, Kenneth Mc CHEUNG, Jean-Claude LAWMIN

Rationale: Autogenous iliac crest bone graft (ICBG) harvesting is a common procedure utilized for scoliosis surgery. Postoperative pain at the ICBG donor-site is a major concern. The following is a parallel, double-blinded, randomized controlled trial addressing the pain management efficacy of continuous anesthetic infusion versus saline at the ICBG site in AIS patients during the immediate postoperative period was addressed. Methods: A Level I trial design of AIS patients (age range: 10 to 18 years of age) undergoing posterior instrumentation and fusion at a single institute was performed. Participants were randomized into two groups. Group A consisted of control subjects who received 3ml per hour of saline locally at the ICBG site and Group B consisted of treatment subjects who received a constant rate of infusion of 3ml/hour of 0.25% levobupivacaine. Results: Twelve subjects were recruited (n=5 Group A; 7 Group B). No difference was noted at baseline between groups and parameters. Postoperatively, no difference was noted in surgical site pain between groups (p>0.05). However, decreased ICBG and contralateral ICBG pain decreased two-fold in Group B patients in comparison to Group A. Similarly Group B subjects had notably decreased postoperative overall pain scores. No significant differences were noted for the pain scores due to the small sample size. Conclusions: This pilot study noted a trend that continuous anesthetic infusion reduces pain at the ICBG site and may further decrease overall physical bodily pain. This study further established a sample size calculation to facilitate large-scale studies addressing these parameters.

#### Abstract no.: 39404 EFFECT OF CRYOTHERAPY AFTER ELBOW ARTHROLYSIS: A PROSPECTIVE, SINGLE-BLINDED, RANDOMIZED CONTROLLED STUDY Shiyang YU, Shuai CHEN, Cunyi FAN

Objective: To investigate the effect of cryotherapy after elbow arthrolysis on elbow pain. blood loss, analgesic consumption, range of motion and long-term elbow function. Participants: Fifty-nine patients (27 females and 32 males) received elbow arthrolysis. Interventions: Patients were randomly assigned into a cryotherapy group (n = 31, cryotherapy plus standard care) and a control group (n=28, standard care). Main Outcome Measures: Elbow pain at rest and on motion was measured using visual analogue scale (VAS) on postoperative day (POD) 1 to POD 7, and at 2 weeks and 3 months after surgery. Blood loss and analgesic consumption were recorded postoperatively. Elbow range of motion (ROM) was measured before surgery and on POD 1, POD 7 and at 3 months after surgery. The Mayo Elbow Performance Score (MEPS) was evaluated preoperatively and 3 months postoperatively. Results: VAS scores were significantly lower in the cryotherapy group during the first 7 postoperative days, both at rest and on motion (P < 0.05). There were no significant differences between the two groups in VAS scores at 2 weeks and 3 months after surgery. Less sufentanil was consumed by the cryotherapy group than by the control group for pain relief (P < 0.01). No significant differences were found in blood loss, ROM and MEPS between the two groups (P > 0.05). Conclusion: Cryotherapy is effective in relieving pain and reducing analgesic consumption for patients received elbow arthrolysis. The application of cryotherapy will not affect blood loss, ROM or elbow function.

### Abstract no.: 41583 ROLE OF A CHRONIC CARE PROGRAM APPROACH IN THE MANAGEMENT OF OSTEOARTHRITIS: AN ANALYSIS FROM A PROSPECTIVE WAIT-LIST COHORT IN A REGIONAL HEALTH SERVICE Niranjan SARJAPURAM, Andrew LEICESTER, Loretta ANDREWSON, Loretta ANDERSON

Introduction: The NSW government, in collaboration with the Agency for Clinical Innovation (ACI) Musculo-skeletal Network, developed and implemented the Osteoarthritis Chronic Care Program (OACCP) to facilitate the uptake of best practice interventions for conservative management of osteoarthritis. Aims: To determine the effectiveness of early referral to the OACCP in changing BMI and pain scores for people on the elective waiting list. Method: A total of 221 patients participated in the OACCP. A 216 patients who elected to have total knee (n=135) or hip (n=81) replacement surgery between October 2011 and March 2013. Base line data collected included BMI and waist circumference. Appropriate referral and management recommendations were made for optimal osteoarthritis and comorbidity management. Participants were followed up at 12 and 26 weeks. Results: The mean age was 65.9 years. The mean BMI was higher in the knee group. The mean KOOS Pain Scale at initial assessment was 42. 8 and the score was not significantly different at 26 weeks (40.8). The mean HOOS Pain Scale at initial assessment was 38.3, but was worse at 26 weeks (31.1), which was statistically significant (p=0.03). Mean BMI at baseline (31.0) was reduced at 26 weeks (30.3) and was statistically significant (n=74; p<0.001). A total of 29% of people overweight/obese at baseline had reduced body weight by >5% at 26 weeks. Of note, there were 10 patients removed from the surgical waiting list as no longer requiring surgery. Additionally, 13 patients were escalated for surgery.

## Abstract no.: 39719 QUICK FABRICATED NONE MODIFIED PROSTHETIC SOCKET FOR TRANS TIBIAL (BELOW KNEE) AMPUTEE - AN ALTERNATIVE, COST EFFECTIVE APPROACH OF PROSTHETIC MANAGEMENT Nirmal DEY, Sanjay KESHKAR

Background: In India, the existing technology does not permit to provide artificial limb to all amputees in right time & remote place. Although different types of fabrication procedures are available, still amputee spends significant time and effort to get prosthesis for regaining their lost walking proficiency. To overcome these problems, we have devised a new technique through which quick fabrication of desired prosthesis can be made with low cost, that too in remote areas and could be fabricated & delivered same day. Material & Method: Quick fabrication socket is a non-modified prosthetic socket, which can be made directly on the amputee stump using a composite material (fiberglass bandage) without taking a negative plaster cast. Quick Fabrication Socket, after fitted with modular TTP component has been evaluated. Results: We have taken 15 TTA (Trans Tibial Amputees) to study the clinical effect of Quick Fabricated Socket and compared with previous PTB socket. In subjective (patient's satisfaction) observation, the overall satisfaction level was found to be almost same in majority of the subjects (12 subjects). In objective observation of kinematic gait analysis, all the gait parameters were found to be almost similar except the Gait Symmetry which was found to be better in non Modified Socket. Conclusion: The quick fabricated non modified socket prosthesis (QFNM Prosthesis) was found to be an alternative cost effective method to provide prosthesis in less time, less tools, less manpower that too in remote area without electricity. However its efficacy, durability and cosmetic aspects need further improvement.

## Abstract no.: 39260 BRACE MODIFICATION IN TALIPES-EQUINO-VARUS (TEV): BETTER PATIENT COMPLIANCE Khaled EMARA, Ramy DIAB

Introduction: Ponseti method for the treatment of clubfoot deformity gained worldwide popularity and became the standard of care in many medical centers due to its simplicity and high rate of success. Once the last cast has been removed, adherence to the brace protocol is crucial to prevent recurrence. Reports on failures with the Ponseti method have shown that the decisive factor that led to recurrence of the clubfoot deformity was noncompliance with the foot abduction brace protocol. The purpose of this study was to assess the results of a modified knee-ankle-foot brace after successful Ponseti method in terms of parental compliance and effectiveness in preventing recurrent clubfoot deformities. Methods: Seventy- one idiopathic club feet treated successfully with ponsetti technique followed by our modified brace (a knee-ankle-foot orthosis with external rotation 70 degree). These patients are followed as regard brace compliance and effectiveness (recurrence of the deformity). Results: Eight feet lost in follow-up. The mean duration of follow-up was 52 months (range, 39-82 months). Noncompliance was not reported in any patients. The parents reported fully complied with the treatment instructions. The parents reported simplicity with bracing with no complications reported. Recurrent deformity requiring additional treatment occurred in 11feets (17.46%). Additional procedures included repeat tenotomy (9 patients), limited posterior release with or without tendon transfers (2 patients). Conclusion: Our modified orthosis provides simple, safe, economical and effective brace that are also comfortable for the child. Higher bracing compliance rates with our brace led to decreased rates of deformity recurrence and subsequent surgical procedures.

## Abstract no.: 42318 POSTERIOR HEMIVERTEBRA RESECTION AND DEFORMITY CORRECTION ASSISTED BY INTRAOPERATIVE THREE-DIMENSIONAL FLUOROSCOPY NAVIGATION Guanyu CUI

Objective: To evaluate the efficacy and accuracy of posterior hemivertebra resection and deformity correction assisted by intraoperative three-dimensional navigation system for the treatment of congenital kyphoscoliosis due to hemivertebra. Methods: 17 consecutive patients with congenital kyphoscoliosis due to hemivertebra who received posterior hemivertebral resection and deformity correction assisted by intraoperative threedimensional navigation system were investigated retrospectively. The average age of the patients at surgery was 14.7 years (range 7.5 ~ 39.0 years). Location of the hemivertebra included 8 cases at thoracic spine and 9 cases at lumbar spine. Intraoperative threedimensional navigation system was used to guide the pedicle screw placement and hemivertebra resection in real-time. The coronal and saggital Cobb angles were measured in the standing X-ray films to determine the deformity and deformity correction. CT scan was used to evaluate the accuracy of pedicle screw placement. The mean follow-up was 5 year 4 months (range 1 year ~ 8 years and 6 months). Results: The mean Cobb angle of segmental curve was 46.2° before surgery and 11.5° after surgery with an improvement of 79.8%, it was 11.8° at the final follow-up. Mean Cobb angle of the main curve was 49.6° before surgery and 13.3° after surgery with an improvement of 75.7%, it was 14.1° at the final follow-up. The segmental kyphotic angle curve was 36.5° before surgery and 9.7° after surgery with an improvement of 76.6%, it was 10.8° at the final follow-up. Trunk shift improve significantly. No complications of neurovascular injury, implant failures occurred. Totally 116 pedicle screws were placed assisted by the navigation system, no screw perforated the pedicle more than 2 mm. Conclusion: Intraoperative threedimensional fluoroscopy navigation system enables safe and accurate hemivertebral resection via a single posterior approach.