
SICOT E- SCIENCE

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From the Chair, Education Council.....

It is said that Education is the corner stone of progress. Our belief is that educating ourselves is the key to better patient care and all advances that go with it.

Education is the prime objective of SICOT and with this aim we launch a new initiative - the e-Science bulletin. This initiative features 4 issues in a year under the leadership of Dr. Hitesh Gopalan from India with his specialty team. It will bring to you an understanding of contemporary orthopaedic research and literature.

I trust that the e-bulletin will be useful for our members and we would be grateful for your feedback and comments on sicot2013@gmail.com.

Prof. Ashok N. Johari

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Tranexamic acid reduces blood loss in patients with extracapsular fractures of the hip: Results of a randomised controlled trial

Authors: P. T. Tengberg, N. B. Foss, H. Palm, T. Kallemoose, A. Troelsen, *Copenhagen University Hospital, Hvidovre, Denmark*

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Tranexamic acid (TXA) is routinely used for Total knee arthroplasty, Total Hip arthroplasty and Spine Surgery to reduce intraoperative blood loss. This study was done to ascertain whether TXA is effective in reducing blood loss and transfusion rates in geriatric patients undergoing hip fracture surgery. It is also imperative to ascertain the safety profile of the drug while treating the geriatric population

Study Design

Single Centre, Therapeutic Level 1 Randomised Control Trial

Materials and Methods (PICO)

Patient Population: 75 patients with an unstable, trochanteric fracture (AO/OTA type 31-A2.2 to 31-A3) scheduled for nailing with a short intramedullary nail (IMHS-CP; Smith & Nephew).

Intervention (TXA group): Patients were infused 1g of tranexamic acid intravenously prior to surgery, and a 3g, 24h infusion of tranexamic acid after surgery. (n=35; 33 analyzed) (Mean age: 79.8+/-11.5)

Control (Placebo group): After an initial placebo dose 1 hour prior to Surgery, a placebo mixed into 1 litre of isotonic saline is administered 24 hour later

Outcome Measurements: The primary outcome was the Total Blood Loss (TBL) which was calculated by the haemoglobin dilution method. Total blood volume was calculated with the Nadler's formula. The secondary outcome measurements were number of transfusions, risk reduction for receiving at least one transfusion and surgical blood loss during the operative procedure. Safety outcomes measured were 30- and 90-day mortality and 90-day incidence of any thromboembolism during admission, re-admission

Results

- Total blood loss was significantly lower in the TXA group (1529.6+/-1012.7mL) versus the placebo group (2100.4+/-1152.6mL) (p=0.029)

- In both groups, six patients received transfusion. There was no statistical difference in the number of blood units transfused between the two groups.
- The 90-day mortality was 27.2% (n = 9) in the TXA group and 10.2% (n = 4) in the placebo group (p = 0.07). The cause of mortality could not be ascertained

Conclusion

Tranexamic acid reduced Total Blood loss in Peritrochanteric fractures treated by IM nail, but the transfusion requirements were unchanged. Though in an initial estimation prior to enrolment required 120 patients (60 in each group); the trial could not reach the numbers required because of early termination due to slow enrolment. There was no incidence of venous thromboembolism in the TXA group, but the 90 day mortality appeared to be higher. The safety profile of Tranexamic acid in the geriatric population needs further investigation before rampant use.

Reference:

<http://www.bjj.boneandjoint.org.uk/content/98-B/6/747.long>

Minimally invasive surgery is equivalent to open surgery in the management of thoraco-lumbar fractures with neurological deficit



Title

Minimally Invasive Posterior Decompression Combined with Percutaneous Pedicle Screw Fixation for the Treatment of Thoracolumbar Fractures with Neurological Deficits - A Prospective Randomized Study Versus Traditional Open Posterior Surgery, *Spine*, Volume 41, Number 19B, pp B23–B29, 2016.

Authors: Wei Zhang, MD, Haiyin Li, MD, Yue Zhou, MD, Jian Wang, MD, PhD, Tongwei Chu, MD, PhD, Wenjie Zheng, MD, PhD, Bin Chen, MD, and Changqing Li, MD, PhD. from the Department of Orthopedics, Xinqiao Hospital, Third Military Medical University, Chongqing, China.

Relevance of the study

Thoracolumbar fractures associated with neurological deficit usually need surgical intervention. This involves pedicle screw fixation and spinal canal decompression. Open surgery can achieve satisfactory results, but the main disadvantage is approach-related complications like paraspinous muscle wasting, blood loss and wound infection, which are high especially in the presence of trauma. Minimally invasive spine surgery has gained credence recently in degenerative spine

surgeries but no study has focused on the treatment of spinal fractures by MIS through posterior approach. The authors have performed a randomized controlled trial to compare the surgical results of open surgery versus minimally invasive surgery for thoracolumbar fractures with neurological deficit.

Materials and methods

Study Design: Prospective randomized cohort study.

Sixty consecutive cases of thoracolumbar fractures with neurological deficits were randomized into MIS group and OS group.

Open group – standard open posterior approach, pedicle screw fixation and laminectomy (n=30)

MIS group – percutaneous pedicle screw system, decompression through tubular retractors (n=30)

Peri-operative variables: Incision length, blood loss, postoperative drainage volume, hospitalization days, blood transfusion rate, analgesic use rate, and x-ray exposure time

Functional outcomes: Visual Analog Scale (VAS) for back pain, Japanese Orthopedics Association (JOA) score and American Spinal Injury Association grade for patients' neurology.

Radiological outcomes: Sagittal Cobb angle, percentage of vertebral height, and vertebral wedging angle.

Minimum follow-up: 12 months.

Results

MIS group was superior in incision length, blood loss and drainage volume, blood transfusion rate, analgesics usage rate, and the duration of hospitalization ($P < 0.05$).

Open surgery group had less operative time ($P = 0.165$) and significantly less x-ray time ($P = 0.000$).

The mean VAS and JOA was better in MIS group at post-operative period of 1 week and 1 year ($P < 0.05$).

Patients in both group achieved a similar neurological recovery ($P = 0.760$).

A broken screw was found in one patient in MIS group and a broken rod in one patient in OS group.

Conclusion

MIS group has achieved the similar radiological and neurological outcome of OS group

Further it can minimize the approach-related complication.

Its limitations include larger radiation dose and longer learning curve (operating time) and higher cost.

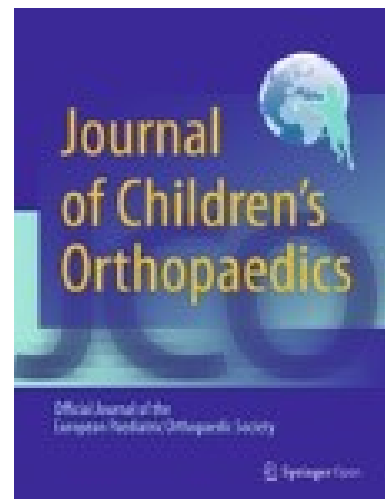
Level of evidence

Level II

Reference

http://journals.lww.com/spinejournal/Abstract/2016/10011/Minimally_Invasive_Posterior_Decompression.5.aspx

Minimally invasive single-session double-level rotational osteotomy of the forearm bones to correct fixed pronation deformity in congenital proximal radioulnar synostosis



Title

Minimally invasive single-session double-level rotational osteotomy of the forearm bones to correct fixed pronation deformity in congenital proximal radioulnar synostosis. *Journal of Children's Orthopaedics*, August 2016, Volume 10, Issue 4, pp 295–300.

Author: Sherif N. G. Bishay, Department of Orthopaedics National Institute of Neuromotor System, Giza, Egypt.

Relevance of study

Congenital proximal radioulnar synostosis is the most common congenital disease of the elbow joints and forearms. Fixed deformity at the forearm is usually compensated by movements at the shoulder and wrist. Surgical intervention is adjusted based on individual needs. However, hyperpronation deformity (60° or more) being more disabling is considered a definite indication for corrective surgery. Of the various surgical methods described, synostosis resection and interposition has shown varied results. Double level rotational osteotomy can be performed in the same setting or be a staged one. Loss of reduction in the absence of internal fixation and need for second procedure are their drawbacks, respectively.

Materials and methods

Design: Level 4 Prospective case series

Population: Twelve children (14 forearms) who consecutively presented to author's institute between September 2012 and September 2013 with congenital proximal radioulnar synostosis and having a mean pronation deformity of 70.7° (range 60°–85°) were chosen for the study. None of the children had associated congenital anomalies. Ten forearms were type III, and four were type II (Cleary and Omer classification).

Intervention: All underwent surgical correction by single-session double-level rotational osteotomy and percutaneous intramedullary K-wires of both radius and ulna. Osteotomy was completed using an electric saw or osteotome. Cast and K wires were removed at approximately 8 weeks. All children were evaluated clinically and radiologically at a mean follow up of 30.4 months (range 24–36 months).

Results

Mean age at the time of surgery was 5 years and 2 months (range: 4 years and 10 months - 6 years and 5 months).

The end point of correction was to achieve 20°–30° of pronation in the affected, dominant extremity and 20° of supination in the non-dominant one.

The mean magnitude of pronation deformity corrected was 59.8° (range 30°–90°).

All children showed improvement in functional activities, with no loss of correction, non-union, circulatory disturbances, neuropathies, or hypertrophic scars.

Discussion

Severe hyperpronation occurs in 50-80% of cases of congenital radioulnar synostosis. Surgery is justified in these children who have difficulty in feeding themselves or receiving objects. Ogino and Hikino observed that patients who complained of disability had a mean pronation deformity of approximately 60° and those asymptomatic had a mean deformity of 21°. Simmons recommends derotation osteotomy for patients with more than 60° pronation while 15°–60° pronation deformity is a relative indication tailored to individual needs. In the current study all children had a mean pronation deformity of 70.7°.

The suitable age for surgical intervention is 4 -10 years as suggested by Griffet et al and 5-7 years as recommended by Farzan et al. The mean age at surgery was 5 years and 2 months in the current study.

Green and Mittal suggested that in bilateral cases the best position was 30°–45° pronation in the dominant hand and 20°–35° supination in the non-dominant hand. Few authors recommended a lesser range of supination and pronation in view of compensatory movements at the adjacent joints.

In the current study, the final position achieved was 20°-30° pronation in the dominant hand and 20° supination in the dominant affected extremities.

Of the various surgical modalities, synostosis excision and interposition has produced variable results. Recurrence of synostosis was noticed in many studies. Three types of rotational osteotomies have been described viz. osteotomy at the synostosis, at the diaphysis of radius and ulna and the third type, at single osteotomy at the distal shaft of radius. In Wael's study, of double level osteotomy with no fixation, loss of correction in some cases was noted following POP cast loosening. Rotational osteotomy involves post-operative complications like Volkmann's ischemia, shortening, angulation and nerve palsy. In the current study, no complications, loss of correction or need for second surgery for implant removal was reported.

Conclusion

Minimally invasive, single-session double-level rotation osteotomy of the proximal ulna and distal radius with percutaneous intramedullary K-wire fixation is a safe, technically simple and efficient procedure for correction of pronation deformity.

References

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4940245/>

Ligamentization of hamstring ACL is enhanced by preserving its tibial insertion



Title

Hamstring graft tibial insertion preservation versus detachment in anterior cruciate ligament reconstruction: a prospective randomized comparative study. *Eur J Orthop Surg Traumatol.* 2016 Aug;26(6): 657-64.

DOI: 10.1007/s00590-016-1812-9. Epub 2016 Jul 7

Authors: Ruffilli A, Pagliuzzi G, Ferranti E, Busacca M, Capannelli D, Buda R from Rizzoli Orthopaedic Institute, Bologna University, Bologna, Italy.

Relevance of the study

Commonly used grafts for anterior cruciate ligament reconstruction are Hamstring tendons composed of semitendinosus and gracilis. The reconstructed tendons undergo remodelling called

"ligamentization" i.e. its transitions to normal ACL like tissue. During this remodelling under the necrotic phase graft is most susceptible for rupture. It has been proposed that this ligamentization process could be improved by maintaining its neurovascular supply by preserving the tendons tibial attachment as compared to the more traditional resection of the insertion site.

Materials and Methods

Design: Randomized Control Trial

Population: 40 patients planned for arthroscopic ACL reconstruction were enrolled for the study. Exclusion criteria involved concurrent arthritis and/or grade III-IV osteochondral lesions.

Intervention: Group involved wherein the tibial insertion of semitendinosus and gracilis tendons was left intact.

Comparison: Group involved wherein the tibial insertion was detachment

Outcome Measures: Graft ligamentization was assessed by MRI by observing the graft signal intensity. Similarly MRI observation of tendon-bone interface was observed for graft integration. International Knee Documentation Committee (IKDC) and the Tegner score were used for clinical evaluation.

Results

Graft ligamentization as observed by MRI signal was hypointense in 20%, isointense in 65%, and hyperintense in 15% cases in whom tibial attachment was preserved. The same was 5%, 55%, and 40% respectively in tibial attachment detached group.

A significantly higher mean ligamentization score was observed in the preservation group as compared to the detachment group.

Synovial fluid absence at tendon bone interface was suggestive of graft integration. 55% of the preservation group and 50% of the detachment group showed graft integration.

IKDC subjective score: 91.6 [75-100] in the preserved and 93.9 [62-100] in the detached group at the time of final follow up.

85% of the preserved and 84.2% of the detached group returned to pre-injury sports.

Conclusion

A significantly increased graft ligamentization is observed at 6 months in ACL reconstructed cases where the tibial attachment of semitendinosus and gracilis autograft are preserved. However in both groups at the end of 6 months graft integration and clinical scores at 24 months appeared similar.

Take Home Message: Graft ligamentization process could be enhanced by preserving the tibial attachment of semitendinosus and gracilis autograft. Also a better morphology of Reconstructed

ACL is observed in this group of patients as compared to the group where the insertion site is detached.

References

<https://www.ncbi.nlm.nih.gov/pubmed/27388213>

Double elasticated bandage as effective, if not superior to cast immobilisation in non-operative treatment of base of fifth metatarsal avulsion fractures



Title

Symptomatic treatment or cast immobilisation for avulsion fractures of the base of the fifth metatarsal. *Bone Joint J* Jun 2016, 98-B (6) 806-811

DOI: 10.1302/0301-620X.98B6.36329

Authors: P. I. Akimau, K. L. Cawthron, W. M. Dakin, C. Chadwick, C. M. Blundell, M. B. Davies from Sheffield, UK.

Relevance of the study

Fifth metatarsal is the commonest metatarsal to be fractured amongst all metatarsal bones and they are not uncommon to be encountered in emergency departments especially in elderly age group. It has been seen that 75% of zone 1 fractures of fifth metatarsal occur in women of older age group. These fractures are caused due to pull on peroneus brevis tendon or lateral band of plantar fascia with foot in inversion. There is a considerable loss of work productivity as return to pre injury level of function would at times take almost 6 months or beyond. Traditionally these fractures have been treated successfully with conservative treatment options in the form of plaster slipper, tubigrip (Elasticated tubular bandage), Non-weight bearing plasters, Aircast walking boot. In the past, there have been studies comparing combined level of pain and function of various non-operative modalities but most of them lack a comparative group. Also inclusion of heterogenous group of metatarsal fracture, Prospective randomised studies without power analysis and use of non-validated outcome measures question the credibility of results from these studies. This study is a level II prospective, randomised, single blinded, non-inferiority controlled trial comparing the Patient

related outcome measures (PROMs) between cast immobilisation and symptomatic treatment. The rationale behind comparing these two modalities of treatment was derived from a preliminary survey conducted on 29 foot and ankle surgeons. As a result of the survey, cast immobilisation has been chosen as the reference arm for this study. The study compares the Visual analogue scale foot and ankle score (VAS-FA) at presentation, 4 weeks, 3 months and 6 months after injury.

The null hypothesis in this study was that immobilisation in a cast would give a better PROMs (Patient reported outcome measures) and the alternate hypothesis being symptomatic treatment is not inferior.

Materials and Methods

Design: Randomised, single blinded, non-inferiority controlled study

Population: All the patients who presented within a week from the time of injury were considered for the study. The mean age for cast immobilisation group was 44yrs and 42yrs for that of symptomatic treatment group with a range of 16 to 79yrs across both the groups. An information leaflet regarding the study was given to patients either in the emergency department or the fracture clinic for them to make a decision to participate in the study. Patients with diabetes, Inflammatory joint disease, Previous ipsilateral foot injury or fracture, Injury more than a week old and patient who didn't understand written English were excluded from the study.

In all 66 patients were assessed eligible for study out of which 6 were excluded due to unwillingness to participate (n=3) and few not meeting the inclusion criteria (n=3).

The remaining 60 patients were randomised and allocated into the following 2 groups

1. Symptomatic treatment (Double elasticated bandage) (n=36)
2. Cast immobilisation (n=24)

Intervention: The patients allocated to respective groups had interventions in the form of cast immobilisation and double elasticated bandage for treatment of avulsion fracture of base of fifth metatarsal

Follow-up: The loss to follow up was eight patients (13%) at 4 weeks from both the groups combined, 24 (40%) at three months and 26 (43%) at 6 months. One patient in the immobilisation group had opted for symptomatic treatment two weeks into the study and one from each group opted out of study.

Outcome measures:

- Primary outcome measure was tested using Visual analogue scale foot and ankle score (VAS-FA). The score ranges from 0 – 100. Higher scores indicating a better functional outcome.
- EuroQol 5D visual analogue scale score (EQ 5D-VAS) was used as a measure of secondary outcome. This ranges from 0-100.

Power analysis: With the α adjusted to 0.02 for multiple testing and power set at 90% for a minimal clinical important difference (MCID) of ten points, the sample size calculation showed that a minimum sample size of 12 patients in each arm to demonstrate non-inferiority was needed.

Statistical analysis: The P value was adjusted due to multiple testings and 0.02 was considered for primary outcome and was achieved using 96% confidence interval.

Results

The outcome data for the symptomatic group was recorded for 30 patients (83%) at 4 weeks, 19 (53%) at 3 months and 18 (50%) at 6 months. The data in the immobilisation group was analysed for 22 (92%) at 4 weeks, 17 (71%) at 3 months and 16 (67%) at 6 months.

Primary outcome:

- VAS was an average of 43 (12 to 76) at baseline for symptomatic group as opposed to 37 (13 to 99) in cast immobilisation group.
- VAS at 4 weeks didn't show any significant difference with symptomatic treatment group scoring an average of 72 (34 to 96) and 65 (37 to 100) for cast immobilisation group.
- At 3 months follow up, VAS was an average of 88 (29-99) and 81 (56-100) for symptomatic treatment and cast immobilisation groups respectively.
- At 6 months VAS was same for both the groups at an average of 93.

Secondary outcome:

- EQ 5D-VAS was an average of 75 (25-95) at baseline in symptomatic group as opposed to 70 (30-100) in cast immobilisation group.
- At 4 weeks, there was a significant difference in EQ 5D-VAS which was 90 for symptomatic group and 73 for the cast immobilisation group.
- EQ 5D-VAS was 90 (45-99) and 80 (41-100) at 3 months for symptomatic and cast immobilisation groups respectively.
- At 6 months EQ 5D-VAS was almost the same at 94 and 95.

The non-inferiority boundary of -10 was never crossed at any point of time for both primary and secondary outcomes in the study indicating that symptomatic treatment was not inferior.

There were no complications in any of the study groups.

Conclusion

Multiple studies in the past (Dameron TB Jr et al, Gray AC et al, Wiener BD et al, Zenios et al, Clapper MF et al) have compared outcomes of various non-operative treatment options for avulsion fracture of base of fifth metatarsal with each study having its own limitations.

However this is the only prospective randomised trial comparing cast immobilisation to symptomatic treatment in the form of double elasticated bandage and showing that none is superior to other and there is no significant benefit in choosing any one modality of treatment in

treating the avulsion fracture of base of fifth metatarsal. The authors also acknowledge the limitations of the study like the significant loss to follow-up and not using block randomisation which could have potentially influenced the study positively.

References

<http://bjj.boneandjoint.org.uk/cgi/pmidlookup?view=long&pmid=27235524>

Video of the Month: Base of 5th Metatarsal fractures
by Dr Jitender Mangwani, Foot and Ankle Surgeon,
Leicester, UK

<https://www.youtube.com/watch?v=iH9ODbKBNYE>

Applications are invited for the Editorial Board of SICOT Education Initiative: "The SICOT eScience". As it is a pure Scientific bulletin, academically inclined members may submit their application with CV to the Editor (hitheshg@gmail.com). The editorial board would comprise members representing different subspecialities of Orthopaedics across various continents. SICOT eScience aims to cover relevant information keeping in mind the interest of the practising Orthopaedic Surgeon and also the Resident.

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