



## FEMORAL NECK FRACTURE FOLLOWING TOTAL KNEE REPLACEMENT

László Sólyom (✉), András Vajda & József Lakatos

Orthopaedic Department, Semmelweis University, Medical Faculty,  
Budapest, Hungary

### Correspondence:

Tele-fax: +36 1 466 8747

E-mail: [z.solyom@chello.hu](mailto:z.solyom@chello.hu)

### **Abstract**

We present four cases of femoral neck fracture without trauma following ipsilateral total knee replacement within one to six months interval.

### **Introduction**

Many frequent and unusual complications have already been described following knee replacement procedures. Lesniewski [5] reported in 1982 a case of 83 years old female patient, who developed a stress fracture of the femoral neck four months after total knee

replacement (TKR), and pointed out, that co-incidence between TKR and femoral neck fractures at the same side had not been published.

McElwaine [6] collected from a series of more than 500 TKR seven cases 3-16 months after knee arthroplasties. Osteoporosis was present in all.

Since 1982 a few further cases were published in the available periodicals [4,7,8,]. Hardy et al.[2] presented a case of a 76 year old female patient, who developed stress fracture of the femoral neck one year after her TKR. Hendel et al. [3] listed a total of 16 cases from the literature and added their own: a 73 year old man, who 6 months following TKR developed severe pain in the medial aspect of his operated knee spreading to his upper thigh with no history of trauma. A week later he was diagnosed as having a displaced subcapital hip fracture, and was treated with bipolar hemiarthroplasty.

### ***Case reports***

Case 1: 70 year old female patient with RA. In 1997 revision arthroplasty was performed because of loosening of unicondylar prosthesis in the right knee. Satisfactory range of motion and stability was achieved. However she developed severe thigh and knee pain 6 weeks following surgery and became unable to walk. Radiographs showed a medial fracture of the femoral neck. THR was implanted and she progressed with no complications (fig.1 and 2).



*Fig. 1: Righth knee with TKR*



*Fig.2: 6 weeks later displaced neck fracture*

Case 2: 80 year old female patient with TKR of the left knee in 1997. Six months following surgery pain arose at the sacrum area and at the left groin. She was treated conservatively, but radiographs disclosed an oblique fracture of the femoral neck. She was also treated with THR and progressed with no further complications.

Case 3: 78 year old male patient with TKR in 1998. Three months later increasing pain started in the left hip. Radiographs disclosed a femoral neck fracture. Osteosynthesis was performed using cannulated screws, the patient progressed well. (Fig. 3 and 4)



*Fig.3:TKR in the left knee*



*Fig.4:3 mths later fracture of the femoral neck*

Case 4: 86 year old female patient with OA. The left knee was operated with TKR in 2000. Doing well for five months, pain was experienced in the left hip without any trauma. Radiographs showed a subcapital fracture on the femoral neck, and osteosynthesis was performed with cannulated screws. She was discharged home after uneventful postoperative period.

## Discussion

The etiology of stress fractures is complex, including general osteoporosis, local osteoporosis due to limited use and steroid treatment. Patients who might have been chairbound or bedridden for months because of their joint pain, increase their activity following TKR after getting rid of their walking aids. The muscle tension grows stronger and this also creates an overload to the femoral neck.

The role of repeated hammer blows while the trial and final femoral components are driven home during surgery has to be considered. The mechanism of the trauma is similar to the effect of force exerted on the femoral neck through the knee at an impaction car accident. This trauma can produce microfractures in osteoporotic bone, leading to completed fracture in the weight bearing period. The protective role of the muscle sleeve is completely missing at surgery.

The design of the knee prosthesis can also be a contributing factor in creating such a risk. The posterior cruciate substituting femoral components with their boxes need a deep resection of the notch, but trial component can be jammed if the resection is insufficient. This motivates the surgeon to press or hammer more violently, especially because it is often hard to visualize the improper fitting. In addition, these designs are often applied in elderly, osteoporotic patients.

If patients with these risk factors start to complain of onsetting hip pain or stiffness, active diagnostic procedures, even repeated X-ray, isotope bone scan are to be considered to diagnose stress fracture. Early onset of the complaints may indicate an occurrence of hip injury.

Regarding the management, Devas [1] classified two forms of femoral neck stress fractures. First type is, where the X-ray shows increased bone density at the inferior part of the cortex, proving the presence of a compression fracture. This type does not require intervention,

merely rest, and weight bearing may start as tolerated. The second type of fractures starts in the upper part of the cortex and extends across the neck of the femur. This type may result in displacement, internal fixation is advised. Our cases seemed to be similar to the second type of fractures.

The successful TKR may be followed by a number of complications. Stress fracture of ipsilateral femoral neck following surgery is known as very rare. Bone quality and surgical technique may be contributing factors, and because of time interval between knee surgery and this complication, etiology of the femoral neck fracture can remain unclear. Considering the multiple mechanisms leading to this complication, and the very small number of reported cases, femoral neck fractures similar to authors' cases can be more frequent, than it is supposed.

## References

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