

# Ipsilateral Proximal, Shaft and Distal Femoral Fracture and Fixation

Aynı Taraf Proksimal, Cisim ve Distal Femur Kırığı ve Tespiti

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## ABSTRACT

Ipsilateral proximal, diaphyseal and distal femur fractures are very rare. These fractures are seen especially in the adult population following motorcycle or in-vehicle traffic accidents. Treatment of ipsilateral multiple femur fractures are difficult and controversial. Variable types of fixation techniques and implants are proposed for these types of fractures, however, no evidence could be submitted for preference of any specific implant. The sequence of fracture type to be fixed first and type of implant to be used are questions yet to be answered. In this case report, we aim to draw attention to the diagnosis, treatment and follow up and also discuss complications which could be encountered during the treatment of these ipsilateral multiple femur fractures. (*JAREM 2012; 2: 120-3*)

**Key Words:** Femur, multiple, fracture, fixation

## ÖZET

Aynı taraf proksimal femur, femur cisim ve distal femur kırığı birlikteliği son derece nadir görülen bir durumdur. Bu güne kadar literatürde sadece 18 olgu bildirilmiştir. Bu tür yaralanmalar sıklıkla motosiklet veya araç içi trafik kazaları gibi yüksek enerjili travmalar sonrasında özellikle genç toplumda meydana gelmektedir. Bu tip yaralanmaların tedavisi için birçok tespit yöntemi ve materyal önerilmiş fakat tercih nedeni olabilecek kanıtlar öne sürülememiştir. Bu tip kırıklarda tespit sırası ve önemi ise günümüzde halen cevap bekleyen sorular arasındadır. Araç içi trafik kazası sonrası acil servise başvuran 28 yaşındaki erkek hastada aynı taraf proksimal femur, cisim ve distal femur kırığı saptandı. Hasta proksimal ve distal femur kırıklarının kanüle vidalarla, cisim kırığının da retrograd femur çivisi kullanılarak intramedüller tespiti ile tedavi edildi ve ameliyat sonrası 8. ayda değerlendirildi. Literatür ışığında ipsilateral proksimal femur, cisim ve distal femur çoklu yaralanmalarına yaklaşım, tedavi prensipleri ve karşılaşılabilecek muhtemel sorunlar bu yazıda değerlendirilmiştir. (*JAREM 2012; 2: 120-3*)

**Anahtar Sözcükler:** Femur, çoklu, kırık, tespit

## INTRODUCTION

Ipsilateral proximal, diaphyseal and distal femur fractures, which were first reported by Kach in 1993, are very rare. Totally, 18 cases are reported in the literature. These traumas are seen especially in the adult population following motorcycle or in-vehicle traffic accidents (1-6).

Treatment of ipsilateral multiple femur fractures are difficult and controversial (7). An implant which is appropriate for one individual fracture may be inappropriate for another. Variable types of fixation techniques and implants are proposed for these type of fractures, however no evidence could be submitted for preference of any specific implant. The sequence of fracture type to be fixed first and type of implant to be used are questions yet to be answered (1-6).

In this case report, we aim to draw attention to the diagnosis, treatment and follow up and also discuss complications which could be encountered during the treatment of these ipsilateral multiple femur fractures.

## CASE REPORT

A twenty-eight year old male patient was evaluated at the emergency department after an in-vehicle accident. Physical examina-

tion and X-Rays revealed right femoral shaft fracture of AO type 32A3 and left femoral ipsilateral basocervical, comminuted segmentary diaphyseal fracture of AO type 32B3 and distal femoral sagittal fracture of the medial condyle of AO type 33B2 as well as an ipsilateral nondisplaced fracture of the patella (Figure 1, 2). The patient also had a hemopneumothorax. He was operated on day 7 under general anesthesia in the supine position. Fractures of the left femur were operated first, starting with a medial parapatellary arthrotomy. Retrograde intramedullary nail by Smith & Nephew, USA was preferred for closed reduction and internal fixation of the comminuted diaphyseal fracture (Figure 3, 4). Secondly, the medial condyle fracture was reduced and internally fixed with 3 sets of 4.5 mm cancellous screws. Thirdly, the femoral neck fracture was fixed with 3 sets of 7 mm cannulated screws. Then, the ipsilateral patella fracture was fixed percutaneously with a 4.5 cannulated screw (Figure 5, 6). Afterwards the patient's position was changed and the right femur was openly reduced and internally fixed with an antegrade femoral intramedullary nail by MedTip, Turkey. The patient was followed-up for 8 months. Bony union was detected at 4.5 months. No signs of avascular necrosis was seen on the latest X-Rays. At 8th month follow-up, the patient was able to walk without crutches. The Harris Hip Sco-



**Figure 1.** AP view of ipsilateral femoral neck and comminuted diaphyseal fracture



**Figure 3.** AP view of the femur fractures fixed with retrograde nail and cannulated screws



**Figure 2.** AP view of ipsilateral nondisplaced femoral medial condyle and patella fracture



**Figure 4.** Lateral view of the femur fractures fixed with retrograde nail and cannulated screws



**Figure 5.** AP view of the distal femoral and patellar fractures fixed with retrograde nail and cannulated screws



**Figure 6.** Lateral view of the distal femoral and patellar fractures fixed with retrograde nail and cannulated screws

re was 80 and left knee range of motion was between  $0^{\circ}$ - $140^{\circ}$ . No Trendelenburg gait was detected in either hips.

## DISCUSSION

Most common ipsilateral multiple femoral fractures involve fractures of the femoral neck and shaft. The ipsilateral proximal femur, diaphysis and distal femoral fractures are very rare in the literature. Proximal fractures of ipsilateral multiple femoral fractures are frequently intracapsular basocervical neck fractures with a vertical extension or, less commonly, pertrochanteric fractures and distal end fractures mostly of lateral condyle fractures in the sagittal plane, Hoffa fractures in the coronal plane or extraarticular metaphyseal fractures (1-6).

Selection of the implant either for proximal or distal fractures should depend on the configuration of the fracture. Fixation of the proximal femur fractures can be fixed with either cannulated screws of a cephalomedullary antegrade nail, multiple cannulated screws or dynamic hip screw plate. Tsai et al. (8) reported high rates of complications after antegrade nailing of the ipsilateral femoral neck and shaft fractures.

Stable fixation of both proximal and diaphyseal fractures of the femur are still possible with cephalomedullary nails, however improvement of locked proximal low contact plates have been an alternative for the treatment of these fractures.

Configuration of the distal femoral fractures is very important for the selection of the surgical technique and the implant. In these

type of fractures, it is possible to fix the distal and diaphyseal fracture using a retrograde nail. If an additional proximal femur fracture exists, it can be fixed with either a dynamic hip screw or cannulated screws (2). In our case, we preferred to use a retrograde nail to fix the femoral shaft fracture and cannulated screws to fix the medial condyle fracture as well as the femoral neck fracture. On the other hand, the femoral neck, shaft and extraarticular distal femur fractures may all be fixed with an antegrade cephalomedullary reconstruction nail only. However, there is risk of axial and rotational malalignment in fixing the distal fragment, which is the weak point of this technique. Lambiris et al. (4) reported successful results with this technique. Palarçık et al. (5) reported another technique in which they first fixed the distal condyle fracture with compression screws, then fixed the other fractures with a reconstruction nail. Another technique which is also dependent on the level of the distal femoral fracture, is to fix the diaphyseal and distal femoral fracture with an anatomical bridging plate and to fix the proximal femur fracture either with dynamic hip screws or proximal femoral nails.

For the treatment of type B distal femur fractures, although cancellous screws are adequate, low contact plates can also be used (3, 4, 6). Fixation of type C distal femur fractures are the most difficult. The type of implant to be preferred is dependent on the degree of comminution on the distal articular surface. There are reports in the literature which describe the use of  $95^{\circ}$  wedged plates for diaphyseal and distal fractures of femur (1, 6). Currently, distal anatomical LISS plates are good alternatives in the

treatment of these fractures. Schmal et al. (9) reported successful results with the combination of LISS plates and proximal femoral nails in the treatment of ipsilateral proximal and distal femoral fractures. Biomechanical studies with combined application of implants for stable fixation of these fractures revealed successful results (10).

As seen in the light of the above cited literature, it is very difficult to suggest a standard surgical technique or implant in the treatment of these rarely seen multiple femoral fractures. Our aim in this paper is to review the literature for similar cases and draw pointers for the approach and treatment of these injuries. The main clinical attention is usually on the diaphyseal fracture. However, these injuries are high energy traumas and direct X Rays showing proximal and distal ends of the femur should be obtained and evaluated in the emergency department, because neglected fractures of these sites are not uncommon. In some instances, even patellar fractures, tibial plateau fractures and ligamentous injuries of the knee may accompany these fractures. The goal of the surgeon should be the anatomical and stable restoration of the fractures, paying maximum attention to preserving the soft tissues and avoiding rotational problems. The method of the surgical technique, type of implant and sequence of which fracture to be fixed first may change depending on the configuration of the fractures and the experience and preference of the surgeon as well as the conditions in the operating theatre and the general status of the patient. However, all colleagues facing these injuries should keep in mind that all authors agree on not using more than two different implants in fixing these types of fractures. Hence, they advise using one implant to fix the femoral shaft fracture together with distal or proximal fracture (2-6). The third fracture should be fixed with another implant.

## CONCLUSION

In the case of a fixation of the proximal and diaphyseal femoral fracture using an antegrade cephalomedullary nail, cannulated compressive screws will be ideal for fixation of the intraarticular distal femoral fracture. The position of the patient may be either lateral or supine depending on the surgeon's preference. If the diaphyseal and the distal femoral fractures are to be fixed using

a retrograde femoral nail, and cannulated screws or dynamic hip screws should be preferred for proximal femoral fracture depending on the configuration of the fracture. The position of the patient should be supine. After fixation of all fractures, soft tissues stabilizing the knee joint should be examined thoroughly.

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