



Hip dislocation associated with ipsilateral femoral neck and shaft fractures: an unusual combination and dilemma regarding head preservation

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Traumatic posterior hip dislocation associated with a fracture of the femoral neck is a rare injury. The combination of posterior dislocation of the femoral head with ipsilateral femoral neck and shaft fractures is even rarer, with only one such case reported in literature. We present the case of a 50-year-old man, with traumatic posterior dislocation of the hip, and fractures of the femoral neck and shaft, in addition to an undisplaced superior pubic ramus fracture of the acetabulum. Osteosynthesis of the femoral shaft fracture followed by open reduction of the femoral head and fixation of the neck was undertaken, while taking care not to damage the intact retinaculum on the posterosuperior aspect of the femoral neck. The radiographs revealed union of all fractures without evidence of avascular necrosis of the femoral head at final follow-up of two years. This case is of particular interest as it highlights some of the important factors in deciding between head preservation versus arthroplasty for this complex fracture-dislocation.

Key words: Dislocation; femur; femoral neck; ipsilateral; fracture.

Hip dislocation with femoral neck fracture is a rare injury and is fraught with potentially devastating consequences including avascular necrosis (AVN) and subsequent early secondary osteoarthritis. Some authors have even recommended a prosthetic replacement primarily in such an injury.^[1-4] However, it has been shown that if an emergent open reduction is performed and retinacular vessels are found to be intact, a satisfactory outcome can be expected without any undue risk of avascular necrosis.^[5] The decision to sacrifice/preserve the femoral head becomes even more difficult in patients in their 4th or 5th decade of life.

Hip dislocation associated with ipsilateral femoral

neck and shaft fractures is an even rarer and further complicates the surgical management. To our knowledge there has been only one other case report with this combination of injuries.^[6] This case highlights the importance of the integrity of the retinacular vessels in deciding between osteosynthesis versus arthroplasty in hip dislocations associated with femoral neck fractures and provides an independent verification of the observation made by Tannast et al.^[5]

Case report

A 50-year-old unrestrained male driver was involved in a head on collision with a tree. He presented to the

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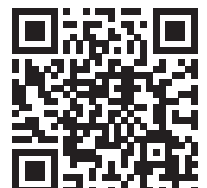
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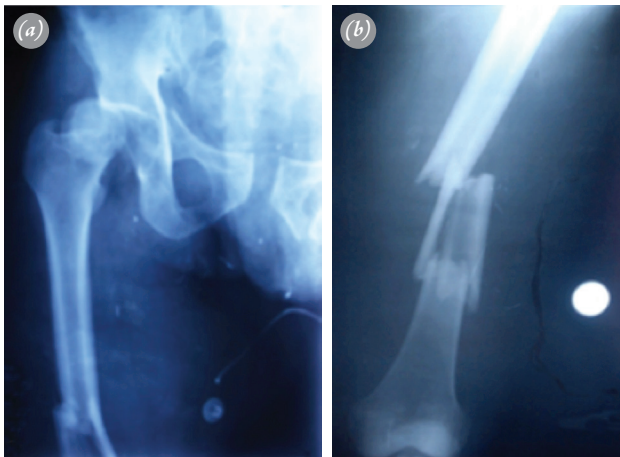


Fig. 1. Anteroposterior radiographs of the right hip joint **(a)** and femur **(b)** showing posterior dislocation of the femoral head with ipsilateral femoral neck and shaft fractures. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

emergency room three hours after sustaining the injury with complaints of pain in his right hip and thigh. On primary survey, the patient was hemodynamically stable and had full Glasgow Coma Score. Secondary survey revealed an externally rotated and shortened right lower extremity without distal neurovascular deficit. The pelvic compression test was negative. Radiographs and computed tomography (CT) revealed a posterior dislocation of the hip associated with a subcapital femoral neck fracture and a comminuted ipsilateral femoral shaft fracture on the right side (Fig. 1 and Fig. 2). The patient also had an undisplaced superior pubic ramus fracture on the same side.

The patient was taken to the operating room four hours after presenting to the emergency room. The femoral shaft fracture was addressed first. He was placed in a supine position on a radiolucent table with a bolster placed under the distal thigh for maintaining knee flexion. A medial parapatellar approach was used and the

femoral shaft fracture fixed with a distal femoral nail (DFN) (Fig. 3a).

The patient was then positioned in the lateral decubitus position and the right hip was exposed through a posterolateral approach. The fascia lata and gluteus maximus were split. The femoral head was found lying between the piriformis and obturator internus tendons. The articular cartilage of the femoral head was intact without any impaction. Both the obturator internus and externus were intact. The piriformis as well as the triceps coxae were cut 1.5 cm from their insertion on the greater trochanter. The femoral head was then gently reduced into the acetabular socket using a Schanz screw. Part of the retinaculum on the posterosuperior aspect of the femoral neck leading to the femoral head was noted to be intact. Osteosynthesis of the femoral neck fracture was performed with two 6.5 mm cannulated cancellous screws (Fig. 3b). Since the patient was in lateral decubitus position, no lateral view was obtained with image intensifier, two screws were placed in crossed configuration under direct vision, and the length of screws was estimated on anteroposterior views on C-arm image intensifier.

Postoperatively, non-weight bearing, crutch ambulation was started on the fourth postoperative day and the patient discharged from the hospital. Radiographic examination 8 weeks later showed signs of healing in both the femoral neck and shaft fractures, at which time partial weight bearing was permitted. This was progressed to full weight bearing at 14 weeks.

At his most recent follow-up visit, 2 years after injury, the patient was completely asymptomatic, with symmetric range of motion of his hips. Radiographs demonstrated union of all fractures without signs of avascular necrosis or osteoarthritis (Fig. 3c, d). There was heterotopic ossification around the hip (Brooker Grade II) without any functional limitations. The patient had a limb length discrepancy of 1.5 cm, which was managed

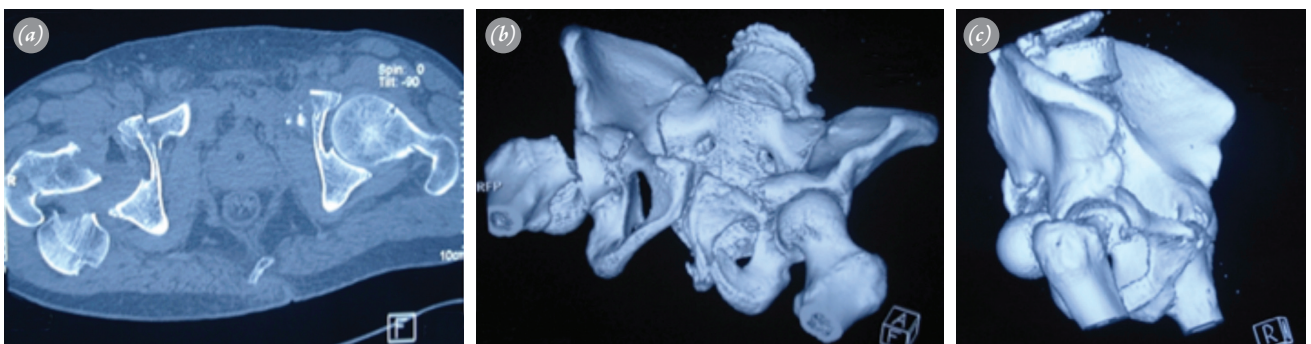


Fig. 2. CT scan of the pelvis showing the posterior dislocation of the hip with fractures of the femoral neck and superior pubic ramus **(a)**, and three dimensional reconstructions **(b)** and **(c)**. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

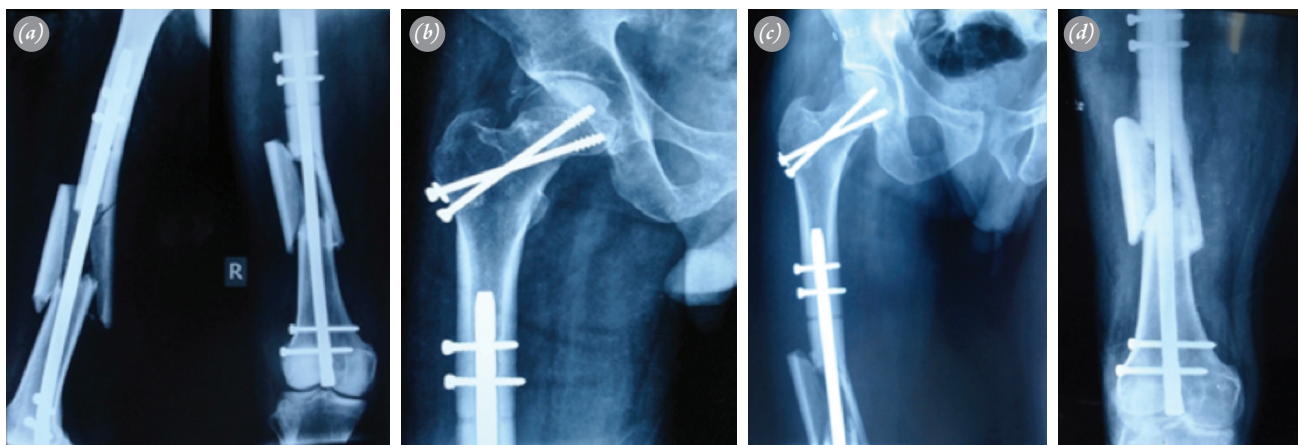


Fig. 3. Immediate post-operative anteroposterior and lateral radiographs of the right femur (a) and anteroposterior radiograph of the right hip (b) showing placement of the distal femoral nail and cannulated cancellous screws respectively. Anteroposterior radiographs of the right hip joint (c) and femur (d) demonstrating union of all fractures without evidence of avascular necrosis or osteoarthritis of the hip, two years after surgery. Heterotopic ossification around hip is noted. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

with a shoe raise. He had a Harris hip score of 88 and according to the assessment system used by Friedman and Wyman for ipsilateral femoral neck and shaft fractures, had a good functional result.

Discussion

Traumatic hip dislocation associated with a femoral neck fracture is a rare and severe injury. Treatment options for this combination of injuries include either osteosynthesis or primary arthroplasty.^[1-4,6-8] The addition of an ipsilateral femoral shaft fracture to this complex fracture dislocation, however further complicates the picture.

Only one such case of traumatic hip dislocation associated with ipsilateral femoral neck and shaft fractures has previously been reported in English literature. Duygulu et al reported on a 52-year-old man with ipsilateral femoral neck and shaft fractures with associated fracture of the acetabulum and posterior dislocation of femoral head.^[6] They fixed the femoral neck and shaft fractures with a reconstruction type intramedullary nail after having reduced the femoral head using a posterolateral approach. The authors decided against arthroplasty procedure based on the presence of additional acetabular and femoral shaft fractures.

The presence of an acetabular fracture is by no means a contraindication to an arthroplasty procedure, with large series of acute total hip arthroplasty (THA) for acetabular fractures being reported.^[9,10] A concomitant femoral shaft fracture however does make an acute arthroplasty a difficult option. An ipsilateral femoral neck and shaft fracture is essentially seen in young patients with high-energy trauma and no mention of an acute

arthroplasty for management of the femoral neck fracture in this setting was found in literature except for a report by Yip et al.^[11,12] They reported on the use of an Austin Moore hemiarthroplasty in combination with a half-sawed Gross-Kempf (GK) intramedullary nail. The length of the GK nail was tailored according to the measured femoral length. The two implants were then impacted with a 4 cm overlap. The tension band wire placed between one of the distal locking holes in the nail and the hole in the Austin Moore implant and tunneled through the intramedullary nail provided additional security. The common femoral neck fracture pattern present in an ipsilateral neck-shaft fracture is simple, vertical, and minimally displaced.^[11] The reported incidence of femoral head osteonecrosis in ipsilateral neck-shaft fractures is approximately 3% and lower than the reported 10% incidence in solitary neck fractures. This discrepancy has been theorized to reflect energy dissipation in the shaft fracture with the combined injury pattern.^[13] However the present case also had a posterior femoral head dislocation in addition, which has an independent risk of avascular necrosis of 10-25%.^[14] Therefore although the incidence of avascular necrosis in ipsilateral femoral neck-shaft fracture may be less than isolated femoral neck fractures, the combined injury reported here has a high risk of AVN.^[7,8,15,16]

Tannast et al., have recently proposed a decision-making algorithm for the management of such complex fracture-dislocations based on the intraoperative integrity of the medial femoral circumflex artery (MFCA) and the retinacular vessels for deciding between osteosynthesis versus prosthetic replacement.^[5] They have attributed the safety of surgical dislocation of hip developed at their

institution to the intactness of MCFA and retinacular vessels. Extrapolating the same rationale to this devastating injury pattern, they advocate that if the integrity of these two vascular structures can be ensured during surgery, an attempt at head preservation should be made.

Some authors who have proposed primary arthroplasty for hip dislocation associated with femoral neck fracture have cited indentation fracture/ articular damage of the femoral head as their reason for deciding against osteosynthesis.^[2-4]

According to Drummer et.al., if the associated dislocation is anterior/obturator, there is usually marked displacement of the fracture and this combination of injuries may be treated with total hip replacement.^[1] This observation of theirs is supported by literature, with all four cases of anterior/obturator dislocation associated with femoral neck fracture, treated with osteosynthesis developing AVN.^[7,15-17] These cases perhaps represent instances where the retinacular vessels would be torn, however an intraoperative assessment would be difficult given the fact that an anterolateral/ lateral approach was used in these cases. Therefore, although intraoperative integrity of the retinacular vessels is an important parameter for deciding between osteosynthesis versus arthroplasty for hip dislocations with femoral neck fractures, other factors such as damage to the articular cartilage as well as the presence of an ipsilateral femoral shaft fracture must also be considered.

The ideal fixation strategy for high-energy ipsilateral femoral neck and shaft fractures remains controversial. However, recent studies have shown higher rates of malreduction as well as non-unions with the use of cephalomedullary nails for ipsilateral femoral neck and shaft fractures.^[11,13] This procedure is technically demanding and requires simultaneous fracture reductions, which is often difficult to obtain. The femoral neck fracture may further displace with nail insertion, potentially jeopardizing the tenuous remaining head blood supply.^[11] These authors have therefore recommended the use of two separate devices for displaced femoral neck fractures associated with ipsilateral shaft fractures.^[11,13] We used two different fixation devices in our case, as it is easier to reduce the femoral neck and hip joint after having stabilized the femoral shaft and because of the fact that cancellous screws provide better compression at the fracture site than locking bolts of reconstruction nails.

The mechanism of a combined posterior hip dislocation and femoral neck fracture merits further discussion. According to Fernandez, the dislocation caused by a longitudinal force combined with adduction, is the first incident in this combined type of hip injury.^[18] The head

of the femur is then fixed by the tight periosteum of the Ilium, and further adduction causes the fracture of the femoral neck. In the present case, while driving the car an anteroposterior force most likely dislocated the hip first, and the additional strong longitudinal force then caused the neck and shaft to fracture as the head of the femur was fixed by the tight periosteum of the Ilium.

To conclude, dislocation of the femoral head associated with ipsilateral femoral neck and shaft fractures is a rare injury. Assessment of intraoperative integrity of the retinacular vessels may have a definite role in the management plan, however other factors such as indentation of the femoral head, pre-existing hip arthritis as well as associated fractures must also be considered; and lastly, as this peculiar injury pattern has a bearing on the treatment plan, we believe, it should be included in the present systems.

Conflicts of Interest: No conflicts declared.

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