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Case Report

Ipsilateral floating hip and knee, or floating lower limb – A rare case report

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ABSTRACT

Introduction: Ipsilateral floating hip and knee injuries at the same time are very rare injuries, occurring due to high velocity trauma. With a small number of such case reports, the treatment guidelines regarding surgical fixation are yet to be formulated.

Case report: We report an interesting case of hip dislocation, comminuted acetabular fracture, intertrochanteric and shaft of femur fracture and both bones leg fracture ipsilaterally. Open reduction of hip, antegrade femoral nailing with recon nail and closed tibial nailing was done in a single setting. Acetabular fracture was treated non-operatively.

Conclusion: Patient's general condition, co-morbid status, fracture pattern and the surgical expertise of the trauma team should guide the definitive treatment and its sequence. Early fixation of long bones is warranted and acetabular fixation can be done in second stage.

Introduction

Floating hip and knee are high velocity injuries seen in younger patients, due to fall from heights or motor vehicle accidents. With the increasing traffic and vehicle population, these injuries are becoming common. They are associated with life threatening injuries to other systems. The complexity of these problems increases due to the difficulties in reducing these fractures. The paucity of literature on ipsilateral floating hip and knee injuries poses a challenge for the treating Orthopedic surgeon as treatment guidelines are not well established. We present a rare case of ipsilateral fracture of acetabulum, hip dislocation, intertrochanteric fracture, shaft of femur fracture, left sacroiliac joint disruption and fracture of both bones of leg. To our knowledge, there is no such case report published in literature with this combination.

Case report

50-year-old male presented to the casualty with pain and inability to use his lower limb following a road traffic accident sustained 24 h earlier. He was splinted initially in the nearby hospital and referred for definitive management. He was in hypovolemic shock. His GCS was 13/15 and ISS was 34. His left lower limb was completely externally rotated and deformed with intact skin. The perfusion of lower limb was normal but he had foot drop on that side. His vitals were stabilized and he was evaluated following ATLS protocol.

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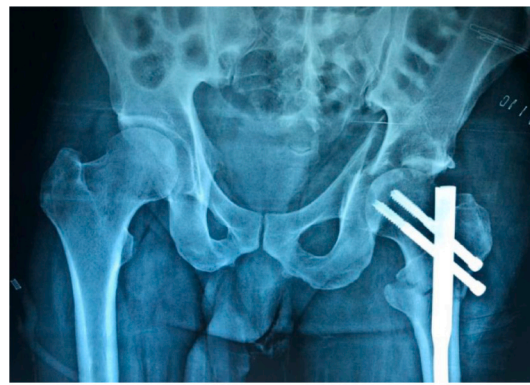


Fig. 1. Radiology at the time of presentation showing ipsilateral fractures of acetabulum, femur and tibia. (a) AP view of the pelvis, (b) lateral view of proximal femur, (c) Lateral view of femur shaft, (d) lateral view of leg, (e) axial image of hips.

Radiology revealed a comminuted transverse-posterior fracture of the acetabulum, dislocation of hip, intertrochanteric fracture, shaft of femur fracture and fracture of both bones of leg (Fig 1). The left sacroiliac joint space was widened. He also had extradural hemorrhage, fracture of the nasal bones, right periorbital wall and glass piece foreign bodies in the periorbital wall. Patient had uncontrolled diabetes, a history of seizure disorder and an initial hemoglobin of 7g%.

Fluid resuscitation and optimization of general condition was done. He was taken up for definitive procedure 48 h from the injury time after neurosurgery team clearance. Patient was positioned in right lateral position. The hip joint was found dislocated posteriorly due to extreme comminution of the posterior acetabulum. Closed reduction was attempted with a Schanz pin from proximal femoral lateral cortex into the femoral head and neck. As the attempts failed, patient underwent open reduction of hip through posterior approach. Proximal femoral nailing was done through the same approach. Intraoperatively the femoral head articular cartilage was normal and the retinacular vessels were found grossly intact. The acetabular fracture was found to be comminuted and sciatic nerve was intact. Acetabular fixation was not undertaken at that time to reduce the surgical trauma. Tibial interlocking nailing was done in the same setting. Facial wounds were debrided and sutured. The operating time was 180 min and visible blood loss was 100 ml (Fig. 2).

Postoperatively the limb was kept in abduction and long knee immobilizer. Since patient was irritable due to extradural bleed, skeletal traction was differed. He was advised surgical fixation of the acetabulum as second procedure. Patient opted for conservative treatment. He was discharged on 10th postoperative day. Indomethacin prophylaxis was followed for 6 weeks. He was started on static exercises of lower limb and maintained in non-weight bearing for 12 weeks. Partial weight bearing was started at that time and



(a)



(b)

Fig. 2. Immediate postoperative X-rays. (a) AP view of pelvis, (b) AP views of thigh and leg.

progressed to full weight-bearing by 6 months. His weight bearing status and range of motion improved gradually. Fractures united by 6 months and the foot drop recovered without residual deficit by 9 months (Fig. 3).

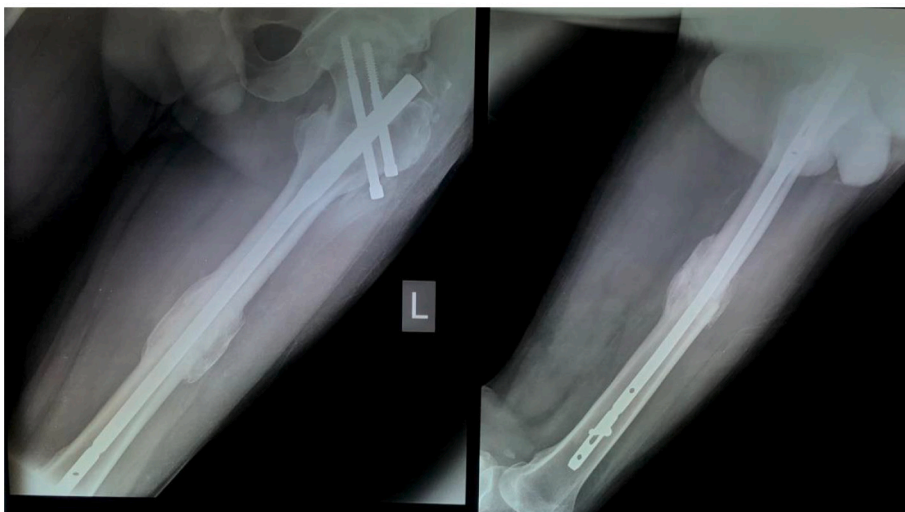
At the time of last follow up at 2 years, there was terminal limitation of internal rotation in the hip and knee movements were normal. Brooker Grade III heterotopic ossification was evident in the follow up X-rays. Limb lengths were normal. There were no avascular necrosis changes and joint space was preserved in the hip. His modified Harris hip score was 76.85 and he was able to carry out most of his activities of daily living without discomfort. Consent was obtained from the patient for publication of his findings and radiographic images.

Discussion

The term ‘floating’ in musculoskeletal injuries refers to bony discontinuity above and below a joint. In 1965, Blake and McBride described floating knee injury from their review of 51 patients with fractures of femur and tibia on the same side [1]. Fraser’s classification describes five patterns according to the location of the fractures in femur and tibia [2]. Libergall, in 1992, introduced the term floating hip for simultaneous fractures in acetabulum and femur following their evaluation in 17 patients with such injuries [3]. They identified central and posterior patterns in floating hip injuries. Ipsilateral floating hip and knee are uncommon injuries that usually occur in head on collision between motor vehicles or collision between a pedestrian and a heavy motor vehicle, as like in our



(a)



(b)



(c)

Fig. 3. At 2 years follow-up. (a) AP view of pelvis, (b) AP and lateral views of thigh, (c) AP and lateral views of leg, (d) clinical picture showing knee extension, (e) clinical picture showing hip flexion and knee flexion.



(d)



(e)

Fig. 3. (continued).

case.

A detailed evaluation and monitoring of all vital organs are essential and the treating team should follow ATLS protocol with utmost care. The incidence of injuries to chest, abdomen and head is high, and mortality ranges from 5% to 15% in these injuries. Complications like DVT (12%), heterotopic ossification (34%), osteoarthritis (16%) and sciatic nerve palsy (33%) are frequent enough

to warrant aggressive monitoring and treatment. We had heterotopic ossification and sciatic nerve palsy which resolved spontaneously.

The chances of avascular necrosis and osteoarthritis depends upon the timing of reduction of femoral head, the indentation injury of articular cartilage and the intactness of retinacular branches of medial circumflex femoral artery. Tannast gave an algorithm for head preservation or arthroplasty in ipsilateral neck fractures with dislocation based on the retinacular vessels intactness [4]. Sharma suggested that these criteria should be included in formulation of management plan [5]. We think, in our case, because the proximal femoral fracture was extra-articular and there was no visible articular cartilage injury, avascular necrosis was not seen.

Only 4 cases of ipsilateral floating hip and knee have been published so far. Essah in 2006 reported a case of pelvic disruption, hip dislocation and multiple fractures of femur and tibia and suggested inclusion of this injury as a variant in the existing classification system. They reduced the hip dislocation and plated the segmental fracture of the femoral shaft. Patella, tibial shaft and medial malleolus fractures were treated conservatively [6]. Guvenir reported a case of simultaneous ipsilateral floating hip and knee injury associated with popliteal artery injury that resolved spontaneously after reduction and fixation of epiphyseal injury [7].

Kumar et al., treated undisplaced acetabular fracture conservatively and did antegrade nailing of femur and tibia. They found the acetabular fracture to be stable on fluoroscopy [8]. Abdellatif did a staged approach for the treatment of ipsilateral floating hip and knee injuries. Open reduction of hip and tibial external fixation was done in the first stage for the grade 2 open fracture. In the second stage 2 days later, they did femoral nailing and posterior acetabular fixation [9].

The sequence of fixation has been a matter of debate for long. Kregor said fixing acetabulum first will help in draping and positioning for femur fixation, and can prevent further damage to the hip joint [10]. From their study on 57 patients, Burd reported that acetabular fractures are most often posterior wall or transverse fractures or a combination of them [5]. The time to first surgery in these patients was 87 h in Burd's report, showing that the delay in surgery is common due to significant systemic injuries [11]. Liebergall advocated a 3–5-day delay for acetabular fixation and stated that fixing the femur first will help in traction and reduction of the acetabulum.

The delay of 48 h in our case is attributed to head injury and hypovolemic shock. We advise open reduction of hip, antegrade femoral and tibial nailing in same setting to lessen the chance of fat embolism syndrome in these injuries. Since acetabular fixation is frequently time consuming and requires extensive surgical dissection, it can be done in second stage after planning with a post-reduction CT Scan. This will avoid the second hit effect and reduce the incidence of systemic complications.

Conclusion

Even though the pendulum is swinging in favor of early operative fixation of all fractures for optimal results currently, general condition of the patient, co-morbid status, the pattern of fracture and the surgical expertise of the trauma team should guide the definitive treatment and its sequence. Reduction of joint dislocation and long bone stabilization should take precedence over acetabular fixation.

CRediT authorship contribution statement

Dr. B. Vijay Anand: Conceptualization, Resources, Writing - original draft.

Dr. Deviprasad: Visualization, Investigation.

Dr. Kalyani Praba: Writing - reviewing and editing.

Dr. Suraj Babar: Validation.

Dr. Mahesh Babu: Supervision.

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Declaration of competing interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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