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Ipsilateral intertrochanter and femoral shaft fracture with a floating knee injury: A case report with management and review of literature

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Abstract
Isolated ipsilateral intertrochanteric fracture with femoral shaft fracture is a rare injury. Similarly, a floating knee injury (ipsilateral fractures of the femur and tibia) is relatively uncommon. We describe a case of 50 year old man with ipsilateral intertrochanteric fracture with the femoral shaft with an ipsilateral floating knee injury.

Keywords: Ipsilateral, floating knee, intertrochanteric, femoral shaft, tibial shaft

Introduction
Ipsilateral intertrochanteric and femoral shaft fractures are typically associated with high energy trauma. Floating knee injuries refers to fractures involving ipsilateral femur and tibia. With the rise in motor vehicle accidents there has been increase in the floating knee injuries. Concept of floating knee was originally established by Blake and McBryde in 1975 [1]. These fractures may involve metaphysic, diaphysis or reach upto knee joint. There are also high chances of life threatening injuries to chest, head and abdomen and fat embolism with such high levels of trauma [2, 3]. Although these injuries are to be treated surgically, however no consensus currently exists on the order of fixation of these fractures.[4] We describe a case of 50 year-old man with ipsilateral intertrochanteric fracture with femoral shaft fractures with an ipsilateral floating knee after a road traffic accident.

Case Report
A 50 year old male patient presented to us in emergency department with closed trauma of left lower limb secondary to road traffic accident. Immediately after trauma patient was unable to stand on his limbs and felt excruciating pain and deformity on left lower limb. After general physical examination no, other significant injury was found. On physical examination patient was unable to do active straight leg raise. Bony deformity was noted in left thigh and left leg. Patient also complained of left hip pain. No neurovascular injury was noted. Distal pulses were bilaterally comparable. Patient was initially stabilised in the emergency with fluids and splints. Radiographs were taken in two planes, anteroposterior view and lateral view before planning for surgical fixation. Imaging revealed left intertrochanteric fracture, a left femoral shaft fracture and a left tibial shaft fracture (Fig 1). No other injuries were noted in the patient. General surgery clearance was taken to rule out chest and abdominal injuries.

Patient was operated the day after admission. All the three fractures were fixed in the single setting. Patient was laid supine with affected knee placed in ~30° flexion over operating table with a bolster underneath the knee. Knee flexion prevents distal fragment from being pulled into more flexion by gastrocnemius. Inferior pole of patella and borders of patella tendon were marked. A 2cm incision was made from inferior pole of patella distal through tendon. We used a Transtendinous approach. Tenotomy was done to develop paratenon layer, sharp dissection through paratenon and then patellar tendon was done. Guide pin start point was in centre of intercondylar notch on anteroposterior view and just superior to Blumensaat's line on lateral view (Fig 2). Guide pin position was checked on C-arm image to ensure pin was in centre of medullary canal. Fracture was reduced and sequential reaming was done.

Nail was inserted over guidewire and was locked distally and proximally. After distal femoral nailing, Dynamic Hip Screw (DHS) was used to fix intertrochanteric fracture. Tibial fracture was fixed with intramedullary nailing using the same incision used for distal femoral nailing. (Fig 3)

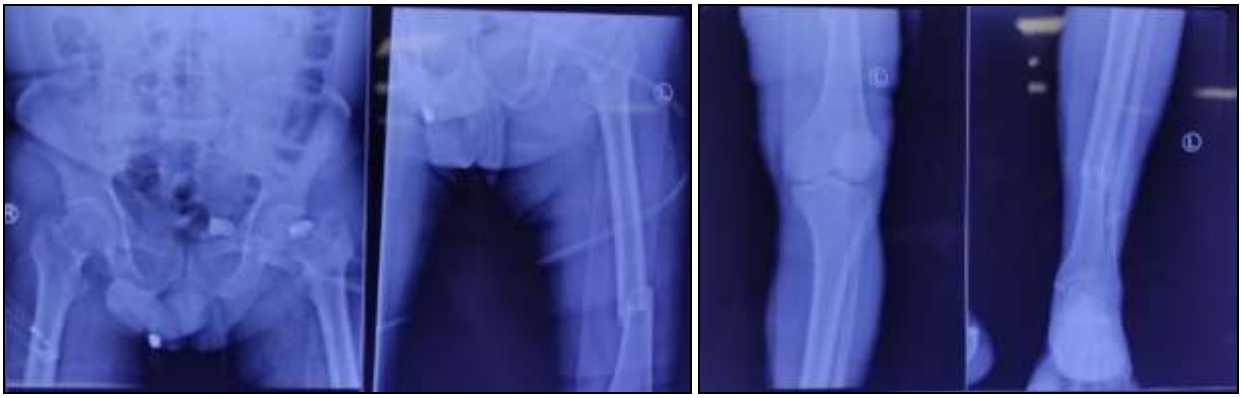

Fig 1: Preoperative Xray

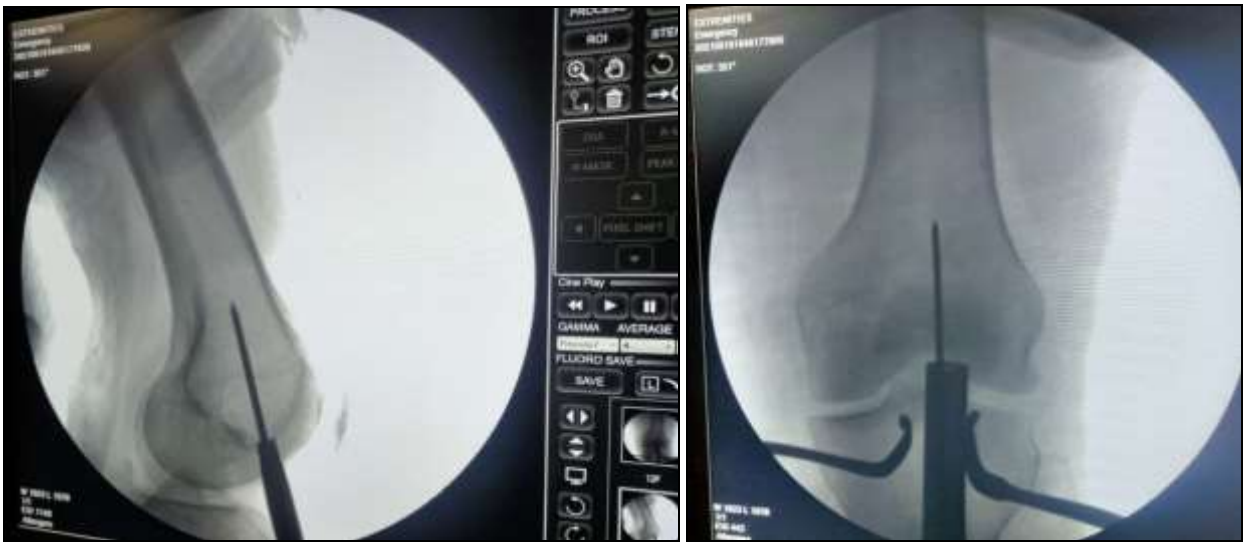

Fig 2: Image intensifier picture showing guide wire position in Lateral and AP view

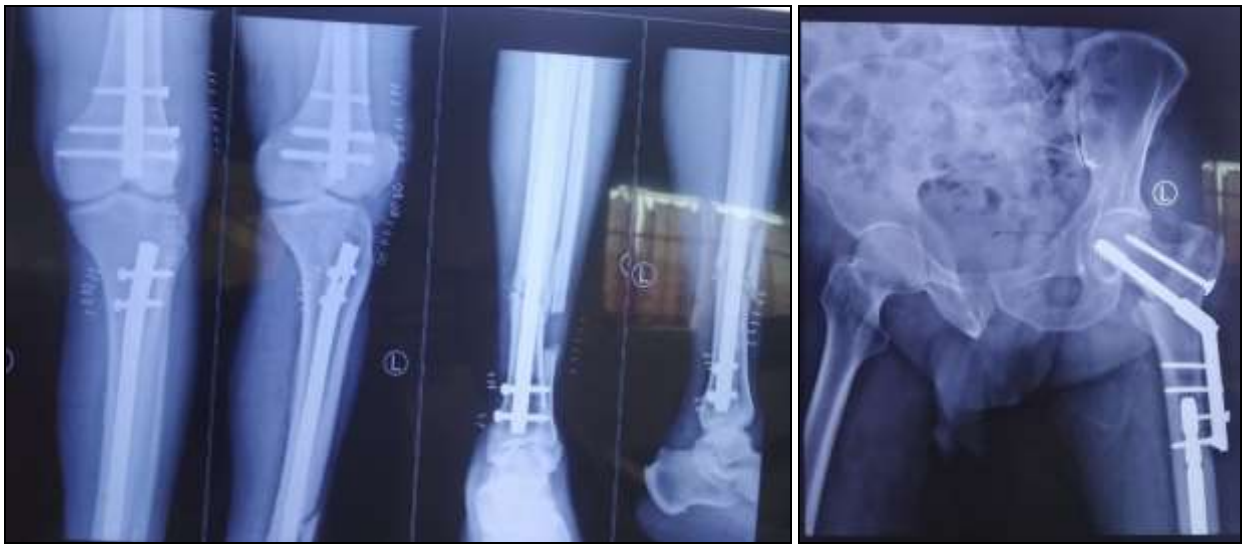

Fig 3: Showing postoperative Xray

Postoperatively IV antibiotics were given for 5 days and sutures were removed on the 14th postoperative day. Physiotherapy was started at the earliest and the patients were mobilized. Partial weight bearing was started once adequate callus at the fracture site was seen in the Xray.

Discussion

Ipsilateral intertrochanteric and femoral shaft fractures with ipsilateral floating knee injuries are rare form of injuries that are encountered in the daily practise to an orthopaedic surgeon. Though these injuries are rare, but they are a result

of high velocity trauma and can sometimes be life threatening to the patients. In the present case, the femoral shaft fracture was first approached using a distal femoral nailing. We then fixed intertrochanteric fracture using DHS followed by the use of a intramedullary nail for the tibial shaft fracture. Initial stabilization of the femur allowed for easy manipulation of the tibia fracture for reduction and fixation during the surgery. There is currently no validated consensus on the optimal strategy for treating ipsilateral femoral neck and shaft fractures or floating knee injuries. Floating knee injuries result from high energy trauma and patients often have injuries to several organs as well as multiple fractures which require careful evaluation of these injuries and adequate resuscitation of the patient before proceeding to the definitive management of the specific fractures. Studies showed associated injuries like head injuries, chest injuries, abdominal injuries and injuries to other extremities [5]. There seems to be a general consensus that early fixation is appropriate for these high-energy injuries. Early fixation decreases morbidity and mortality and allows for early patient mobilization and rehabilitation that leads to better functional outcomes. There is an ongoing debate regarding use of a single device versus two separate implants for treating each fracture in ipsilateral femoral neck/ intertrochanter and femoral shaft fracture. Bedi *et al*. [6] in their study found a significantly higher rate of femoral malreduction after using a single implant to treat ipsilateral femoral neck and shaft fractures. Subsequently, the authors concluded that using two implants was preferable for better fixation and functional outcomes. Regarding the management of floating knee injuries, fixation depends on individual patient's fracture pattern as no standard management method is currently followed. Type I floating knee injuries have been treated using intramedullary nails in both femur and tibia fractures with good functional outcomes [7, 8]. It is recommended that the femur should undergo surgical fixation before the tibia. This is because of a concern that further soft-tissue damage can occur in the unstable femoral fracture while fixing the tibial fracture. Additionally, stabilization of the femur allows for a more stable position to approach the tibia fracture and allows access to the starting point [9]. Single incision technique for intramedullary nailing of both the fractures have been recommended by several authors in the literature [10, 11]. Rios *et al*. compared single incision versus traditional antegrade nailing of the fractures and found the former to have less surgical & anaesthesia time with reduced blood loss [12].

Conclusion

Ipsilateral Intertrochanteric and femoral shaft fractures as well as floating knee injuries result from high-energy trauma, and they often include various associated injuries that affect treatment outcomes. Early fixation is desirable as it decreases morbidity and mortality and allows for early patient mobilization and rehabilitation giving better functional outcomes.

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