

CASE REPORT

Right Ipsilateral Acetabulum Fracture with Compound Type 3 Comminuted Intra-articular Lower 1/3rd Femur with Quadriceps Tendon Avulsion from Patella

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ABSTRACT

We report an exceptionally rare and complex polytrauma in a 38-year-old male who sustained a right acetabulum fracture (Posterior column and wall fracture with Anterior column fracture) in combination with an ipsilateral open (Gustilo-Anderson Type 3) comminuted intra-articular distal femur fracture involving the lower one third of the femoral shaft, further complicated by a complete avulsion of the quadriceps tendon from the patella in a single limb. Such combined injuries present extraordinary challenges to the orthopaedic surgeon, requiring a staged, multidisciplinary approach to optimize functional recovery. This case highlights the importance of systematic injury assessment, meticulous wound management, staged surgical planning, and intensive rehabilitation in achieving a satisfactory outcome.

KEYWORDS

• Acetabulum Fracture • Distal Femur Fracture • Compound Fracture
• Quadriceps Tendon Avulsion • Ipsilateral Polytrauma • Open Reduction
Internal Fixation • External Fixation • Staged Surgery

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INTRODUCTION

Distal femur fractures account for about 3% to 7% of all femur fractures. ■ Most distal femur fractures in young adults result from high-energy trauma such as motor vehicle collision or fall from height. Approximately 5%-10% of distal femur fractures are open injuries. ■ The traumatic wound is nearly always anterior and is associated with a variable degree of damage to the extensor mechanism. Such fractures with open wound require early antibiotic administration followed by serial surgical debridement and irrigation. Immediate internal fixation is not indicated and depends on the type of fracture and patient condition.

Acetabular fractures and distal femur fractures each represent distinct, technically demanding injuries requiring specialised orthopaedic expertise. ■ Their simultaneous occurrence on the same extremity – further compounded by an open wound classification and extensor mechanism disruption – is extraordinarily uncommon. The ipsilateral combination creates competing biomechanical and rehabilitative demands: early mobilisation of the hip and knee is desirable yet potentially antagonistic to healing at each site. Quadriceps tendon avulsion from the patella, while less frequent than patellar tendon rupture, carries significant morbidity if not repaired anatomically and in a timely fashion.

CASE SUMMARY

A 38-year-old male construction worker presented to the Emergency Department following a high-velocity road traffic accident (RTA) in which his vehicle was struck laterally at highway speed. Pre-hospital Glasgow Coma Scale (GCS) was 13/15; systolic blood pressure on arrival was 72 mmHg. He reported severe pain in the right hip, right thigh, and right knee, with bleeding and inability to move the right lower limb.

Clinical Examination

On examination, the patient had:

- Tachycardia (HR 118 bpm) and hypotension responsive to 1 L crystalloid bolus
- **Right lower extremity:** limb shortened and externally rotated at the hip.

- **Right hip:** tenderness over the posterior wall, restricted and painful range of motion (ROM)
- **Right distal thigh/knee:** a 12 cm contaminated laceration over the anterior aspect with bone exposure – classified Gustilo–Anderson Type IIIB
- Significant soft tissue swelling and deformity of the distal femur
- **Neurovascular status:** distal pulses intact (dorsalis pedis and posterior tibial); sensation intact in all dermatomes

Imaging Findings

X-ray of the hip demonstrated a right acetabulum comminuted fracture with inferior pubic rami fracture. X-ray of the knee with femur showed a distal femur comminuted fracture.

Diagnosis

1. Comminuted posterior column and wall of acetabulum fracture with anterior column of acetabulum fracture.
2. Type 3B open comminuted right distal 1/3rd femur fracture with bone loss, quadriceps tendon avulsion from patella, and laceration over anterior aspect of the right knee.

TREATMENT

Treatment included open reduction and internal fixation with a 4-holed and 10-holed recon plate plus a 6.5 mm anterior column screw for the acetabulum fracture. Closed reduction and internal fixation with external fixation (CRIF + Ex-Fix) was performed along with quadriceps tendon repair and wound debridement for the distal femur fracture.

The patient subsequently presented with a 4-months-old non-union of the severely comminuted distal femur fracture with articular and metaphyseal bone loss of the right knee with limb shortening, but without infection. This was managed with distal femur replacement using a DEPUY LPS tumour prosthesis with antibiotic stimulon bead insertion. At 4-month follow-up post-surgery, all surgical wounds had healed, the patient reported no pain, and achieved knee flexion up to 80 degrees with full extension.



DISCUSSION

Acetabular fractures occur at an incidence of approximately 3 per 100,000 per year, predominantly in males aged 30–50 years following high-energy trauma.² Distal femur fractures account for roughly 4–7% of all femur fractures. The simultaneous ipsilateral occurrence of both injuries with an open wound and extensor mechanism disruption has seldom been reported. The mechanism in our case – lateral impact at the hip and simultaneous hyperflexion/valgus force at the knee – explains the acetabular posterior wall fracture (dashboard mechanism from impact) and the distal femur comminution with quadriceps avulsion (eccentric loading of the extensor mechanism during forced knee flexion).

The Judet-Letournel classification remains the gold standard for acetabular fractures,¹ encompassing anterior wall, posterior wall, transverse, comminuted, and stress fracture subtypes. Most acetabular fractures are treated surgically, as the goal is to restore a smooth, gliding hip surface by reconstructing the fractured bones through open reduction and internal fixation. The AO/OTA 33-C3 designation denotes complete articular, comminuted distal femur fractures – the most surgically demanding subgroup, requiring anatomical articular reconstruction before diaphyseal fixation.

Gustilo–Anderson Type IIIB classification mandates specialist soft tissue coverage after adequate debridement.³ The goals of operative treatment of distal femur fractures are: anatomical reduction of the articular surface, restoration of limb alignment and length, stable internal fixation, rapid mobilisation, and early functional rehabilitation of the knee. In this case, the DEPUY LPS prosthesis was used, which provides angular stability, biological preservation, prevents varus collapse, and is ideal for bridge plating in comminuted fracture patterns.

Recognised Complications

- Post-operative infections
- Pulmonary embolism (life-threatening)
- Implant failure
- Varus malunion
- Non-union and shortening
- Wound dehiscence
- Popliteal vessel injury
- Nerve injuries
- Knee stiffness

CONCLUSION

This case illustrates that a right acetabulum fracture combined with an ipsilateral compound Type 3 comminuted intra-articular

lower 1/3rd femur fracture and quadriceps tendon avulsion from the patella, though exceptionally rare, can be managed successfully with a well-planned, multidisciplinary staged approach. Damage-control orthopaedics followed by anatomical definitive fixation and early rehabilitation enabled satisfactory functional recovery at 8 months. Such complex polytrauma cases demand familiarity with multiple fixation techniques, a thorough understanding of each injury's individual demands, and the flexibility to adapt surgical sequencing to patient physiology.

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