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CASE PRESENTATION

Ipsilateral fracture of the femoral diaphysis and intertrochanteric hip: a case report

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ABSTRACT

Introduction: ipsilateral fractures of the femur and hip are uncommon in emergency departments worldwide and require a multidisciplinary management approach. **Objective:** to present the treatment and clinical outcome of a patient with an ipsilateral fracture of the femoral diaphysis and intertrochanteric hip, managed with plate fixation. **Case presentation:** a 74-year-old male was brought to the emergency department following a traffic accident and evaluated by a multidisciplinary team using the polytrauma protocol. Imaging studies revealed an intertrochanteric hip fracture and a mid-third femoral diaphyseal fracture on the right side. In the emergency room, skeletal traction was applied via trans-tuberositary transfixation, along with antithrombotic prophylaxis and analgesia. After ruling out life-threatening associated injuries, the patient was admitted to the trauma ward for preoperative assessment and definitive treatment. Ten days later, a single-stage surgical procedure was performed via a lateral approach: a Dynamic Hip Screw (DHS) was implanted for the hip fracture, and a DCP (Dynamic Compression Plate) was used for the mid-diaphyseal femoral fracture. The patient had an uneventful postoperative recovery, was discharged on postoperative day five, and followed monthly in outpatient clinic until bone consolidation. **Conclusions:** in such cases, thorough preoperative planning is essential for appropriate therapeutic management. Despite using a less common surgical technique, a favorable evolution and complete functional recovery of both the hip and femur were achieved.

Keywords: Hip Fractures; Femoral Fractures; Orthopedic Procedures.

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INTRODUCTION

Ipsilateral fractures of the hip and femoral diaphysis are uncommon injuries resulting from high-energy trauma, occurring in young adults and representing between 2 % and 9 % of all femoral fractures.[1]

If an adequate and timely diagnosis is not performed, the impact on clinical outcomes can be significant, as delayed diagnosis of these concomitant fractures may lead to severe complications. Radiographs must be meticulously examined, as associated hip fractures are frequently overlooked and only detected later by computed tomography (CT). Although CT has a high negative predictive value for occult hip fractures, there are cases that are not initially identified and may have important surgical implications.[2]

Femoral diaphyseal fractures are typically transverse, wedge-shaped, segmental, comminuted, and displaced, whereas the associated hip fracture is usually basicervical and minimally displaced, and only very rarely extracapsular.[3] Currently, there is no consensus regarding the optimal internal fixation device or surgical strategy for these complex fractures.[4] The literature reviewed for the preparation of this work reveals a scarcity of studies on this topic due to its rarity. The management remains controversial—particularly regarding the timing of surgery, the number of implants to use, and whether fixation should be performed in one or two stages. Therefore, our objective is to present the treatment applied and the outcome achieved using plate fixation in a single surgical procedure for this case.

CASE REPORT

A 74-year-old male patient, Caucasian, 170 cm tall, weighing 80 kg, with a history of systemic arterial hypertension under regular treatment with enalapril, working as a mechanic, who sustained a traffic accident involving indirect trauma to the right lower limb and head. He was brought to the emergency service unconscious and disoriented.

He arrived by advanced life support ambulance after a car struck his motorcycle laterally. While on the stretcher, he complained of severe pain in the mid-third of the femur and hip. On physical examination, the patient was hemodynamically stable with a Glasgow Coma Scale score of 13 (E3, V4, M6). He exhibited evident deformity of the right lower limb in external rotation, with the foot resting on the stretcher, approximately 4 cm of shortening predominantly in the thigh, swelling, increased volume of the affected lower extremity compared to the contralateral side, functional impairment, abnormal mobility, bone crepitus, and increased local temperature. Distal pulses, sensation, and motor function in the lower extremity were preserved. A detailed physical examination was also conducted to assess potential soft tissue injuries, specifically ligamentous and/or meniscal knee injuries.

Following the polytrauma patient management protocol, he was transferred to the Emergency Department and Intensive Care Unit (ICU), where he remained continuously monitored and hemodynamically stable. A multidisciplinary team evaluated him thoroughly to rule out any life-threatening injuries. Laboratory tests were ordered, including complete blood count, blood chemistry, serum electrolytes, and coagulation profile, all of which were within normal limits, except for elevated liver transaminases and lactate dehydrogenase.

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Radiographs of the chest, skull, bony pelvis, entire spine, right thigh, leg, and knee were performed to detect associated injuries in the spine, pelvis, and ipsilateral lower extremity. An abdominal ultrasound was also conducted and yielded negative results. CT or MRI scans were not performed due to lack of availability at the institution. Imaging studies revealed an ipsilateral fracture of the right hip and mid-third femur (Fig. 1). The extracapsular hip fracture was classified as Tronzo type 2A, and the femoral diaphyseal fracture was classified as Winquist and Hansen type 3.

Fig. 1. Radiographic view showing the ipsilateral fracture of the hip and mid-third of the right femur.

The patient was managed as a polytrauma case, with mild traumatic brain injury and ipsilateral fractures of the right hip and femur. Transtuberositary skeletal traction was applied with the appropriate weight in a sterile setting, and the limb was immobilized using a Dennis Brown splint. Analgesic and antithrombotic therapies were initiated. Upon completion of the emergency department observation period, he was transferred to the traumatology ward for surgical planning.

Upon admission, the corresponding blood tests and an electrocardiogram were ordered. A urinary catheter was inserted, and intravenous access was secured. The clinical record was completed, including the relevant informed consent forms, during which the patient and his family were thoroughly informed about the necessity of surgical intervention and its potential complications.

Ten days after the initial injury—once significant reduction of swelling and hematoma reabsorption were observed—and given the unavailability of advanced-generation implants or osteosynthesis devices described in the literature, the surgical team held a multidisciplinary discussion and decided to proceed with a single-stage surgical procedure using a Dynamic Hip Screw (DHS) system for the hip fracture and a Dynamic Compression Plate (DCP) for the femoral fracture.

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For the hip, a 135º DHS nail-plate with 80 mm transcervical screws was used. A six-hole plate was secured with four bicortical screws and one distal unicortical 4,5 mm screw. For the femoral diaphysis, a 12-hole DCP plate was applied using 11 bicortical screws; three of these screws engaged the butterfly fragment to provide reduction and compression. The most proximal screw adjacent to the distal fracture focus was omitted due to its proximity to the fracture line (Fig. 2). Autologous bone graft harvested from the iliac crests was placed at the diaphyseal fracture site of the femur. The patient was positioned supine on a radiolucent orthopedic table, and the procedure was performed through a Smith-Petersen approach extended laterally along the femur, with image intensifier guidance. A surgical drain was placed at closure. One unit of packed red blood cells was transfused intraoperatively. The total surgical time was two hours, and a postoperative orthopedic splint was applied. The patient received antibiotic and antithrombotic prophylaxis.

Fig. 2 Radiographic view showing the surgical outcome.

The patient was discharged on postoperative day five, with outpatient follow-up scheduled for the first week and subsequently on a monthly basis until fracture consolidation. At the 12-week follow-up visit in the traumatology outpatient clinic, he demonstrated a good gait pattern with the aid of a cane, complete wound healing, and full joint range of motion, and remained under close supervision by a rehabilitation specialist. By the six-month mark, the patient was in excellent general condition, walking independently with a normal gait and without any limp or assistive device.

DISCUSSION

One of the main challenges in managing ipsilateral fractures of the femoral diaphysis and intertrochanteric hip region is the absence of a universally accepted classification system and the lack of high-quality scientific evidence, which leads to considerable variability in fixation strategies. These fractures typically occur in young adults as a result of high-energy trauma—primarily motor vehicle collisions and falls from heights greater than 5 meters. In such cases, the initial energy is absorbed by the femoral diaphysis and subsequently transmitted to the femoral neck, particularly when the hip is in abduction or adduction. This mechanism usually results in a transverse, wedge-shaped, segmental, comminuted, and displaced diaphyseal fracture, accompanied by a basicervical, vertical, and minimally displaced hip fracture, with extracapsular involvement being rare. This injury pattern is often associated with multiple orthopedic and visceral injuries.[5]

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Because obtaining a high-quality lateral radiograph of the affected hip can be difficult in patients with a femoral shaft fracture, pelvic computed tomography (CT) is essential. Pelvic CT should include 2-mm-thick slices and reconstructed coronal and sagittal images in addition to standard axial views. The incorporation of magnetic resonance imaging (MRI) into the imaging protocol for patients with high-energy femoral diaphysis fractures has increased the detection rate of ipsilateral femoral neck fractures from 5,1 % (2/39) with radiographs and 2-mm-thin-slice CT alone to 15,4 % (6/39) when MRI is added.[6] Emergency MRI can diagnose up to 12 % of cases that remain undetected by CT.[7]

During the initial evaluation of these fractures, Advanced Trauma Life Support (ATLS) principles must be immediately applied, and the patient should be admitted to the Intensive Care Unit (ICU) for initial management and diagnostic workup. This includes anteroposterior (AP) and lateral views of the femur, an AP pelvic view, a lateral view of the affected hip, as well as imaging of the knee, leg, and entire vertebral column. MRI is considered the gold standard for evaluating occult fractures. Nevertheless, these fractures are frequently overlooked.[8,9]

The femoral neck fractures most commonly associated with ipsilateral femoral diaphysis fractures are nondisplaced subcapital or basicervical fractures, as well as vertical neck fractures. Comminution is often present in the femoral diaphysis. Additionally, these injuries are frequently accompanied by ipsilateral knee injuries (20–40 %), including tibial plateau fractures, ligamentous complex injuries, patellar fractures, or knee dislocations.[10]

Several meta-analyses comparing MRI with CT for diagnosing occult hip fractures have shown that MRI generally provides diagnostic accuracy comparable to CT. Despite the widespread use of CT—owing to its capability for multiplanar reconstruction (coronal, sagittal, and axial)—significant limitations remain. These include diagnostic difficulties related to the complex anatomy of the intertrochanteric region, interference from nutrient vessels, and the potential for inconclusive scans. In fact, studies suggest that CT misses 30–60 % of fractures, particularly those involving the femoral head.[11]

MRI demonstrates superior sensitivity in fracture detection, suggesting its clinical utility may be underestimated.[12] Although MRI's superiority in diagnosing occult hip fractures is well established due to its high sensitivity and specificity, its relatively high cost and limited availability often necessitate the use of alternative imaging modalities, such as ultrasound (US), CT, and bone scintigraphy.[13]

Beyond diagnostic challenges, there is limited evidence regarding the optimal timing, sequence of fixation, and choice of implant for these injuries. The complexity of these fractures can lead to complications, which can be mitigated through timely diagnosis and appropriate fixation of each fracture component.

A major point of debate concerns whether to use a single or combined implant system. There is no consensus on which implants yield the best outcomes or which approach is most appropriate, despite favorable results reported with each method.[14]

Among the various treatment strategies described in the literature, four primary approaches are most commonly employed: one using a single implant and three involving two different implants. The first approach utilizes a long cephalomedullary nail (CMN) to fix both fracture sites. The second combines a dynamic hip screw (DHS) or cannulated screws for the proximal femur fracture with a plate for the diaphyseal fracture. The third uses cannulated screws for the proximal fracture along with an antegrade intramedullary femoral nail (IMNa) for the diaphysis. The fourth approach combines DHS or cannulated screws for the proximal femur with a retrograde intramedullary femoral nail (IMNr) for the diaphyseal fracture.

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Intramedullary nailing is considered the standard of care for femoral diaphysis fractures. As a load-sharing device, it reduces tensile and shear forces. Intramedullary nailing offers several advantages over plating, including limited surgical exposure and dissection, lower infection rates, reduced quadriceps muscle fibrosis, earlier functional use of the limb, immediate full weight-bearing, better restoration of length and alignment in comminuted fractures, faster fracture consolidation, and a lower refracture rate.

Plate fixation for femoral fractures is infrequently used and indicated only in specific scenarios, such as fractures involving the distal femoral metaphyseal-diaphyseal junction, periprosthetic fractures, pre-existing deformities, or a narrow or obliterated intramedullary canal.

No significant differences have been found in the literature regarding complication rates or timing of definitive fixation between single-implant and combined-implant strategies for ipsilateral proximal femur and diaphyseal fractures. Regardless of the chosen implant, proper osteosynthesis technique is critical. Nevertheless, high complication rates are to be expected.[15]

In our case, the use of two implants in a single surgical procedure was a challenging experience. Although the literature provides minimal support for this technique—given the rarity of combined extracapsular hip and femoral diaphysis fractures—we resorted to it due to institutional limitations. Despite not using the conventional implants described in the literature, we achieved a favorable outcome without complications. We therefore suggest that this approach may be considered by institutions lacking the resources or equipment necessary to manage this uncommon and complex clinical scenario.

CONCLUSIONS

Ipsilateral fractures of the femoral diaphysis and intertrochanteric region are uncommon and typically occur in young adults as a result of high-energy trauma. The majority of patients also present with injuries affecting other organ systems. Although high union rates are generally observed and treatment is often considered adequate, there remains considerable disagreement regarding the optimal therapeutic pathway. There is a clear need for validated, specific classification systems and treatment algorithms to optimize patient management and improve both survival and functional outcomes. We recommend the use of a DHS nail-plate combined with a DCP plate for the management of these ipsilateral fractures in low-resource settings, given the favorable outcome achieved in this case.

Conflicts of interest
The authors declare no conflicts of interest.

Authors' contributions

All authors participated in the conceptualization and methodological design of the study, implementation of the research, manuscript writing, review, and final approval of the manuscript.

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