



Case report

A rare combination of sagittal fracture of the medial femoral condyle (Trélat fracture) with an ipsilateral femoral shaft fracture: A case report

Imad Jadib^{*}, Houssam Eddine Rachidi, Soufiane Abdennaji, Abdeljebbar Messoudi, Mohamed Rafai

Department of Orthopedics and Trauma-Surgery P32, University Hospital Center Ibn Rochd – Casablanca, Faculty of Medicine and Pharmacy Hassan-II, Morocco

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ABSTRACT

Introduction: Isolated unicondylar fractures of the distal femur are rare injuries, accounting for 3–6 % of adult femur fractures. The association with a femoral shaft fracture is very rare and, to our knowledge, has, never been described in the literature.

Case presentation: In this article, we report the case of a 19-year-old motorcyclist involved in an accident, that resulted in both a midshaft transverse femoral fracture and an ipsilateral sagittal fracture of the medial femoral condyle (Trélat fracture).

Clinical discussion: The surgical intervention involved open reduction and internal fixation for both fractures, utilizing a dynamic compression plate for the femoral shaft fracture and screws for the medial condyle fracture. Postoperative results showed excellent fracture reduction, and the patient progressed well with rehabilitation. The choice of fixation method for the sagittal medial femoral condyle fracture considered the unique anatomical challenges posed by this rare combination, the emergency (fat embolism), and the fact we didn't have a retrograde nail in our structure. A dynamic compression plate was used for femoral shaft fracture and screw fixation for condyle fracture treatment. The traction table in antero-grade femoral nailing, led to the recurvatum of the condylar fracture and difficulty accessing it with the medial subvastus approach.

Conclusion: This case report adds a description of a rare combination and valuable insight into the management of complex femoral fractures, emphasizing the importance of individualized treatment approaches.

1. Introduction

Distal femur unicondylar fractures are relatively rare lesions [1–3], and they're frequently associated with other post-traumatic injuries [4]. They occur from the direct force exerted on the flexed knee during weight-bearing [5].

The origin of either a medial or lateral femoral condyle fracture is located in the intercondylar-trochlear groove [4]. AO-33 B2 [B2] type fracture, or Trélat fracture type, is one where the fracture specifically aligns more in the sagittal plane at the medial condyle [5–7].

Various treatment approaches are available for condylar fractures, which rely on criteria such as patient characteristics, fracture pattern, and bone stock. When evaluating these fractures for surgical repair, the available alternatives include single lateral plating, retrograde nailing, or a combination of nailing and plating. Previous implants, such as blade plates, dynamic condylar screws with side plates, and condylar buttress

plates, were commonly utilized for lateral plating. [8]

For the femoral shaft fracture, the treatment of choice is intramedullary nailing with a high consolidation rate [9]. In some situations, dynamic compression plating can be a valuable treatment in situations where intramedullary nailing is either not recommended or not technically possible [10].

We describe in this article a rare combination of an ipsilateral femoral shaft fracture with a sagittal fracture of the medial femoral condyle (Trélat fracture), treated subsequently with a dynamic compression plate and screw fixation. After reviewing the English literature on PubMed, we found 3 reports of medial Hoffa fracture with ipsilateral femoral shaft fracture [11–13]. Our rare combination described in this report was never reported previously to the best of our knowledge.

In this report, a dynamic compression plate was used for femoral shaft fracture and screw fixation for condyle fracture treatment, as we

^{*} Corresponding author at: Department of Orthopedics and Trauma-Surgery (P32), CHU Ibn-Rochd, Faculty of Medicine and Pharmacy Hassan-II, Casablanca, Morocco.

E-mail address: imadjadib@gmail.com (I. Jadib).

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didn't have a retrograde nail in our department and also because the traction table, if we chose anterograde nailing, led to recurvatum of the condylar fracture and difficulty in accessing it with the medial subvastus approach.

This case report details the evaluation, diagnosis, and treatment of a patient with a sagittal fracture of the medial femoral condyle (Trélat fracture) associated with an ipsilateral femoral shaft fracture. The report writing and presentation of this study follow the SCARE 2023 criteria [14].

We obtained informed consent from the patient to use his information and images for the publication of the present manuscript. All procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the Helsinki declaration [15] and its later amendments.

2. Case presentation:

Nineteen-year-old was hit by a car while riding a motorcycle. We immediately transferred him to our emergency department. In the physical examination, his vital signs were normal. The patient suffered from severe pain and a closed deformity on the right leg with an intact neurovascular exam.

Upon admission, the patient's clinical examination revealed consciousness and stability in terms of hemodynamics and respiration, with a blood pressure of 130/80 mm Hg and a SpO₂ of 98 % in ambient air. The diagnosis revealed no clinical signs of fat embolism syndrome.

At the interrogation, the patient reports a dashboard mechanism with a knee in a flexed position, and a direct impact on the inner side of the right knee due to the high-energy mechanism.

A radiograph of the right femur and leg showed a midshaft transverse fracture of the femur associated with an ipsilateral sagittal fracture of

the medial femoral condyle (Fig. 1). No fracture of the femoral head, neck, or intertrochanteric region was present.

After immobilization with skin traction and posterior splinting of the right leg, a CT scan was performed and demonstrated a simple oblique femoral medial condyle fracture through the notch (AO classification: 33 B2 [B2] type fracture) (Fig. 2). The body scan didn't reveal any other vital lesions or associated injuries.

The patient developed an alteration of consciousness, possibly due to symptoms of fatty embolism at H4 of the trauma. We then took him to the operating room for an open reduction and internal fixation of the femoral fractures. Due to the absence of a retrograde nail in our structure, we opted to use a dynamic compression plate for the femoral shaft fracture and screw fixation for the condyle fracture in the patient's treatment. We opted for the dynamic compression plate instead of an intramedullary nailing because, with the traction table, the knee joint is fully extended, and the pull of the gastrocnemius muscle and of the adductor magnus muscle leads to a recurvatum of the medial condylar femur fracture and makes it difficult to reduce the fracture. And also, accessing the medial condylar fracture is challenging using the operating table.

The patient was under general anesthesia and placed in the lateral decubitus position. All the lower limb was included in the same sterile field. First, with a lateral approach of the thigh, we proceed of the osteosynthesis of the femoral shaft with a 10 holes dynamic compression plate (DCP).

The sagittal fracture of the medial condyle was addressed next, with a medial subvastus approach to the knee. We positioned the patient supine, knee flexed at 30°, over a knee support to relax the gastrocnemius. The fracture was reduced by two bone holding forceps, a temporary reduction was achieved by three Kirschner wires (18/10); internal fixation was performed by two cancellous and one cortical screw from



Fig. 1. A + B: Anteroposterior and lateral view radiographs of the right femur showed a midshaft transverse fracture of the femur associated with an ipsilateral vertical fracture of the medial femoral condyle and partial vertical fracture of patella.

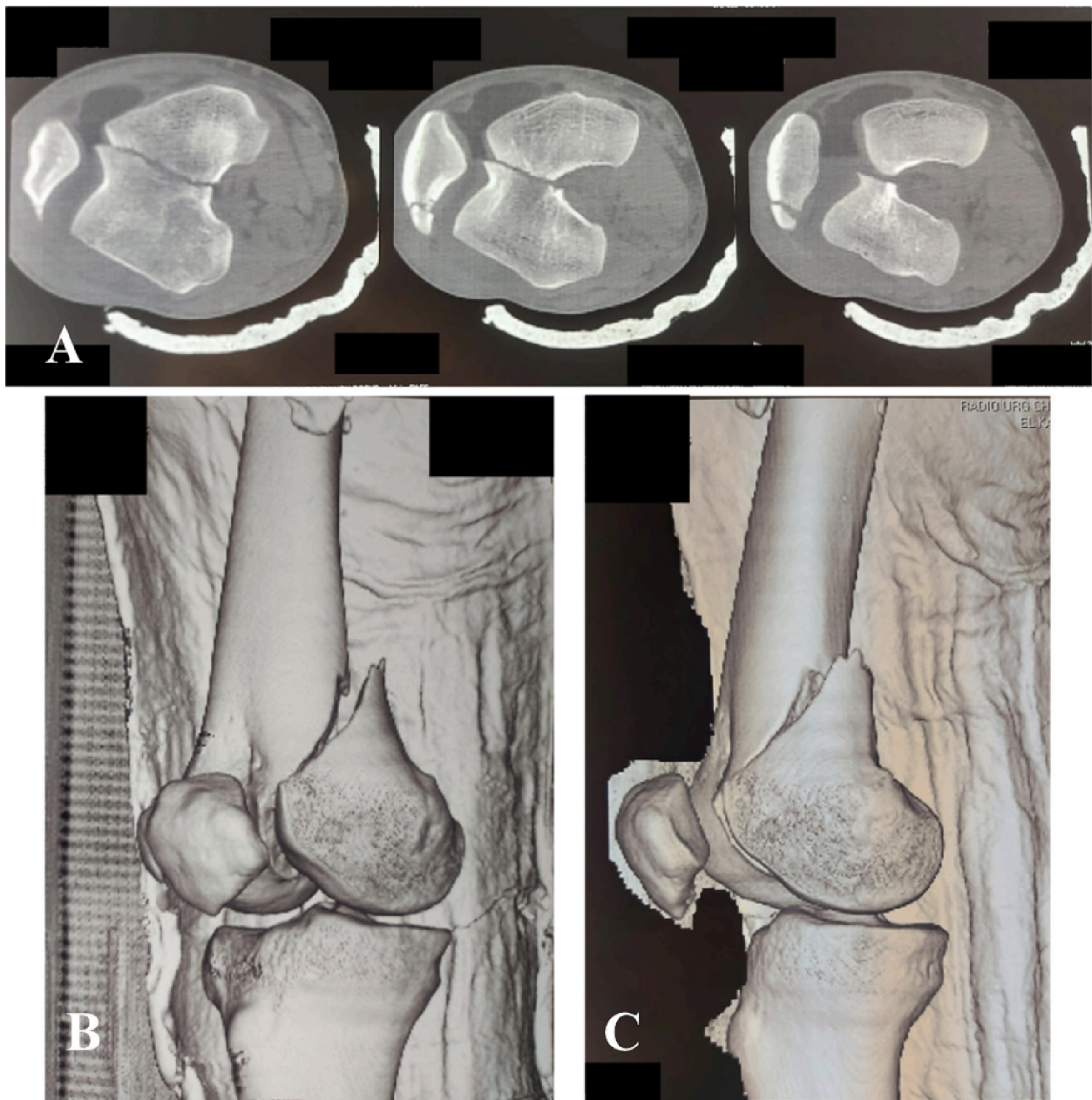


Fig. 2. CT scan imaging (A) and 3D reconstruction (B + C) demonstrated a simple oblique femoral medial condyle fracture through the notch.

medial to lateral; and good alignment of the condylar fracture was achieved. The per-operative examination revealed a stable knee. The stability test of the knee didn't show any abnormalities. The patient was taken to intensive care for 48 h postoperatively for neurological monitoring.

Post-operative imaging confirmed a satisfactory reduction of both fractures (Fig. 3).

An 8-week non-weight bearing post-operatively was indicated, and the active-passive range of motion has been allowed since the first post-operative day.

At three months post-operatively, the patient was allowed to walk with crutches. At six months, the patient didn't complain of any pain, and he had a good range of motion (Fig. 4).

At the last follow-up, 14 months post operatively, the patient had a good range of motion of the hip and knee and was walking without crutches, with no sign of infection on the surgical wound and no limb-length discrepancy.

3. Discussion

This case report describes a rare combination of injuries never before described and may help to understand the mechanism of injury and assist practitioners in the subsequent appropriate management of this type of injury.

Isolated unicondylar fractures of the distal femur are uncommon injuries [1,2,16], accounting for 3–6 % of adult femur fractures [17]. Both high energy trauma in young adults and low energy falls in elderly patients with osteoporotic bones are associated with their bimodal energy distribution [8]. Medial femoral condyle fractures are known to be less frequent than lateral femoral condyle fractures, according to a paper on unicondylar fractures of the distal femur [16]. The association with a femoral shaft fracture is very rare, and after reviewing the English literature, we haven't found any similar cases. The few cases we found in the literature involved the association of an ipsilateral femoral shaft fracture with a Hoffa fracture [11–13].

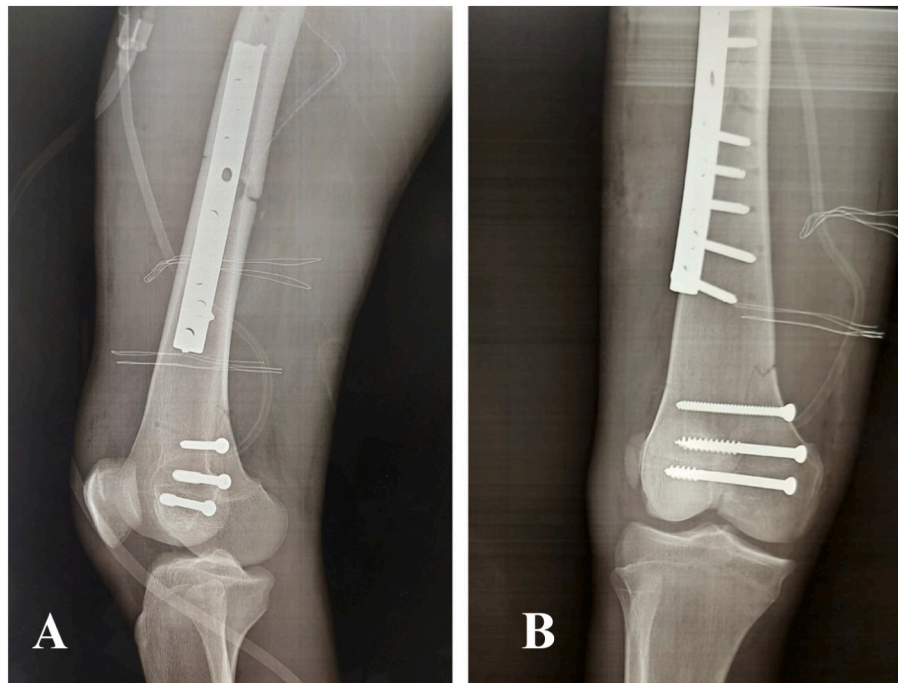


Fig. 3. A + B: The post-operative radiography.

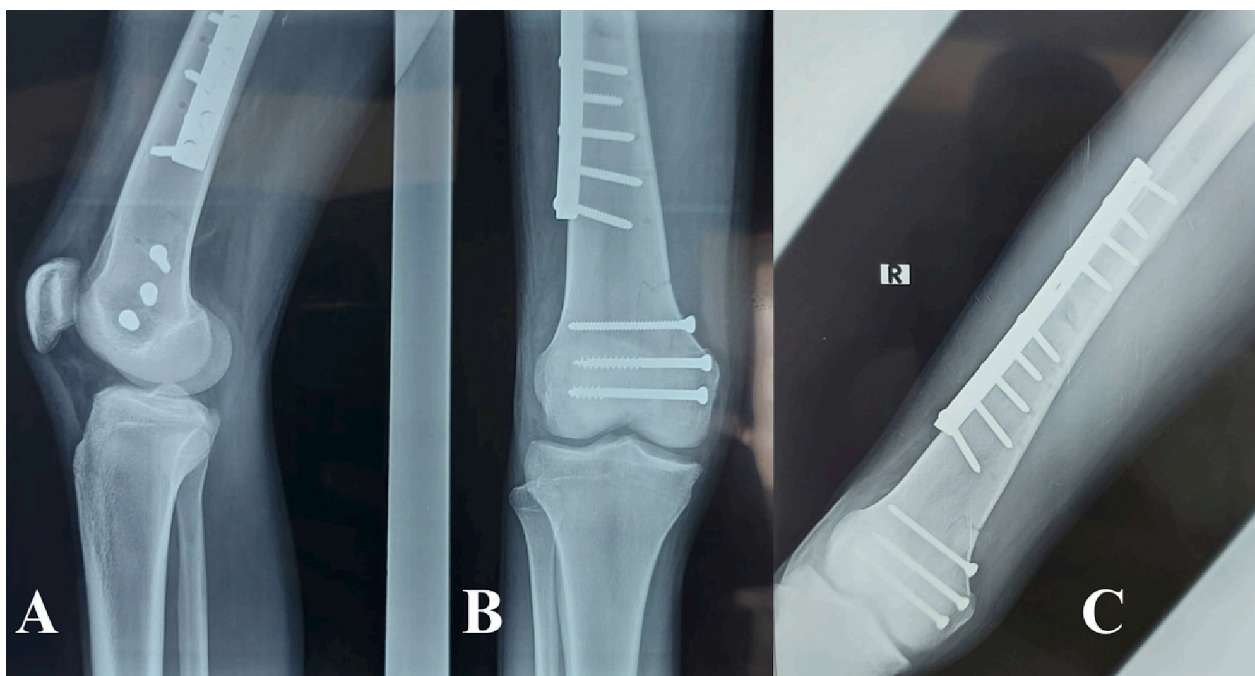


Fig. 4. Radiography at 6 months post operatively. A + B: Anteroposterior and lateral view of the right knee. C: radiograph of the femoral shaft.

They occur mainly in young people [5]. The most common mechanism is indirect trauma on a bent knee, and more rarely direct trauma by crushing [18]. In a different study, high-energy trauma was the cause of 51 % of these fractures [4]. In our case, the injury mechanism was a direct impact on the inner side of the right knee in a flexed position (dashboard injury), and due to the high energy mechanism, the progression of the traumatic energy to the thigh led to the fracture of the femoral shaft.

The preoperative CT scan shows the fracture displacement and the comminuted nature of the fracture site [4]. In order to establish an

approach, careful planning with a CT scan is usually necessary for concomitant distal articular femoral fractures and femoral diaphysis fractures [9].

Surgery is the gold standard for displaced fractures or for rapid recovery of knee function [19]. Open reduction and internal fixation is recommended to preserve the soft-tissue envelope, promote early knee motion while restoring the articular surface, preserve limb length and alignment, and allow functional rehabilitation during bone healing [19,20]. This is accomplished using common surgical procedures such as plate/screw fixation, screw fixation, and retrograde intramedullary

nailing [20–22].

Holmes et al. [3] concluded that the outcomes of surgical treatment of medial femoral condyle fracture with lag screws. Half of the patients (5 patients) had excellent results, two patients had good outcomes, and three patients had fair results. Adding a buttress plate may be necessary for fixing vertical fracture lines when screw fixation alone may not be sufficient. Except for the relatively short plate created for distal femoral osteotomy, there are no anatomical plates on the market that fit the femoral medial condyle or fracture fixation [19]. Previous papers [7,16,18,23,24] have reported the potential use of screw fixation plating for the fracture. However, due to the small number of cases, there is still no agreement on the ideal implant [18,19]. As per a new study by Upadhyay and others [8], the ipsilateral anterolateral proximal tibial variable angle plates fit the medial femoral condyle the best because they had the most screws possible in each of the condylar quadrants.

In our case, in the absence of a retrograde nail, we believe that the use of a dynamic compression plate for the femoral shaft fracture and screw fixation for the condyle fracture in the patient's treatment was the best procedure due to the emergency situation (fat embolism neurological sign).

Our choice was to use a dynamic compression plate instead of an intramedullary nailing because when the knee is on the traction table, it is fully extended, and the pull of the gastrocnemius muscle and the adductor magnus muscle makes it hard to reduce the condylar fracture. And also, accessing the medial condylar fracture is challenging using the operating table.

Yu-Bao and colleagues in his study [13] have used similar procedures to treat patients diagnosed with ipsilateral femoral shaft fractures and coronal fractures of the lateral condyle. We treated the femoral shaft fracture with open reduction and plating. Two lag screws fixed the Hoffa fracture through a parapatellar incision.

This study reported a unique case but had limitations due to the lack of controls to compare the clinical and functional outcomes.

4. Conclusion

This case underscores the rarity of combined ipsilateral femoral shaft and medial sagittal femoral condyle fractures and highlights the importance of careful planning and surgical intervention in such cases. We successfully employed open reduction and internal fixation to restore joint stability, preserve limb function, and facilitate early rehabilitation. When deciding how to fix the medial femoral condyle fracture, the unique anatomical challenges of this rare combination and the lack of a retrograde femoral nail were taken into account. These implants could be an option for this fracture association.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethical approval

This case report is exempt from ethical approval at our institution.

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Author contribution

All the authors contributed to the study concept, data analysis and writing of the paper.

Guarantor

The guarantors for this case series are the first author and the corresponding author doctor Jadib Imad.

Research registration number

1. Name of the registry:
2. Unique identifying number or registration ID:
3. Hyperlink to your specific registration (must be publicly accessible and will be checked):

Conflict of interest statement

The authors report no declarations of interest.

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