

# The Challenging Diagnosis and Management of a Pediatric Bicondylar Hoffa Fracture: A Case Report

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## Learning Point of the Article:

The challenge of diagnosing and managing of an uncommon fracture in children to avoid fonctionnal complications.

## Abstract

**Introduction:** Hoffa fractures are uncommon fractures in adults and less common in children. They are defined as fractures of the femoral condyles that occur in the coronal planes. To this day, Hoffa fractures in children comprise only of case reports.

**Case Report:** Our case report is focused on a 12-year-old patient victim of a high-impact trauma causing a bicondylar Hoffa fracture. The diagnosis was based on an X-ray in front and lateral views and confirmed by a computed tomography scan and 3D reconstructions. A screw fixation through open reduction with a lateral approach. We report the satisfactory results of our case after a 24-month follow-up with a good range of motion.

**Conclusion:** To avoid necrosis of the fragment, pain and stiffness at long-term follow-up make the management of this fracture a serious challenge, and in the pediatric population, the prevention of growth cartilage injuries is crucial to accurate management.

**Keywords:** Hoffa fracture, children, bicondylar, open reduction, rehabilitation.

## Introduction

Hoffa fractures are uncommon fractures in children. It is defined as fractures of the femoral condyles that occur in the coronal planes, unlike the sagittal plane fractures that are the most frequent. Mr. Hoffa first defined this fracture in 1904 [1]. On the day of writing this article, Hoffa fractures in children counted a few case reports in the literature. We report the case of a 12-year-old boy victim of high-impact trauma causing a bicondylar Hoffa fracture.

## Case Report

It is about a 12-year-old boy who presented to the emergency

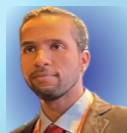
department with swelling of the left knee caused by a high-impact trauma. The patient was the victim, 3 h before his admission, of two motorcycle collisions with a flexed knee. The physical examination found a swollen knee and a few dermabrasions. There was tenderness over the lower end of the femur, and no movements of the left knee were possible. No neurovascular deficit in the affected limb and any other injuries in the rest of the physical examination were noted. The immediate treatment was immobilization with a knee posterior slab, and an X-ray associated with a computed tomography (CT) scan was then performed. On the anteroposterior and lateral X-rays of the knee, it was a bicondylar coronal plane fracture (Fig. 1). A CT scan with 3D reconstruction showed a sagittal

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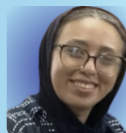
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## Author's Photo Gallery



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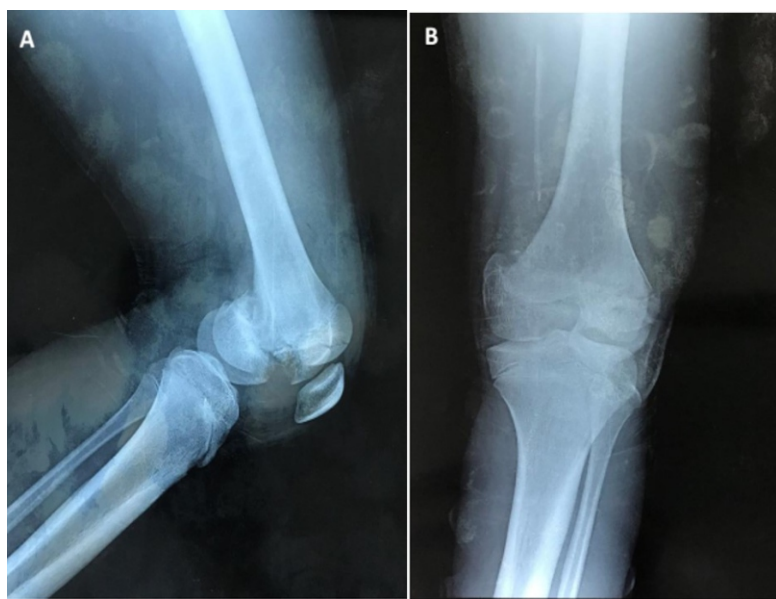
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**Figure 1:** X-ray in lateral (A) and front (B) view of left knee showing Letenneur type II bicondylar Hoffa fracture.

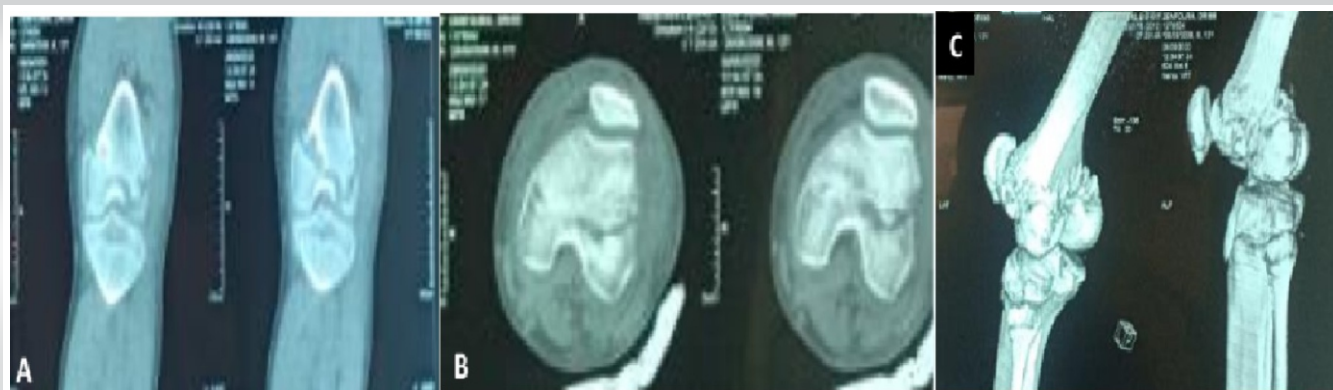
bicondylar fracture of the left limb with a posterior displacement of the distal fragment associated with the dissociation of a small bone fragment inside the articulation. The fracture was classified as Letenneur type II (Fig. 2). Once the diagnosis has been made, the surgery schedule has been established. Since it is a bicondylar fracture, the choice between a medial or lateral approach of the knee was discussed, and we opted for a lateral approach given that the largest fragment on the scan images was the lateral condyl, which could allow us to have a more solid fixation. An open surgery has been decided with internal fixation, using an image intensifier, and on a plane orthopedic table without traction. The reduction was established and maintained with two 4 mm partially threaded cancellous screws to assure a satisfactory reduction; the screws were introduced in an anteroposterior direction, and with the

distal thread allowing impact on the fracture site. We could not avoid going through the physis for better stability of the reduction (Fig. 3), then the knee was immobilized by a cast in 10° flexion. The immobilization was kept for 4 weeks and followed by progressive physiotherapy. Weight-bearing was allowed at 8 weeks. The 1-year follow-up showed a good range of motion of the left knee at 90°, absence of laxity, and absence of pain (Fig. 4).

At 24-month follow-up, the flexion of the knee reached 110°, and no discomfort during daytime activities was noted. Given the age of our patient, we are considering that the screws can be removed after the closure of the growth plate if the patient presents implant-related symptoms, to avoid further damage during the removal.

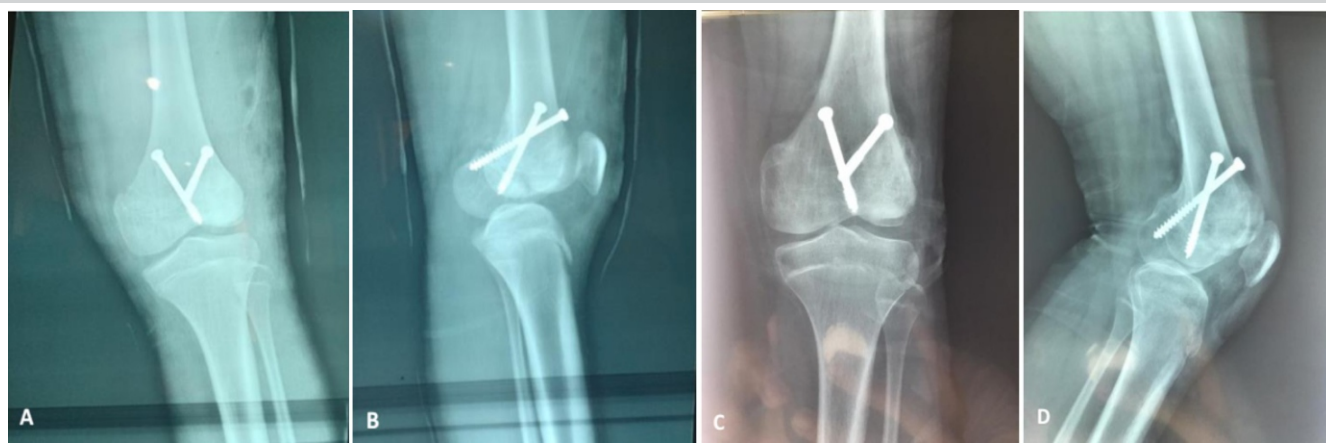
### Discussion

Hoffa fractures are uncommon in the distal femoral; it represents <1% of cases [2-5], and it was described by Hoffa for the 1st time in 1904 [6]. This fracture is often uni-condylar; the bi-condylar variety is rarer, especially in children. These fractures are mostly resulting from direct high-energy trauma, which causes a shear force on the posterior femoral condyle. The usual cause of Hoffa's fracture is motorcycle accidents [7]. When a Hoffa fracture is suspected, an X-ray must be planned first, and for better evaluation of the lesion, a CT scan must be performed or sometimes even magnetic resonance imaging. Letenneur et al. [2] provided a classification with three types of fracture: Type I is a vertical fracture involving the entire condyle parallel to the posterior cortex of the femur. Type II is a fracture of variable size, horizontal to the base of the condyle. Type III is a fracture oblique to the femur and has the worst results. Surgical treatment is the reference to recover anatomic articular



**Figure 2:** Computed tomography scan (A and B) with 3D reconstruction (C) showing the complexity of the fracture with intra-articular fragment.





**Figure 3:** Front and lateral X-ray view immediately after surgery (A and B) and at 6-month follow-up (C and D).



**Figure 4:** Clinical finding at 12-month follow-up: (A) front standing view, (B) lateral standing view, and (C) range of Knee flexion.

surfaces; open reduction associated with internal fixation using screws seems almost necessary given the absence of a soft tissue ensuring fixity at the level of the femoral condyles or when other injuries are associated as the extensor system considering mechanism [8]. A variety of techniques have been discussed in the literature, and according to the location and type of the fracture, a surgical approach can be chosen. Many studies have utilized a general lateral or medial parapatellar incision to access the anterior femur [9, 10].

The less frequently reported arthroscopic approach for the treatment of Hoffa fractures is one of the least invasive approaches. It is beneficial for acute Hoffa's fractures with large fragments and minimal communication [11]. It minimizes soft-tissue damage, blood loss, infection rate, and operative time [12]. The few studies that used a non-operative approach reported both successful and unsuccessful results [13]. Post-operative outcomes depend on the severity of the injury, the technical approach, and fixation, and they also depend on early mobilization, which is encouraged by most studies to stimulate

bone healing and avoid joint stiffness [1]. Some reports allowed weight bearing 2-day postoperatively; however, most preferred a more slowly progressive approach. A summary of some of the cases described in the literature [9, 14, 15] and differences in management, results, and complications between bicondylar and unicondylar Hoffa fractures is presented in Table 1.

### Conclusion

The challenge with Hoffa fractures in children is to make an early diagnosis to make a good choice of treatment; this one has the objectives of establishing the articular anatomy to avoid necrosis of the fragment, growth cartilage injuries, pain, and stiffness at long-term follow-up.

### Clinical Message

The challenge in managing a Hoffa fracture is based on an accurate diagnosis based on X-rays and 3D CT scans.

Authors	Cases	Approach	Fixation	Post-operative treatment	outcomes	complications
Lewis et al. [9]	7 lateral	Direct lateral incision/non-operative	Small and large fragment screws	2 weeks cylinder cast	Operative: 2 good/3 fair Non-operative: 2 fair	-
Sahu and Gupta [14]	7 bicondylars	Medial or lateral	Kwires or screws	Touch down and weight bearing at 2 <sup>nd</sup> day post-operative	-	Malunion/delayed union/stiffness/ligament laxity
Agarwal et al. [15]	Bicondylar	Lateral incision	Small fragments screws	Unrestricted active and passive movements + touch down and weight bearing	10–100°	-
Our case	1 bycondylar	Lateral incision	Two 4 mm partially threaded cancellous screws	8 weeks cylinder cast followed by physiotherapy and weight bearing	Good: 100° of flexion, no pain, no ligament laxity	Limited range of motion at 100°

**Table 1: Summary of management of some Hoffa's fractures in children in literature.**

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Conflict of interest:** Nil **Source of support:** None

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