

## Hoffa fracture: a case report

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### SUMMARY

Unicondylar fractures of the femur that occur in the coronal plane (Hoffa fractures) are uncommon and most often affect the lateral condyle. Conservative treatment generally yields poor results, but rigid internal fixation allows early functional rehabilitation and decreases the incidence of malunion, nonunion, and stability loss. This case report describes open reduction and internal fixation in the treatment of a young man with a Hoffa fracture.

The fragment was reduced and fixed with a cannulated corticocancellous screw. At 16-month follow-up, the fracture was completely healed and he was able to achieve a normal range of movement, with 145° flexion of the knee and full extension.

To achieve favorable long-term results in coronal plane fractures of femoral condyles, open reduction, stable fixation and early mobilization are mandatory. Physical rehabilitation should be initiated as soon as possible to minimize joint contractures.

**Key words:** Hoffa fracture, medial femoral condyle, corticocancellous screw

## Hoffa kırığı: olgu sunumu

### ÖZET

Femurun koronal plandaki unikondiler kırıkları (Hoffa kırığı) nadir görülür ve sıklıkla lateral kondili etkiler. Konservatif tedavi sonuçları genellikle başarısızdır. Rijit internal fiksasyon erken fonksiyonel rehabilitasyona izin verir; malunion, nonunion ve stabilite kaybı görülme sıklığını azaltır. Bu olgu sunumunda, genç bir erkek hastadaki Hoffa kırığının açık redüksiyonu ve internal fiksasyonu bildirilmiştir.

Kırık fragman redükte edilerek bir adet kanüle kortikokansellöz vida ile tespit edildi. 16.aydaki takibinde; kırığın tamamen iyileştiği, hastanın 145° fleksiyon ve tam ekstansiyon ile eklem hareket açıklığının tam olduğu değerlendirildi.

Femur kondillerinin koronal plan kırıklarında uzun-dönemde iyi sonuçlar elde edebilmek için; açık redüksiyon ve stabil fiksasyon ile erken hareket başlanması çok önemlidir. Eklem kontraktürlerini önlemek için mümkün olan en kısa sürede rehabilitasyona başlanmalıdır.

**Anahtar kelimeler:** Hoffa kırığı, medial femoral kondil, kortikokansellöz vida

### INTRODUCTION

Intraarticular, unicondylar fractures of the lower end of the femur occurring in the coronal plane (Hoffa fractures) are uncommon injuries and most often affect the lateral condyle (1). Nonoperative treatment of Hoffa fractures yields poor results (2,3). Rigid internal fixation allows early functional rehabilitation and decreases the incidence of malunion, nonunion, and stability loss (5). This case report describes open reduction and internal fixation in the treatment of a young man with a Hoffa fracture.

### CASE REPORT

A 25-year-old man (height, 170 cm; weight, 68 kg) presented to the emergency department one hour after experiencing trauma to his right knee. He was working in a pipe factory when his right knee became jammed between two pipes weighing approximately 100 kg each. On physical examination, his knee was swollen and tender to palpation, and hemarthrosis was present. Range of movement of the knee could not be measured because of pain. Notably, his leg showed neither abrasion

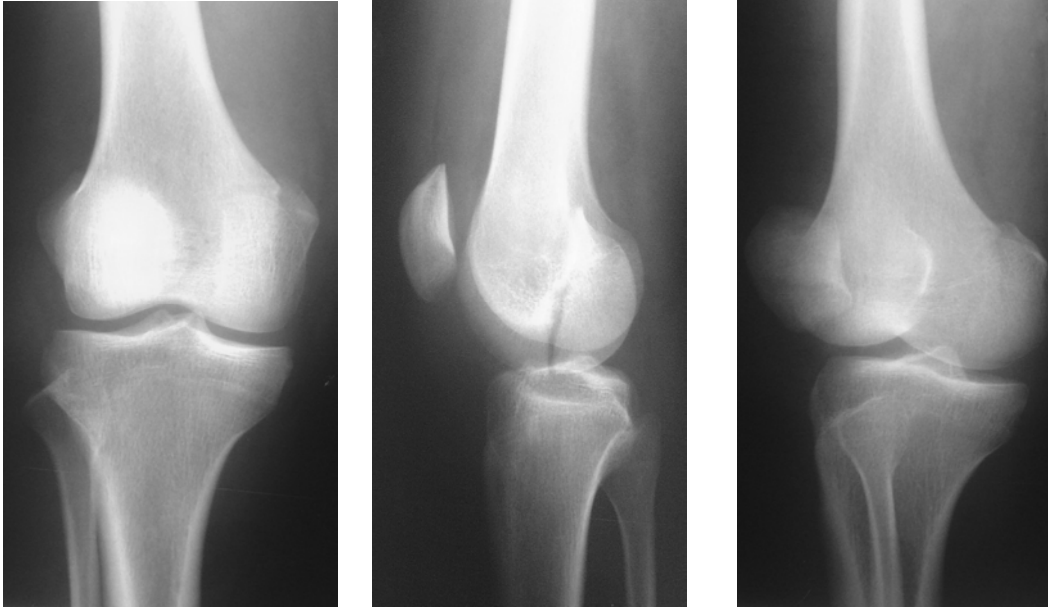


Figure 1 a, b, c. Anteroposterior (a), lateral (b) and oblique (c) radiographs of the knee showing medial femoral condyle fracture

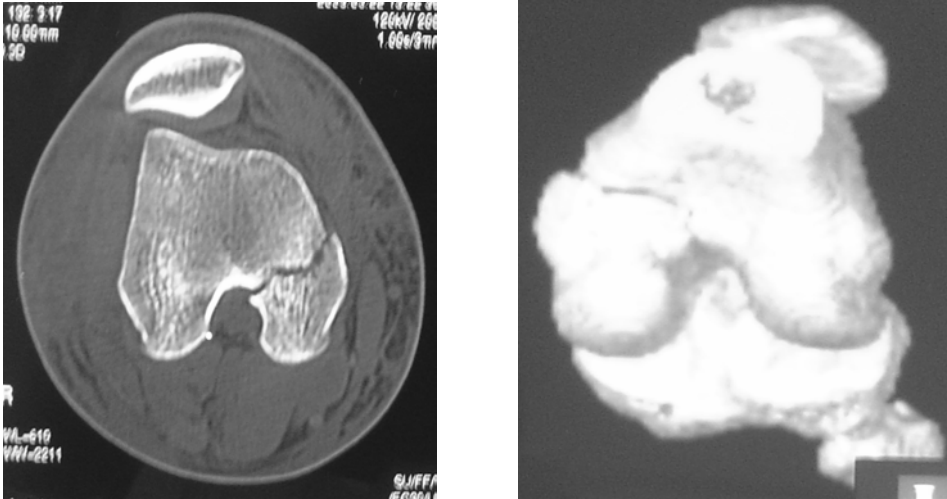


Figure 2 a, b. CT (a) and three dimensional CT (b) views of the knee

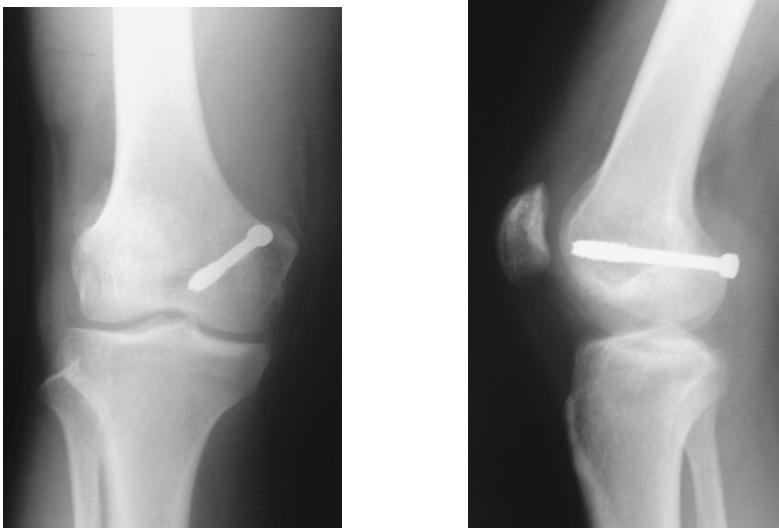


Figure 3 a,b. Postoperative anteroposterior (a) and lateral (b) radiographs at 18 months' follow-up

of the skin nor external deformity. Peripheral pulses were all palpable and no neurological deficit was noted on his right lower extremity. Radiographs (Fig. 1a-c) and computed tomography (CT) scans (Fig. 2a, b) revealed a minimally displaced, intraarticular coronal plane fracture on the medial femoral condyle. The patient was admitted to the orthopedics and traumatology department and was operated on during the second day of admission. Following regional spinal anesthesia, a pneumatic tourniquet was applied and a posteromedial incision made with the patient in a prone position. Using fluoroscopic control, the fragment was reduced and fixed with a posteroanteriorly-directed 6.5-mm cannulated corticocancellous screw. The position of the screw was convenient. The fracture was considered stable with 140° flexion of the knee and additional fixation was not required. Continuous passive movement was initiated after surgery and a physical rehabilitation program was started to allow the patient to regain full range of movement. At day 4 after the operation, ambulation was initiated with only touch-down weight-bearing. After 2 weeks of wearing a long-leg plaster cast splint, the patient was given a hinged knee brace. However, he felt a "snapping" at 40° flexion of the knee. No additional pathology was detected on radiological examination. Partial weight-bearing was allowed at week 8 when the snapping was no longer present. Full weight-bearing was allowed at week 13. At the last follow-up visit 16 months after the operation, the fracture was completely healed (Fig. 3a, b) and the patient had no complaints or sensation of snapping. He was able to achieve a normal range of movement, with 145° flexion of the knee and full extension.

## DISCUSSION

Isolated distal femoral condyle fractures were first described by Hoffa in 1904 and are uncommon injuries. Fractures in the condyles occur as isolated injuries to the involved femur (2) and are more common in the lateral than the medial condyle (2). A unilateral bicondylar fracture has also been described (5).

Opinions vary regarding the mechanism of fracture. Kumar and

Malhotra (6) suggested that although the Hoffa fracture may affect either condyle, the preponderance of lateral condylar fractures indicates an anatomical-biomechanical vulnerability due to the physiological valgus. Other studies have implicated direct violence to the knee region (5), an oblique transverse force resulting from the impaction of the upper part of the tibia on the femoral condyles with the knee flexed at an angle >90° (1), and direct trauma to the knee combined with an element of abduction (3). In this case, the fracture resulted from the femoral condyles being squeezed between two heavy pipes, with the force from the lateral side possibly breaking the medial condyle on the pipe on the medial side.

Physical examination may reveal edema, effusion, or skin lesions. Varus and valgus instabilities may be subtle (2), and neurovascular examination of the whole extremity should be carefully performed.

Careful roentgenographic evaluation, including anteroposterior, lateral, tangential patellar, and tunnel views, is necessary to accurately diagnose knee-related injuries and coronal fractures of the condyle (7). A CT scan may be needed to more accurately describe the fracture (7), as coronal fractures may be easily overlooked (3,8), and tend to displace with conservative treatment (3).

Whittle (1) recommended treatment with open reduction and internal fixation with a lag screw because Hoffa fractures, which appear harmless on roentgenograms, may produce a marked disability. If the fragment is not properly reduced, roughening of the articular surface and avascular necrosis may occur (7). Holmes et al. (2) also suggested operative treatment because weight-bearing creates shear forces along the fracture line, making nonoperative management unpredictable and adequate stabilization challenging.

Excellent results have been reported in patients treated with open reduction and lag screw fixation (5, 6). Holmes et al. (2) achieved rigid fixation with optimally positioned lag screws placed perpendicularly to the fracture plane with an ipsilateral parapatellar approach. In a case with heterotopic ossification and arthrofibrosis complications, 145° flexion

of the knee was achieved 2 years after surgical intervention; notably, the authors recommended indomethacin prophylaxis (1). Lewis et al. (3) reported two good outcomes and three fair outcomes with internal fixation and one fair outcome and one poor outcome with conservative treatment. Although the results thus far have been favorable, experience with arthroscopic-assisted fixation is limited (4, 9), and the procedure should only be used in select cases.

In most studies on the treatment of knee fractures, anterior, medial, and lateral approaches have been used. We believe that an incision of sufficient length made with either an anterior midline parapatellar (2) or a posterior approach facilitates favorable outcomes, whereas a small incision (e.g., 3 cm) makes sufficiently reducing and fixing a condyle fracture technically demanding (1).

The timing of full weight-bearing after treatment for a Hoffa fracture depends on several factors and has differed considerably in the literature, occurring at 6 (1, 5), 10 (2), 16 (6), and 12 weeks (7). We allowed full weight-bearing at week 13 and believe that doing so any sooner may have posed risks to the patient.

Coronal plane fractures of femoral condyles are uncommon and can be easily missed on routine radiography. To achieve favorable long-term results, open reduction, stable fixation with corticocancellous lag screws, and early mobilization are mandatory. Physical rehabilitation should be initiated as soon as possible to minimize joint contractures.

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## REFERENCES

1. Papadopoulos AX, Panagopoulos A, Karageorgos A, Tyllianakis M: Operative treatment of unilateral bicondylar Hoffa fractures. *J Orthop Trauma* 18:119–122, 2004.
2. Holmes SM, Bomback D, Baumgaertner MR: Coronal fractures of the femoral condyle: a brief report of five cases. *J Orthop Trauma* 18:316–319, 2004.
3. Lewis SL, Pozo JL, Muirhead-Allwood WF: Coronal fractures of the lateral femoral condyle. *J Bone Joint Surg. [Br]* 71B:118–120, 1989.
4. Wallenbock F, Ledinski C: Indications and limits of arthroscopic management of intra-articular fractures of the knee joint. *Aktuelle Traumatol.* 23:97–101, 1993.
5. Zeebregts CJ, Zimmerman KW, ten Duis HJ: Operative treatment of a unilateral bicondylar fracture of the femur. *Acta Chir Belg.* 100:104–106, 2000.
6. Kumar R, Malhotra R: The Hoffa fracture: three case reports *J Orthop Surg. (Hong Kong)* 9:47–51, 2001.
7. Whittle AP: Fractures of lower extremity. In Canale ST (ed): *Operative Orthopaedics.* 9th ed, Mosby Co, St. Louis, MO, pp: 2126–2127, 1998.
8. Baker BJ, Escobedo EM, Nork SE, Henley MB: Hoffa fracture: a common association with high-energy supracondylar fractures of the distal femur. *AJR Am J Roentgenol.* 178: 994, 2002.
9. McCarthy JJ, Parker RD: Arthroscopic reduction and internal fixation of a displaced intraarticular lateral femoral condyle fracture of the knee. *Arthroscopy* 12:224–227, 1996.