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CASE REPORT OPEN ACCESS

Arthroscopic Management of Articular Hoffa Fracture: A Case Report

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Introduction: Hoffa fractures are uncommon. These joint fractures require anatomical reduction with stable osteosynthesis allowing early rehabilitation. The arthroscopic reduction with percutaneous osteosynthesis has the advantages of being a minimally invasive technique with minimal morbidity and a good control of the reduction.
Case Presentation: We report here a 35-year-old patient who has a left knee injury after a motorbike accident. The case was treated for Hoffa's fracture by percutaneous fixation arthroscopically assisted with good outcomes.
Keywords: Hoffa fracture, knee articular fractures, arthroscopy

Introduction

Distal femur are uncommon; they represent less than 10% of all fractures of the femur. Unicondylar fractures represent approximately 3% and Hoffa fractures are even unusual with difficult management. These joint fractures require anatomical reduction with stable osteo synthesis allowing early rehabilitation (1, 2).

The arthroscopic reduction with percutaneous osteosynthesis of Hoffa fractures has the advantages of being a minimally invasive technique with minimal morbidity. It also offers a good control of the reduction and allows an appropriate treatment at the same time (6). In recent literature, the published series concerning arthroscopic management of this type of fracture remain limited. We report here the case of a patient treated for Hoffa's fracture by percutaneous osteosynthesis under arthroscopic control.

Case Presentation

A 35-year-old patient has a left knee injury after a motorbike accident. Clinical examination showed a painful and swollen knee (Figure 1). X-rays revealed a displaced Hoffa fracture of

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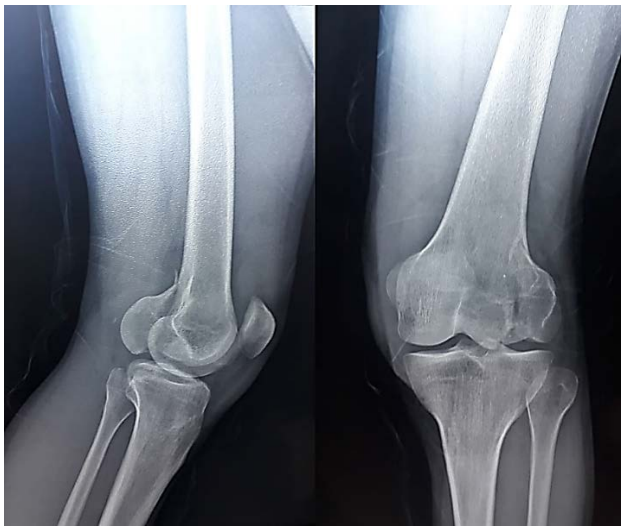

Figure 1. X-rays; Hoffa fracture of lateral condyle

the lateral femoral condyle. The computed tomography confirmed the diagnosis (Figure 2). After patient was planned for an arthroscopic-assisted fixation of his fracture. In the operating room, he was positioned supine with a tourniquet to upper thigh. After evacuation of the hemarthrosis, diagnostic arthroscopy was envisaged (Table 1) (Figure 3).

Figure 2. Computed tomography scan; Hoffa fracture of lateral condyle

The menisci and cruciate ligaments were found to be regular. Joint exploration showed a large Hoffa fracture with osteochondral lesions. The clots were removed by a 3.5 mm shaver and loose fragments were excised (Figure 4).

Table 1. Indications and contraindications

Indications	▪ Recent fractures *Mono-fragment, large volume* ▪ Neglected fractures *Without comminution, large fragment with good bone quality*
Contraindications	▪ Recent fractures *Irreducibility or comminution* ▪ Neglected fractures *Pseudarthrosis requiring grafting*

Fracture reduction was achieved with K-wires used as a joystick. Then, two guide wires were placed in antero-posterior direction (perpendicular to fracture sit). The length and good position of the K-wires were verified under C-arm. Osteosynthesis was carried out by 6.5 mm cannulated screws. Osteochondral lesions were repaired with Herbert screws (Figure 5, 6). The reduction was anatomical and the osteosynthesis was stable (Figure 7). The postoperative suites were simple. Rehabilitation was immediately started with a good recovery of the articular amplitudes. Patient was allowed to bear weight partially at the 6th week. Total bear weight was allowed at the 3rd month. Functional results were very satisfactory.

Discussion

In 1904, Albert Hoffa was the first to describe the typical form for fractures of the femoral condyle in the sagittal plane (3). The therapeutic management of these injuries has undergone a large evolution over the years. Indeed, reduction techniques with internal fixation assisted by arthroscopy appear as new methods providing several advantages (1, 2, 4):

- Surgical aggression is relatively minimal, thus avoiding damage to surrounding tissue, including the risk of iatrogenic damage to the common peroneal nerve.
- The joint architecture can be inspected thoroughly by the arthroscopic control. Consequently, associated lesions (in particular cartilage or ligament damages) can be treated simultaneously.
- The use of a multi-angle screw fixation under fluoroscopic control offers a stable and reliable fixation preventing any risk of rotation or second displacement of the fragment.
- The operating time is shorter, the bleeding is minimal and the risk of infection is so negligible because procedure is performed under continuous irrigation.
- The scar is minimal and conducive to the rapid recovery of the knee joint amplitudes.

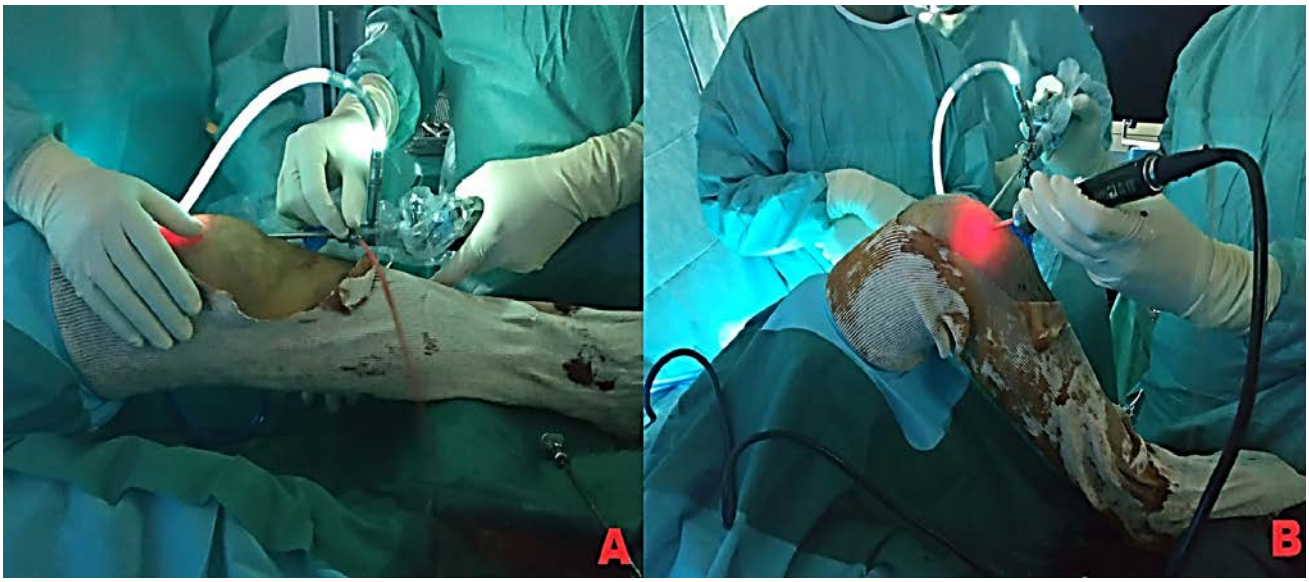

Figure 3. A: Evacuation of the hemarthrosis, B: Diagnostic arthroscopy

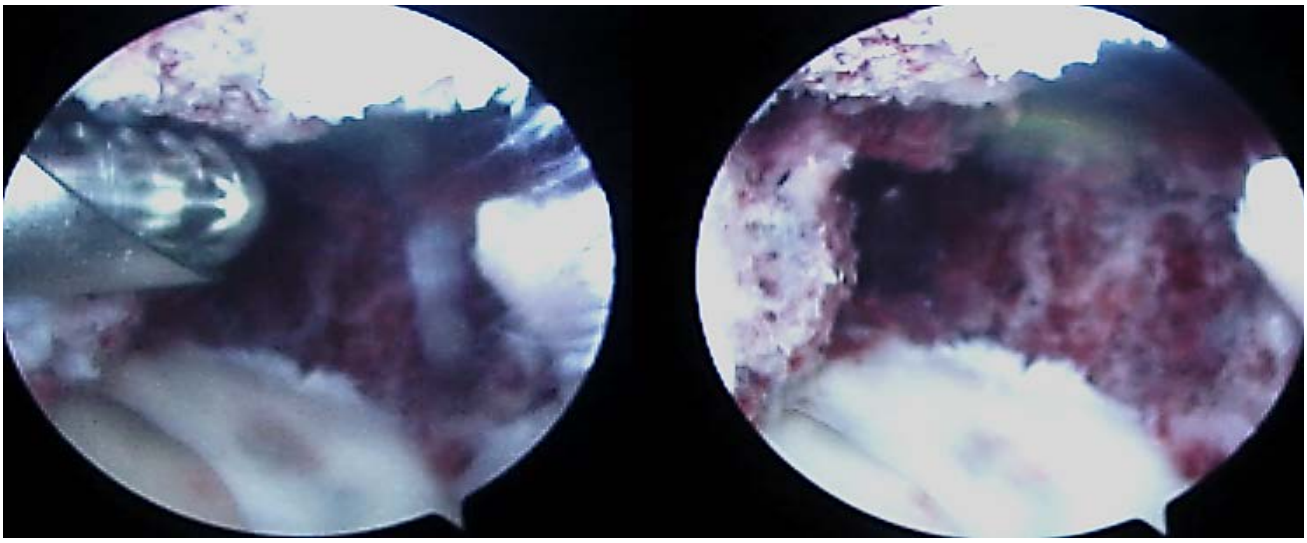

Figure 4. Removing the clots between the fracture surfaces by a 3.5 mm shaver

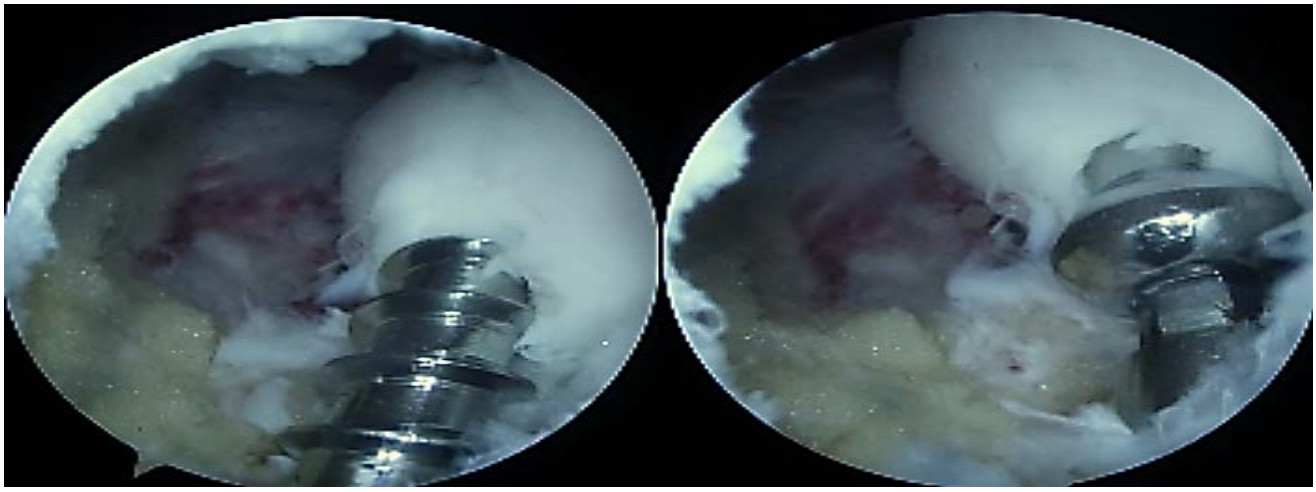

Figure 5. Osteosynthesis of the fracture by 6.5 mm cannulated screws

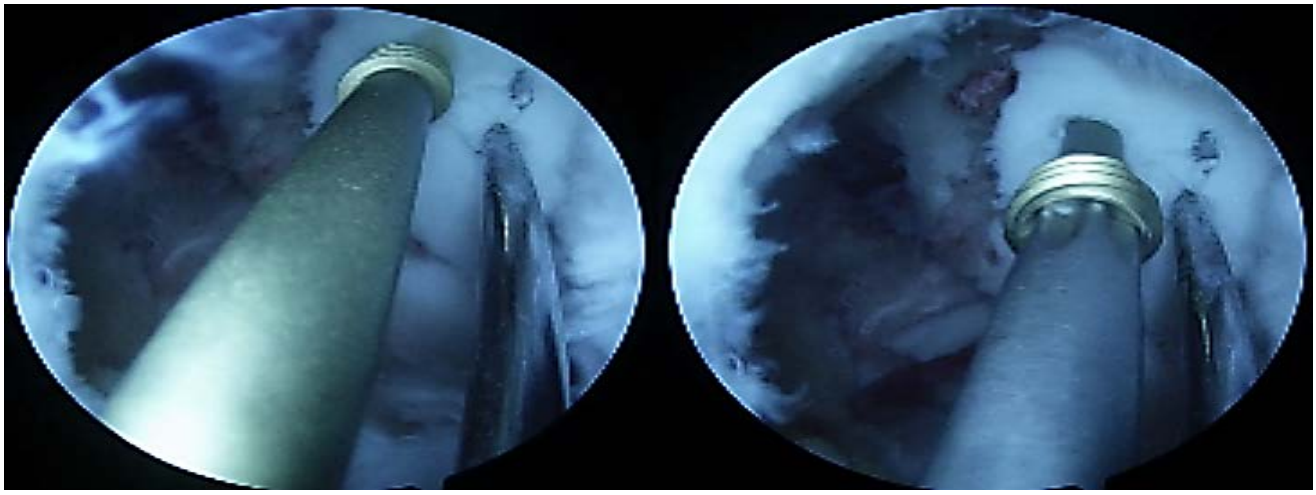

Figure 6. Reparation of osteochondral lesions with Herbert screws

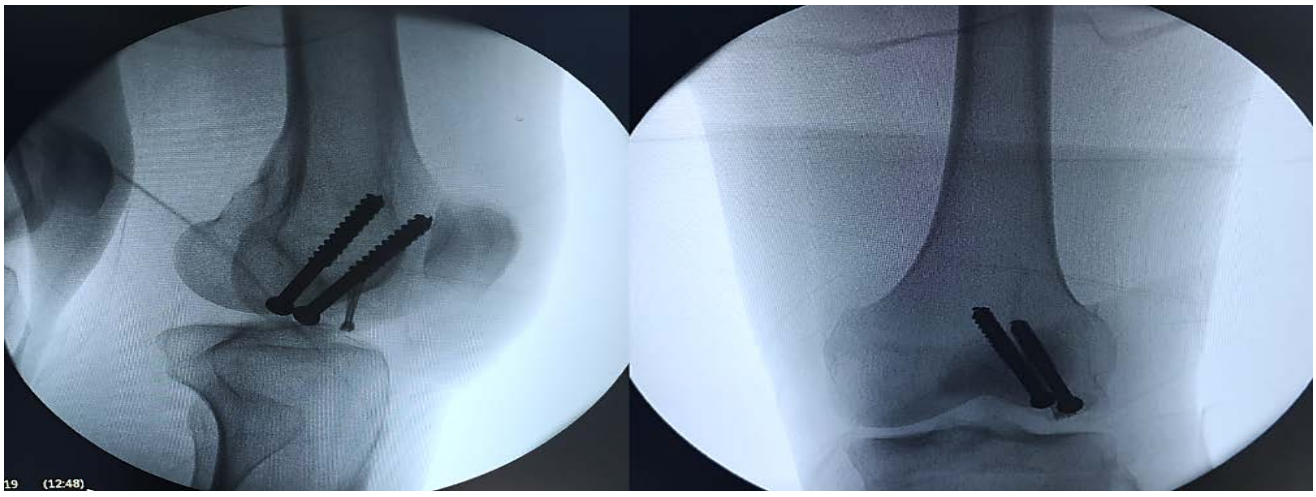

Figure 7. Final fluoroscopic control

The procedure is performed under spinal anesthesia; patient is installed in supine position with a tourniquet to upper thigh. Conventional arthroscopic approaches are used.

After evacuating the hemarthrosis (Figure 1; A), a first diagnostic-look is made (Figure 1; B). The cartilage, menisci and ligaments lesions are checked. The clots between fracture surfaces are excised by a shaver. Generally, the condylar fragment moves retro-femur due to its posterior capsular attachments. A 120° knee flexion relaxes the posterior capsule and the gastrocnemius muscles, thereby reducing the fracture using a simple curved Halsted forceps.

A Kirschner wire can be used as a joystick to assist reduction maneuvers. Also, tibial plateau contributes to the repositioning of the fragment by pushing it back during hyperflexion. The quality of reduction is carefully controlled by magnification offered by the arthroscope camera. The condyle is then temporarily stabilized with two guide pins inserted obliquely and oriented medially and anteriorly from the most posterolateral point of the fragment, just above the lateral meniscus. The final fixation is achieved by 6.5mm cannulated screws following the path of the guide wires. A minimum of 2 screws is required to ensure the rotational stability of the fragment. The screw heads must be inserted through the articular cartilage. The small comminuted fragments are generally removed while the larger are anatomically fixed using Herbert screws under arthroscopic control. The reduction and alignment of the screws are confirmed by intraoperative fluoroscopy. A stability test is then performed by bending the knee up to 140°.

In the postoperative, walking without bear weight is allowed on the second day of surgery. Full weight bearing is allowed from the 12th week. The functional results are globally satisfactory and remarkable (1, 2, 4 - 6) which makes this surgical technique as an excellent therapeutic option in selected patients.

Few reports of arthroscopic assisted fixation of Hoffa fractures are available. Wallenbock and Ledinski reported on a series of 24 intraarticular knee fractures surgically treated two Hoffa injuries (7). They confess the demanding and challenging nature of the arthroscopic fixation. However, they report good early results. McCarthy reported a sagittal plane lateral femoral condyle fracture (8). They were not able to achieve adequate reduction but acclaimed the decreased blood loss, soft tissue dissection, operative time, and the accelerated recovery time. Arthroscopy has been described as a useful tool in the treatment of neglected Hoffa fractures without bone loss (9-11). It also wells as a great treatment for intra-articular and ligamentous injuries which could be not recognized by clinical exam, CT-scan or MRI.

Conclusion

Arthroscopic-assisted osteosynthesis of Hoffa fractures is a technically demanding surgical method, most often applicable for fresh and simple fractures. However, despite its long learning curve, its limited and poorly coded indications, this treatment promises multiple advantages. It reduces the rate of complications encountered with open surgery and thus offering broad prospects for the management of these joint fractures.

Conflict of Interest

The authors declare no competing interest. The patient gives his informed consent to publish this case.

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