



## Percutaneous surgical treatment of tibial plateau fractures with arthroscopy (about 15 cases)

MA Berrady, A Benabdesslam, MS Berrada and M el Yaacoubi  
Ministry of Health, AVICENNE Hospital, Morocco.

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### ABSTRACT

Percutaneous treatment of tibial plateau fractures under arthroscopic control, although minimal, is a cause of a decrease in morbidity compared to open surgery. The objective of this work is to report the functional results, in short and medium term, of these percutaneous osteosynthesis under arthroscopic control. Fifteen patients were treated by percutaneous screwing with arthroscopic control for fractures classified Shatzker I to III. The average age was 32 years; the average follow up was 39, 9 months (24 -119 months). We have not noticed postoperative infection, the results were considered good, the score IKS (International Knee Society) average was 83.2 for the knee score and 89 for the function score. One patient presented a secondary bone depression at 35 days post-surgery. Percutaneous treatment of fractures separation or separation and depression of the lateral plateau conducted under arthroscopy provides satisfaction in terms of postoperative indolence, early recovery and rehabilitation, and seems to have satisfactory results in the short and medium term. We cannot assess the impact on the evolution of osteoarthritis due to lack of sufficient experience.

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### Introduction

Tibial plateau fractures represent 1% of all fractures. The articular character imposes adequate care and restitution and integument of the articular surface. It also requires stabilization and stable fixation allowing early mobilization. Those treatments are the only way to guarantee a satisfactory result and to delay the osteoarthritis consequence [1,2].

The technique of percutaneous fixation under arthroscopic control initially described by Caspari and al [3] and Jennings [4] asserted its place in the treatment of fractures classified from I to III according to Shatzker [3, 5]. It is a technique that combines the advantages of percutaneous surgery (minimally invasive portals), and those of arthroscopy, specifically visual control of the reduction, and global articular assessment of the lesions and their associated treatment.

The aim of our study is to report the functional results in short and medium term of this technique on a series of fifteen patients. Those patients all had closed fractures of the lateral tibial plateau, and percutaneous screwing osteosynthesis under arthroscopic control.

### Materials and Methods:

This is a retrospective, single-centered study, on fifteen patients treated by reduction and percutaneous screw fixation with arthroscopy.

We included in our study closed tibial plateau fractures type I to III according to the classification of Shatzker [9]. Fractures that required immediate open sky osteosynthesis or intraoperative conversion, were excluded from our study.

We noticed a male predominance with twelve men and 3 women, mean age was 32.

Radiological evaluation included standard anteroposterior and lateral radiographs, and a tomographic study (CT) with 3D reconstruction.

A significant predominance of fractures separation recess of the external plateau was noted.

The average time of care was 1.5 days; the arthroscopic time objectified:

- associated shredding type lesions of a ACL without complete break in 5 cases,
- injuries of the middle part of the external meniscus in 3 cases.
- And chondral lesions on the femoral side in 11 cases.

The mean duration of hospitalization was 4 days (4-8).

**Surgical technique:** All patients underwent arthroscopic reduction and osteosynthesis with screwing. We first used the conventional two portals of arthroscopy. Although this is not recommended, we used an arthropump. The first step was an extensive washing with complete assessment of the lesions. We conducted:

- A simple synthesis for Type I fractures.
- a reduction by elevating the depressed bone without grafting for type II.
- An elevation of the depressed bone using a hook or a spatula and filling of the empty space left after bone harvesting with autologous bone grafts (12 cases) or bone substitute granules (3 cases).

A meniscal complementary gesture (suture or regularization) was performed as needed (unstable meniscal lesions and ACL dilacerated filaments.)

Osteosynthesis was achieved by cannulated cancellous screws diameter of 6, 5 mm without washers.

We used two screws in 11 cases, three screws in 4 cases. Radiographic control was carried out with fluoroscopic monitoring. No patient was drained post procedure. antibiotic prophylaxis and anti thrombosis prophylaxis was given to all patients.

Rehabilitation was started the next day for all patients with a mobility area of 0 to 90°. A restraint by a removable splint contention was used for all patients. Progressive support has been enabled starting from the sixth week.

**Evolution:**

The patients were seen in consultation by different surgeons, with a mean follow of 39, 9 months.

Clinical evaluation was performed using the score of the International Knee Society IKS score, Rasmussen radiographic and functional Lysholmscore.

No immediate post-operative complication was deplored, especially infection. Otherwise, one patient developed a secondary compaction by non-compliance to weight bearing instructions; the involved has a particular psychological profile.



**Figure 1: Tomodensitometric section of a fracture classified III according to Shatzker (Front).**



**Figure 1 (Bis): Tomodensitometric section of a fracture classified III according to Shatzker (side).**

**Clinical and radiological results:**

The average knee IKS score for our study was 83.2 (25-100) and the average function score was 91. The average Lysholm score was 79 points in our series (25-100). Finally the clinical score was 24.5 Rasmussen average points (4-30), while the radiological score was 8 points out of 10.

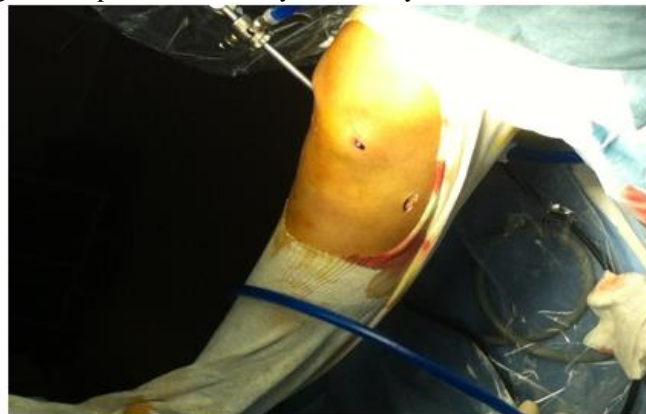
The patients seen in consultation had a 130° as mean flexion amplitude and an average extension surrounding 1, 3 (-10° - 0°).

**Discussion:**

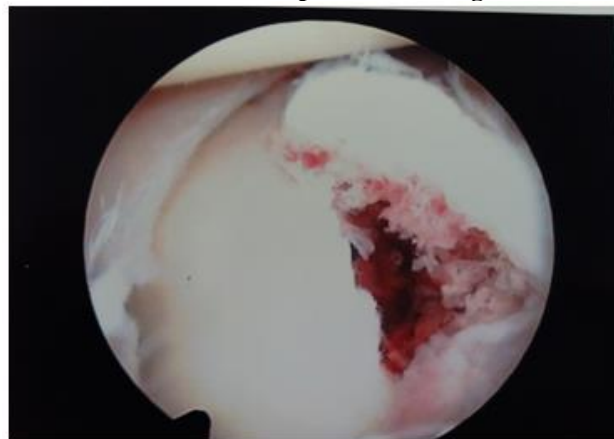
The severity of tibial plateau fractures resides in the articular topography lesions, thus, every reducing

defect precipitates the knee to an inevitable change to osteoarthritis and stiffness.

Until now, the publications reporting the results of treatment of arthroscopic tibial plateau fractures are not many. The most important series was reported by Bobic [3] including 31 patients. Jennings [18] and Caspari [5] brought back respective series of 21 and 20 patients. Fowble [9] published the first retrospective study comparing 12 patients undergoing tibial plateau fractures treated arthroscopically against 11 patients treated by arthrotomy.



**Figure 2: Arthroscopic time: two first portals in addition to the conventional external path for Raising of the recess**

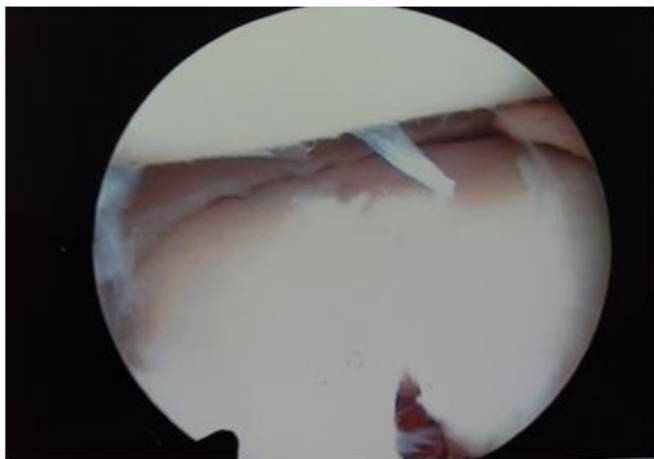


**Figure 3: Arthroscopic view of a fracture: recess of the lateral plateau before reduction.**

**Surgical technique:** There is no consensus regarding the installation of the patient. We usually use dorsal supine position without retention of the thigh; the knee should be in a cabot position to allow the usage of fluoroscopic guidance. The use of arthropumps is strongly discouraged because of the compartment syndrome risk [23]. Guanche [11] pointed out the importance of drainage through the lateral portal arthroscopically in reducing the intra-articular hyper pressure risk.

The infero-lateral portal does not always permit a good visualization of fracture lines especially when those fall below the lateral meniscus. In this case the use of a second infero-medial portal visualizes the slope under external meniscus. We start by cleaning the joint, removing hematoma and articular debris.

Once the joint assessment is done, we create a metaphyseal window in contact with the recessed area. Jennings [18] and Fowble [9] recommended the use of the drill guide of the tibial tunnel habitually used for ligamentolasty. We can also use a simple trephine to dig a tunnel of 12 mm according to the technique described by Muezzinoglu [22].



**Figure 5 : Arthroscopic view of the same fracture: recess of the lateral plateau after reduction**



**Figure 5 : Immediate post operative radiography depicting the completed reduction and osteosynthesis**



**Figure 6 : lateral radiography depicting the completed reduction and osteosynthesis**

We used cannulated cancellous screws, this has enabled us control the reduction, initially held by Kirshnerwires, by image intensifier, before screwing.

Koegh [20] recommends using washers to increase the effect of compression of the fracture.

Jennings [19] proposed to fill the defect created by the compaction with the surgical cement; we did not use this method in our serie.

In the short and medium term: The postoperative course was uneventful for all patients. The absence of pain permitted a mobilization on arthromotor 48 h after the surgery. This seems to be a crucial element in the functional outcome of the knee.

Indeed, Chaix [6] in a series of 111 patients treated for fractures of the tibial plateau by arthrotomy, reports a delayed recovery of flexion, and a residual flexion contracture of 2 at 10°. He attributes this to the late mobilization of the knee especially because of postoperative pain.

Clinically and functionally, our results are satisfactory and comparable to those reported in the literature. We have an average knee IKS of 83.2 (25-100) and IKS function through 91. Cassard and al [1] reported a knee IKS and IKS function respectively of 94.1 and 94, 7 in a serie of 26 patients.

Recently, Rossi and al [17] reported a serie of 46 patients, with a followup of five years, an IKS knee of 93, 2 and IKS function of 94, 8 with a Rasmussen clinical score of 28.2.

Radiologically, except a case of secondary displacement by early weight bearing, the short and medium term controls are very satisfactory and do not objectify any significant axial deformation.

Our study is limited by the small number of patients included, it does not highlight significant differences with other series as far as statistics are concerned.

It would be interesting to repeat this study with a bigger number of patients and with a significant follow up to study the osteoarthritis complications in the long term. In fact, Volpin and al [10] and Honkonen [22] speak of an onset of osteoarthritis in six to eight years after the trauma.

#### **Conclusion:**

Percutaneous fixation of tibial plateau fractures under arthroscopic control appears to be a good indication for fractures TYPE Shatzker I to III, and gives satisfaction in terms of results in the short and medium term.

Our study, although with a limited number of patients, corroborates the contribution of arthroscopy in the treatment of these fractures, and this, considering the results obtained on the clinical, functional and evolutionary level in the medium term.

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