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Original Research Article

Surgical Treatment of Tibial Plateau Fractures About 100 Cases

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Abstract: Tibial plateau fractures are articular fractures that must benefit from anatomical reduction to avoid the occurrence of complications, a source of serious functional sequelae. Their management has become largely surgical. We report a retrospective study of 100 tibial plateau fractures treated surgically between 2012 and 2018. The objectives were to study the epidemiological characteristics of tibial plateau fractures, to evaluate and compare the clinical and radiological results, in the short and long term, of different techniques for the surgical treatment of tibial plateau fractures. The average age of our patients was 45 years old. The male sex was affected in 66% with a sex ratio of 1.94. The etiologies were dominated by domestic accidents in 52% of cases, followed by public voting accidents (47%). The fracture was open in 3 cases. We adopted the classifications of DUPARC and FICAT and of SCHATZKER, thus the patients were classified: 30 cases of unituberosity fractures, 41 cases of spinotuberosity fractures and 29 cases of bituberosity fractures. Stabilization was provided by a screwed plate in 62 cases and by screwing in 32 cases, 26 of which were percutaneous. Only 1 patient had stabilization with a HOFFMAN-type external fixator for an open CAUCHOIX II fracture. 5 patients had an ILIZAROV type external fixator. Autologous corticocancellous bone grafting was performed in 12 cases. According to the criteria of HOLH AND LUCK, the anatomical results were satisfactory in 77% of cases. According to the criteria of MERLE AUBIGNE and MAZAS, the functional results were satisfactory in 82% of cases. In the light of our results and a review of the literature, it appears that the prognosis of these fractures depends on the type of fracture, the degree of comminution, the quality of the reduction, the patient's age, the time to treatment, meniscal and ligament lesions, type of surgical treatment and quality of rehabilitation.

Keywords: Fracture, Knee, Tibial plateau, Bone graft, Surgical treatement.

INTRODUCTION

The fractures of the tibial plateaus arouse particular attention given their seriousness which relates to their articular location and their complexity which determines the therapeutic difficulties. They thus threaten the functional prognosis by compromising the mobility of the knee by the occurrence of secondary osteoarthritis which remains the most formidable complication in the long term.

These fractures constitute a therapeutic emergency and must benefit from adequate management. It requires stable anatomical reduction with rigid compression, the aim of which is to prevent complications and ensure early rehabilitation.

MATERIAL AND METHODS

This was a retrospective study spread over a period of eight (08) years from January 2012 to December 2018, involving 100 patients who presented fractures of the tibial plateau treated surgically. The patients included are people aged over 18, with a recent tibial plateau fracture, treated surgically regardless of the mechanism of onset and the therapeutic method, with a minimum follow-up of 12 months. We used the functional criteria of MERLE AUBIGNE and MAZAS [1] . All the data collected were entered into a computer using SPSS software.

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RESULTS

Epidemiological aspects

The age of our patients varied between 19 and 78 years, with an average age of 45 years. In our series, we noted a large male predominance. Domestic accidents were the most common etiology, found in 52 patients. In second place came road accidents which accounted for 47% of etiologies.

Clinical aspects

It was found that the left side was more frequently affected than the right side in 61 cases. In our series, 3 cases of cutaneous openings were revealed, classified according to CAUCHOIX as type I in 1 case and type II in 2 cases. Ligament injuries are frequent, but often unrecognized. They concern the collateral and cruciate ligaments. In our series: 7 patients presented a ligament lesion: We noted 4 cases of meniscal lesions discovered intraoperatively, involving disinsertion of the external meniscus involving three external unituberosity fractures and one external spinotuberosity fracture.

In our series, associated bone lesions were present in 42 patients including 29 cases of fracture of the upper extremity of the fibula.

Radiological aspects

We have adopted, for the classification of tibial plateau fractures, those of DUPARC and FICAT and of SCHATZKER (table 1).

Table 1: Radiological findings according to the Duparc and Ficat and Shatzker classification

Typeoffracture		I	II	III	Total
Single tuberosity Fracture (30cases)	External	16	6	6	28
	Internal	1	1	0	2
Spinotuberosity Fracture (41cases)	External	10	9	11	30
	Internal	5	4	2	11
Bituberosity fractures (29 cases)		7	13	9	29
Posterior fracture-separation		-	-	-	0
				Total	100

Therapeutic aspects

Stabilization was provided by a screw plate in 62 cases and by a screw fixation in 32 cases, 26 of which were percutaneous. Only 1 patient had stabilization with a HOFFMAN fixator for an open CAUCHOIX II fracture. 5 patients had an ILIZAROV fixator. Of the 100 cases of fractures treated surgically, the material used was distributed as follows (figure 1).

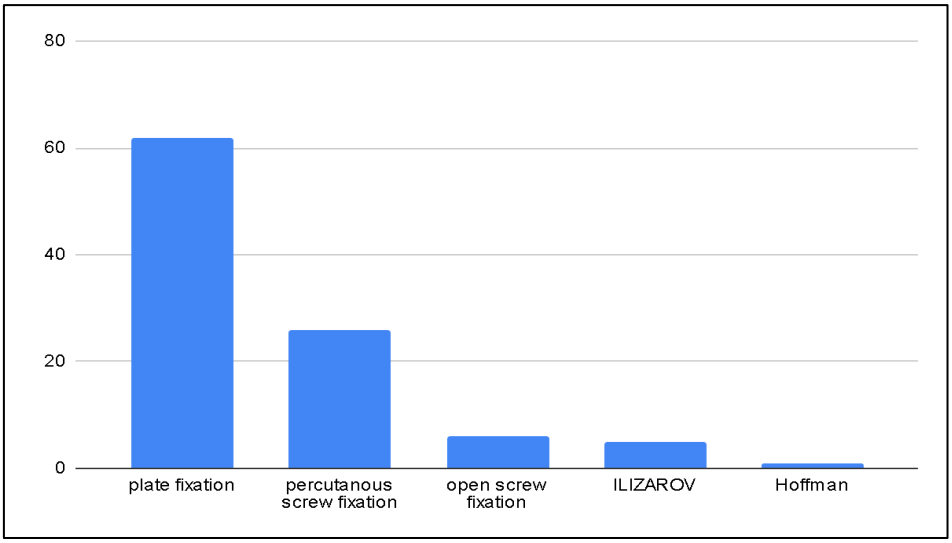

Figure 1: Osteosynthesis materials used for surgical treatment

58 patients had an anterolateral external GERNEZ approach. 7 patients were operated on via an internal GERNEZ approach. 7 patients via a double GERNEZ approach. Sub-meniscal arthrotomy was performed in all the patients who had an external approach (65 patients); after evacuation of the hemarthrosis, it made it possible to take stock of the intra-articular lesions, to check the integrity of the menisci and to control the articular reduction of the fracture. The filling of the metaphyseal void, created by the raising of the sunken plate, was ensured by the establishment of a cortico-cancellous graft taken from the internal tablet of the ipsilateral iliac crest in 12 cases.

Evolution

The results were evaluated with an average follow-up of 35 months and extremes ranging from 12 to 72 months:

According to the criteria of Merle Aubigné and Mazas, we listed 70 cases of very good functional results, 12 cases of good functional results, 13 cases of average functional results and 5 cases of poor functional results. The overall anatomical results were satisfactory (very good and good) in 77% of cases, according to the radiological criteria of Holh and Luck.

It was noted that the functional results varied according to the type of surgical treatment, indeed a satisfactory functional result was noted in 97% of percutaneous screwing and 83% of osteosynthesis by screwed plate alone. The worst functional results were observed in patients who had undergone stabilization with ILIZAROV. The difference between the different treatments was significant (P = 0.035) with better functional results for osteosynthesis by screw plate and screwing versus the rest of the means of osteosynthesis. Fractures of the external unituberosity fractures and external spinotuberosity fractures gave the best anatomical results for all treatments combined.

The radiological result was bad for the fractures complex twin-tuberosities (46% satisfactory results). In our series, we deplored 3 cases of infections, one case of circumferential skin necrosis of the leg and 2 cases of dismantling of the osteosynthesis material Of the 100 cases of tibial plateau fractures, we found 12 cases of osteoarthritis, 6 cases of algodystrophy, 12 cases of malunion including 10 cases of tibial varus and 2 cases of valgus

CLINICAL CASES

Clinical case 1

Figure 2: 50 years old, external unicondylar fracture of the right tibia, percutaneous screw fixation. Excellent anatomical and functional results at 30 months follow-up

Clinical case 2

Figure 3: 36 years old, bicondylar fracture. Osteosynthesis with an external screw plate and an external screw anchor. At 3.5 years, the patient had a very good anatomical and functional result

Clinical case 3

Figure 4: 44 years old, right tibia bicondylar fracture. He underwent reduction and elevation using an external GERNEZ approach with stabilization by screwed plate associated with a cortico-cancellous graft taken from the iliac crest. Good anatomical and functional results at 3 years.

Clinical case 4

Figure 5: A 28-year-old patient with a bicondylar fracture of the left tibia following a traffic accident, treated with an illizarov fixator with a good functional result at 02 years.

Clinical case 5

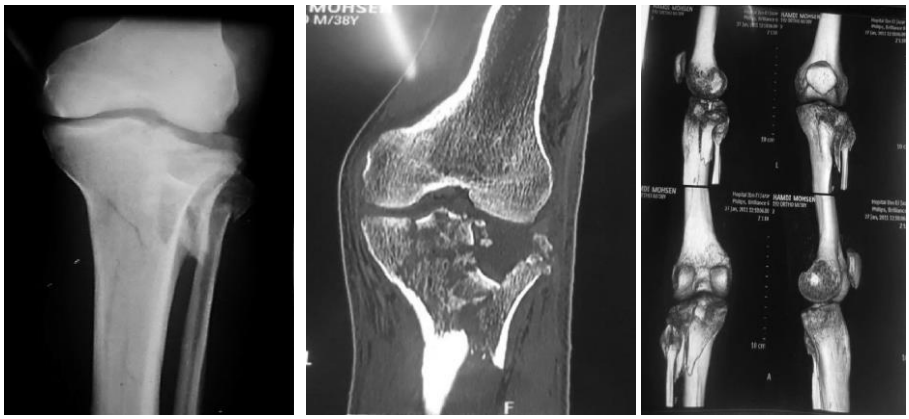

Figure 6: 39-year-old patient with an bicondylar complex fracture of left tibia following a traffic accident The treatment consisted of an open reduction and stabilization by an L plate + antero-posterior screwing and immobilization with a cruropedial splint for 3 weeks

The evolution was made towards necrosis of the external tibial plateau, which required to remove the osteosynthesis material in the seventh postoperative month with a genu valgum deformity of 15° and limitation of flexion to 80°.

Figure:

Figure:

DISCUSSION

The average age of our patients was 45 years old with a peak frequency between 40 and 50 years old. Our results were in line with those of the other series which varied within the same margins (36 years - 49 years). Fractures of the tibial plateaus are characterized by a clear male predominance observed in all the series studied as well as in ours [1]. This particularity would be due to male exposure to violent trauma in connection with accidents on the public highway and professional activity. We note the relative frequency of the fracture of the head of the fibula, it is generally seen in the case of fractures-separations of the external tibial plateau and bituberosity fractures, presenting a line of separation.

Ligament injuries are usually associated with tibial plateau fractures. Lesions of the internal lateral ligament and the anterior cruciate ligament, isolated or combined, are the most frequent and significantly worsen long-term functional results. Hence the rule of

testing the knee after osteosynthesis, thus allowing immediate treatment of the ligament lesion [2-6]. In the literature, the incidence of ligament lesions varies according to the studies, it is 48.6% of cases in a study by Stannard *et al*., [7] in 2004. While Van Glabbeek *et al*. [8] noted only 15% in a study conducted in 2002. In our series, 7 patients presented a ligament lesion, this frequency is lower than that found in the other series, and this is probably due to insufficient exploration.

Vascular lesions are rare and most often contusions of the popliteal artery. Significant displacements and associated dislocations increase the risk of arterial section [8]. Tibial plateau fractures are a therapeutic emergency because the evolutionary mode of these fractures towards consolidation is extremely rapid. In addition, these fractures should be stabilized urgently to avoid the appearance of blisters. The choice of treatment must take into account several elements, which are the patient's age, the appearance and prognosis of the skin, the radiological type of the fracture and the previous articular condition. It is based on four principles:

- Early treatment due to rapid aging of joint fractures.
- Perfection of the reduction restoring the articular profile as well as possible.
- Solidity and effectiveness of the restraint.
- Earliness of rehabilitation.

Whichever method is used, the final short and long-term result is dominated by the quality of joint surface reduction, restoration of the femoro-tibial axis, knee stability and early mobilization. The purpose of osteosynthesis is to allow solid fixation of the reduction, allowing early mobilization in order to safeguard knee mobility [9,10]. The external GERNEZ approach is most often used, given the frequency of lateral plateau lesions [11, 12]. The internal approach, in case of isolated attack of the medial plateau.

Our approach, in the case of bituberosity fractures, was to begin with a single approach on the side of the compression, which is generally external. Then, after reduction and placement of the plate externally, the internal tuberosity will be fixed by recall by screwing the plate. If the hold is insufficient, internal percutaneous screws can be added and if significant displacement persists, an internal approach with stabilization by screwing or plate will be performed.

External unituberosity fractures and spinotuberosity fractures have the best functional prognosis (89% and 88% satisfactory results in our series). On the other hand, the prognosis of bituberosity fractures, independently of the type, remains more severe (only 69% of satisfactory results). These results are similar to those found in the literature. We thus note, in comparison with the results of the literature (according to the criteria of MERLE AUBIGNE and MAZAS) concerning the other therapeutic methods, that those of our series approached those of the other series using the same method. The most modest results were found in the series using external fixation.

Regarding treatment under arthroscopic control, the majority of studies have shown excellent results. VAN GLABBEEK [8], in a series of 20 cases with an average follow-up of 39 months, obtained very good results for 18 patients. The best results are found for separation fractures and mixed fractures (13 excellent results out of 16). In a comparative study between open and arthroscopic treatment, FOWBLE [13] demonstrated the superiority of arthroscopy for separation fractures and mixed fractures

CONCLUSION

In light of this study, we emphasize that these fractures are serious compromising the function of the knee, because they affect the articular surfaces, associating to varying degrees, separation and sinking. They affect the functional prognosis of the knee by the risk of occurrence of secondary osteoarthritis. These fractures require anatomical joint reconstruction which must be maintain over time with, as a corollary, a stable and rigid synthesis to allow early rehabilitation, the only guarantee of adequate restitution integrity. Many treatments, surgical or not, have been proposed for the management of these fractures.

Open reduction and stabilization by internal osteosynthesis remains the treatment of choice for these fractures. In addition, arthroscopy makes it possible to visualize the entire joint and the treatment of associated lesions, while reducing septic risks and risk of postoperative stiffness. In the light of our results and the review of the literature, it appears that the prognosis of these fractures depends on:

The age of the patient:

The older the patient, the less satisfactory results are obtained.

The lead time:

The longer the delay, the worse the results.

The type of fracture:

Bituberosity fractures have a poorer prognosis than others.

The degree of comminution:

The quality of the reduction.

Meniscal lesions:

Poor functional results increased with the size and severity of meniscal lesions.

Ligament injuries:

In fact the stability of the knee is an essential element for a good evolution.

The type of surgical treatment.

Rehabilitation: This is an essential element of the treatment and an essential complement to surgical treatment.

Declaration of interests

The authors declare that they have no conflicts of interest in relation to this article.

REFERENCES

1. Messoudi, A., & Rafai, M. (2007). Arthroscopy versus arthrotomy in the treatment of plateau fractures (about 28 cases). *Moroccan journal of orthopedic surgery and traumatology*, *30*, 19-23.
2. Scheerlinck, T., Ng, C. S., Handelberg, F., & Casteleyn, P. P. (1998). Medium-term results of percutaneous, arthroscopically-assisted osteosynthesis of fractures of the tibial plateau. *The Journal of Bone and Joint Surgery. British volume*, *80*(6), 959-964.
3. Delamarter, R. B., Hohl, M., & Hopp Jr, E. (1990). Ligament injuries associated with tibial plateau fractures. *Clinical orthopaedics and related research, (250)*, 226-233.
4. Prasad, G. T., Kumar, T. S., Kumar, R. K., Murthy, G. K., & Sundaram, N. (2013). Functional outcome of Schatzker type V and VI tibial plateau fractures treated with dual plates. *Indian journal of orthopaedics*, *47*(2), 188-194.
5. Yao, Y., Lv, H., Zan, J., Zhang, J., Zhu, N., Ning, R., & Jing, J. (2015). A comparison of lateral fixation versus dual plating for simple bicondylar fractures. *The Knee*, *22*(3), 225-229.
6. Reddy, S., Kumar, Y., Shah, H. M., Golla, D. K., DJ, N. G., & Kumar, A. (2014). Evaluation of tibial condyle fractures treated with Ilizarov fixation, a prospective study. *Journal of Clinical and Diagnostic Research: JCDR*, *8*(11), LC05.
7. Stannard, J. P., Wilson, T. C., Volgas, D. A., & Alonso, J. E. (2003). Fracture stabilization of proximal tibial fractures with the proximal tibial LISS: early experience in Birmingham, *Alabama (USA). Injury*, *34*, S36-S42.
8. Van Glabbeek, F., Van Riet, R., Jansen, N., D Anvers, J., & Nuyts, R. (2002). Arthroscopically assisted reduction and internal fixation of tibial plateau fractures: report of twenty cases. *Acta orthopaedica belgica*, *68*(3), 258-264.
9. Papagelopoulos, P. J., Partsinevelos, A. A., Themistocleous, G. S., Mavrogenis, A. F., Korres, D. S., & Soucacos, P. N. (2006). Complications after tibia plateau fracture surgery. *Injury*, *37*(6), 475-484.
10. Boisrenoult, P., Bricteux, S., Beaufils, P., & Hardy, P. (2000). Biomechanical comparison of screw versus screw-plate fixation of type 2 Schatzker fractures of the lateral tibial plateau. *Revue de chirurgie orthopedique et reparatrice de l appareil moteur*, 86(7), 707-711.
11. Huec, J.C. (1996). Recent articular fractures of the upper extremity of the tibia in adults. SOFCOT Teaching Conference. *Paris*, *55*, 97-117.
12. Cassard, X., Beaufils, P., Blin, J. L., & Hardy, P. (1999). Osteosynthesis under arthroscopic control of separated tibial plateau fractures. 26 case reports. *Revue de Chirurgie Orthopedique et Reparatrice de L'appareil Moteur*, *85*(3), 257-266.
13. Fowble, C. D., Zimmer, J. W., & Schepsis, A. A. (1993). The role of arthroscopy in the assessment and treatment of tibial plateau fractures. Arthroscopy: *The Journal of Arthroscopic & Related Surgery*, *9*(5), 584-590.

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