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Surgical Treatment of Tibial Plateau Fractures in Bamako: A Study of 70 Cases

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Abstract | **Original Research Article**

Introduction. Tibial plateau fractures most often result from violent trauma. Their management has become largely surgical. The objective of this study was to evaluate the anatomical and functional outcomes of surgical treatment of tibial plateau fractures in the orthopedic and trauma surgery department of the Gabriel Toure University Hospital. ***Materials and methods.*** This was a retrospective, single-center, analytical study conducted over a 4-year period from January 2019 to December 2022, involving 70 patients. All patients admitted for tibial plateau fracture who underwent surgical treatment were included. Outcomes were evaluated according to the anatomical criteria of Mazas and Duparc and the functional criteria of Postel Merle Aubigné. ***Results.*** A total of 70 cases were collected. The mean age was 44.3 years. There was a male predominance with a male-to-female ratio of 6.7. The most common etiology was road traffic accidents (92.9%). Unilateral tibial plateau fractures were the most frequent (40%). Plate fixation was the most commonly used method, accounting for 90% (n=63) of cases. Infection was the most frequent complication, occurring in 11.42% of cases (n=8). At a mean follow-up of 13.3 months (range 7–25 months), functional outcomes were satisfactory in 82.9% of cases (n=58) and anatomical outcomes were satisfactory in 87.2% of cases (n=61). ***Conclusion.*** The various fixation methods used in our setting yielded generally encouraging results.

Keywords: Fracture – Osteosynthesis – Tibial Plateau – Bamako.

INTRODUCTION

Tibial plateau fractures are discontinuities of the proximal metaphyseal-epiphyseal block of the tibia [1]. They are among the most common intra-articular fractures resulting from indirect coronal or direct axial compression forces. The severity of tibial plateau fractures and the complex treatment options depend on the force exerted on the limb.

Surgical treatment employs several techniques and fixation methods, with recent techniques such as arthroscopic-assisted reduction and tuberoplasty gaining popularity among surgeons [2].

The objective of this retrospective study was to evaluate the outcomes of surgical management of tibial plateau fractures in the orthopedic and trauma surgery department.

MATERIALS AND METHODS

We conducted a retrospective, single-center, analytical study over a 4-year period from January 2019 to December 2022, involving 70 patients.

All patients with a tibial plateau fracture who underwent surgery and were followed for at least 13 months during the study period were included.

Preoperative imaging evaluation consisted of standard radiographs of the injured knee in anteroposterior, lateral, medial, and lateral oblique views.

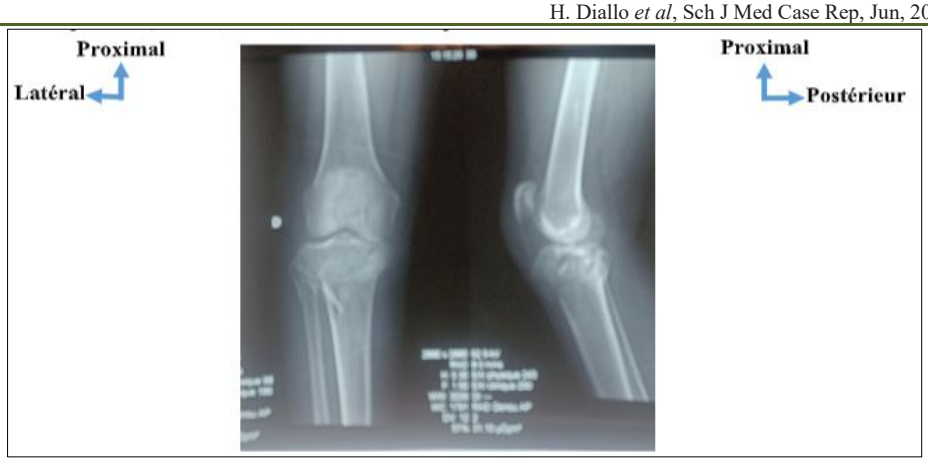

Figure 1: Standard radiograph of the knee, anteroposterior and lateral views

A CT scan of the knee was performed in 17.10% (n=12).

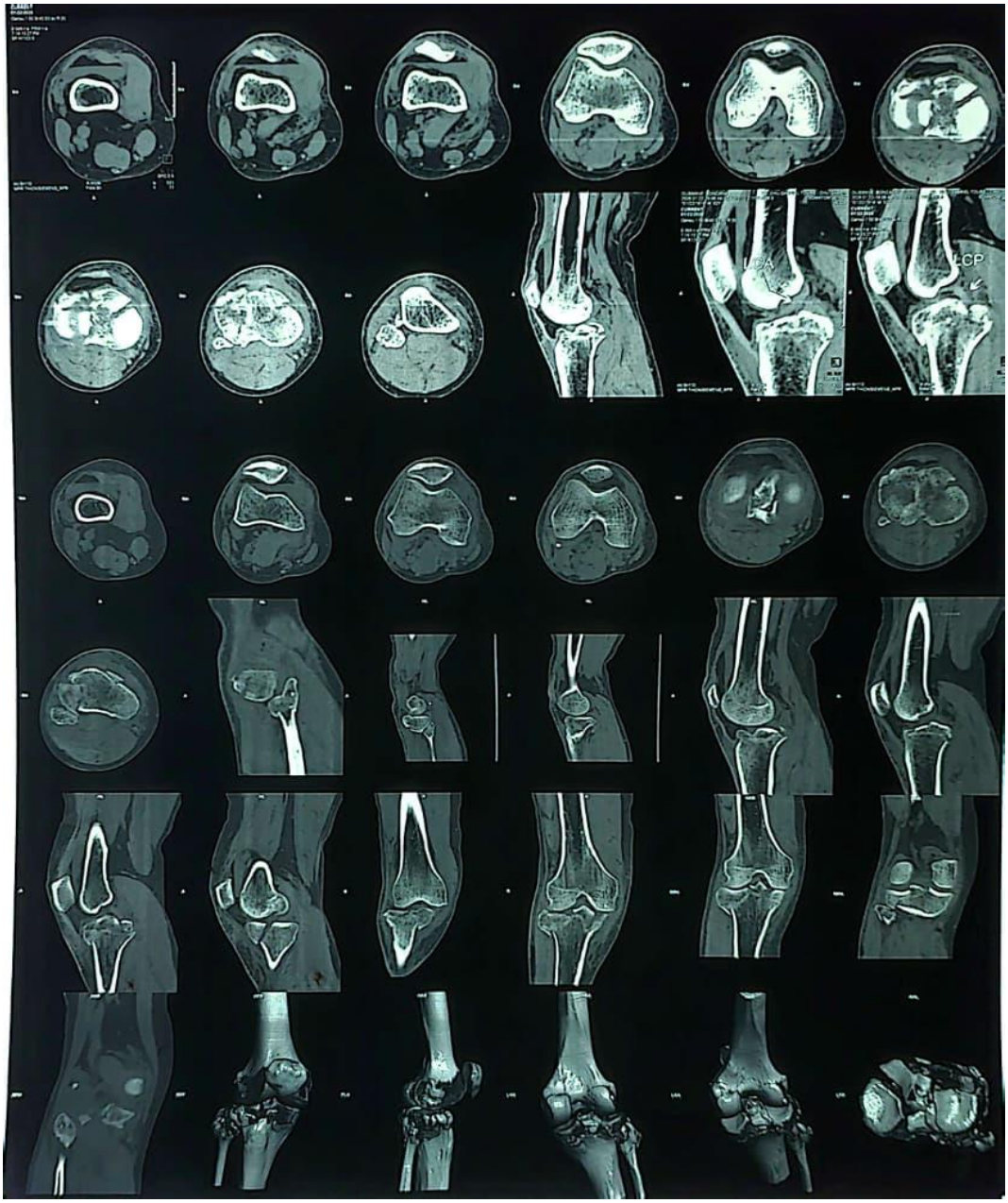

Figure 2: CT scan images showing a complex fracture of the tibial plateau

The Schatzker classification was used to classify the fractures.

Table I: Distribution of fractures according to the Schatzker classification

Schatzker classification	Number of employees (n)	Percentage (%)
Type I	10	14,3
Type II	17	24,3
Type III	1	1,4
Type IV	8	11,4
Type V	14	20
Type VI	**20**	**28,6**
Total	**70**	**100**

The surgeon was a senior orthopedic surgeon or a resident physician supervised by a senior orthopedic surgeon. Regional anesthesia was administered to all patients (100%, 70). All patients were positioned supine on a standard operating table with a biomechanical support under the leg and a pneumatic tourniquet at the root of the limb. The ipsilateral ridge was systematically prepared as needed. Depressions were addressed and the resulting void filled with a corticocancellous bone graft harvested from the medial table of the ipsilateral ridge in 14.30% (n=10). Osteosynthesis was achieved using a conventional T- or L-shaped screw plate in 18.5% (n=13), an anatomical plate in 71.4% (n=50), percutaneous screw fixation under fluoroscopic guidance in 5.7% (n=4), and an external fixator in 4.3% (n=3) of cases. A Zimmer splint for pain relief and protection was applied for 3 weeks, with crutches used for support, for patients who underwent open reduction and internal fixation. All patients who underwent open reduction received systematic drainage, with drain removal on the third day. They received regular dressing changes until suture removal, as well as medical treatment including antibiotics (amoxicillin and clavulanic acid 1000/125 mg every 8 hours for 7 to 10 days), analgesics (paracetamol 1 g every 6 hours, tramadol 100 mg every 6 hours for 5 to 7 days), and prophylactic anticoagulants (enoxaparin 4000 IU/24 hours until weight-bearing was permitted). Isometric muscle contractions were performed starting the day after surgery.

Figure 3: Intraoperative image showing the incision of the lateral Gernez approach and the placement of the anatomical L-shaped screw plate.

Partial weight-bearing was delayed until 8–12 weeks. Full weight-bearing was permitted after clinical and radiological confirmation of bone callus formation (12–16 weeks). Rehabilitation was initially performed by the patient (self-rehabilitation) and subsequently by physical therapists. After discharge, all patients were followed up regularly in the department for clinical and imaging evaluations.

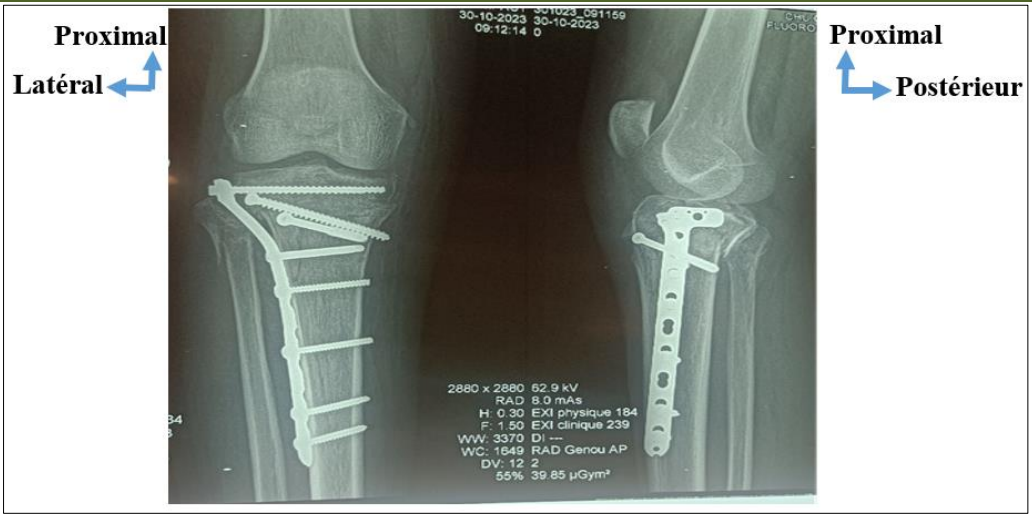

Figure 4: Anteroposterior and lateral radiographs of the knee showing osteosynthesis with a screwed plate

The evaluation of the results was based on the anatomical criteria of Mazas and Duparc and the functional criteria of Postel Merle Aubigné

Table II: Sociodemographic data and circumstances

VARIABLES	Number of employees (n)	%
Age	44,3 ans range 20-66 years	
Sexe		
M	61	87,1
F	9	12,9
Etiologies		
AVP	65	92,9
AVD	2	2,9
AS	2	2,9
CBV	1	1,4
Affected side		
D	25	35,7
G	45	64.3

M: male F: female AVP: road traffic accident, AVD: domestic accidents, AS: sports accident, CBV: intentional assault and battery, D: right, G: left.

RESULTS

A total of 70 patients were included in our series. Sociodemographic data and circumstances of the trauma are summarized in Table II.

The complications we recorded were as follows:

- Infections: 11.42% of cases (n=8)
- Superficial infections: 62.5% (n=5), occurring 10 days post-surgery, were successfully treated with appropriate antibiotic therapy and local wound care.
- Deep infections: 37.5% (n=3), requiring a return to the operating room with hardware removal at 3 months for one patient and at 6 months for the other two.
- Hardware removal: 2.85% of cases (n=2) due to premature weight-bearing in the first patient, subsequently corrected by the placement of a longer screw-retained plate, and in the second case due to osteoporosis that progressed to a varus malunion.
- Knee stiffness: 2.85% of cases (n=2) requiring continued physical therapy sessions to maintain a range of motion between 20° and 110°.

At a mean follow-up of 13.3 months, functional results were rated very good in 34.3% (n=24) of cases, good in 48.6% (n=34) of cases, fair in 15.7% (n=11) of cases, and poor in 1.4% (n=1) of cases. Anatomical results according to Mazas and Duparc were very good in 32.90% (n=23) of cases, good in 54.30% (n=38) of cases, and poor in 12.90% (n=9) of cases. From an analytical perspective, in terms of function, Schatzker type I, II, and III fractures represented 96.29% (n=26/27) of satisfactory results (very good or good) and 7.41% (n=2/27) of unsatisfactory results (fair or poor), while Schatzker type IV, V, and VI fractures represented 76.19% (n=32/42) of satisfactory results and 23.81% (n=10/42) of unsatisfactory results.

Table III: Correlation between fracture type and functional outcome

Functional result		Schatzker Classification						Total
		Type I	Type II	Type III	Type IV	Type V	Type VI	
Very	Very good	6	12	0	3	1	2	24
	Good	4	3	1	5	10	11	34
	Average	0	1	0	0	3	7	11
	Bad	0	1	0	0	0	0	1
Total		10	17	1	8	14	20	70

DISCUSSION

Tibial plateau fractures represent 1% of all fractures and 25% of tibial fractures [3,4]. These are intra-articular fractures requiring the most anatomical reduction possible, with stable osteosynthesis allowing for early rehabilitation to achieve the best functional outcomes [2].

We report the anatomical and functional results of surgical treatment of tibial plateau fractures after a mean follow-up of 13.3 months. The mean age of our patients was 44.3 years, and the etiologies were largely dominated by road traffic accidents. Our results are similar to those in the literature, which report a predominance of road traffic accidents in lower limb trauma [5]. Osteosynthesis was achieved using a plate and screws, screws combined with a plate and screws, or percutaneous screw fixation under fluoroscopic guidance. No cases of double-plate osteosynthesis requiring a double approach were used in our series, as this approach exposes the patient to skin necrosis and increases the risk of infection. Although some authors recommend the use of two screw-retained plates in cases of fractures involving both pillars [6–10], we performed reduction and osteosynthesis using a screw-retained plate combined with direct screw fixation. Only three patients required an external fixator. We observed an infection rate of 11.43% in 34.29% of complication cases. This result is consistent with that of BOUNABE R. [11], who reported a 34% complication rate, and DIALLO C.T. [12], who recorded 25.4% complications in his series. These authors reported lower infection rates, at 4% and 1.4% of cases, respectively. This difference could be explained by the fact that our study did not consider orthopedic treatment. The literature reports a wide range of infection rates, from 2.6% to 45% [13].

Overall, the anatomical and functional outcomes were satisfactory in Schatzker type I, II, and III fractures, but unsatisfactory in Schatzker type IV, V, and VI fractures. The poor results were primarily due to the high velocity of these fractures, with significant cartilage damage and major impaction. Our results remain consistent with those reported in the literature [14].

CONCLUSION

Tibial plateau fractures remain a frequent problem in traumatology. These are serious injuries that can compromise the functional prognosis of the knee. Surgical treatment, which currently leaves little room for orthopedic treatment, must ensure the restoration of knee function and the preservation of the lower limb's static balance. Functional rehabilitation is a fundamental and essential step that must be early, meticulous, and consistent to allow for better joint recovery and avoid complications. Furthermore, the prevention of these fractures must be ensured through road traffic regulations.

Conflict of interest: None

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