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Delayed osteosynthesis of tibial plateau fractures at Dakar general Idrissa Pouye hospital

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Abstract

The objective of this study was to evaluate the anatomical clinical and therapeutic outcomes of delayed osteosynthesis of tibial plateau fractures.

Materials and Methods: This was a retrospective, descriptive, single-center study conducted over a period of 10 years. We included all patients aged at least 18 years who had been followed for a tibial plateau fracture (at least 21 days) and who had undergone delayed osteosynthesis of tibial plateau fractures. The study was conducted on a population of 50 patients, 38 of whom were male. The parameters studied were epidemiological, diagnostic, therapeutic, and evolutionary. Our results were evaluated according to the IKS score.

Results: Schatzker type II split-depression fractures represented 48%. The so-called external Gernez approach was used in 34 patients (68%). Osteoclasts + bone grafting and osteosynthesis with Kerboul plate were performed in 86%. All patients achieved clinical and radiological consolidation at the osteoclast site at the last follow-up. Two cases of knee osteoarthritis were recorded. At an average follow-up of 56 months, the IKS-global score was excellent in 19 patients and good in 22 patients.

Conclusion: Delayed osteosynthesis requires adequate technical facilities and appropriate surgical techniques.

Keywords: Osteosynthesis, plateau fractures, Idrissa Pouye hospital

Introduction

Tibial plateau fractures represent a wide spectrum of severity, from stable, non-displaced fractures with minimal soft-tissue damage to highly comminuted, unstable fractures with massive tissue damage that threatens the viability of the limb ^[1]. They are common in road and occupational trauma ^[2]. The diversity and complexity of these fractures have led to the proposal of several classifications ^[3]. Management is difficult in cases of significant displacement of bone fragments, concomitant impaction of subchondral cancellous bone and the inevitable associated cartilage damage ^[4]. In addition, the stability of these fractures means that early rehabilitation is essential to restore satisfactory mobility. Their major complication is knee osteoarthritis ^[5].

Worldwide, and in Africa in particular, delayed osteosynthesis of the tibial plateau has been studied little.

The aim of this study was to evaluate the anatomical clinical and therapeutic results of deferred osteosynthesis of tibial plateau fractures.

Materials and Methods

The Orthopaedics and Traumatology Department of the Hôpital Général Idrissa Pouye (HOGIP) in Dakar (Senegal) was the setting for this study. It was a retrospective, descriptive and mono-centric study covering a 10-year period from January 1, 2009 to December 31, 2019. We included all patients aged at least 18 years followed for a displaced tibial plateau fracture (at least 21 days) and treated with deferred osteosynthesis. Patients with incomplete records, pathological fractures, orthopedic treatment and follow-up of less than six months were not included.

The parameters studied were epidemiological, diagnostic, therapeutic and evolutionary. The population consisted of 50 patients, 38 of whom were male (76%) and 12 female (24%),

giving a sex ratio of 3.17.

This population represented 14.58% of cases of tibial plateau fractures (343 cases). There was a clear predominance of young and older adults (38% each), with a mean age of 45.78 +/- 14.90 years. The extremes of age were 19 and 76. Twenty-seven (54%) patients lived in Dakar. Four patients had a medical-surgical history of chronic homolateral ankle instability (2%), bilateral flatfoot (2%) and two cases of treated hypertension (4%). Road traffic accidents were recorded in 33 (66%) patients (see Table I), with a direct mechanism in 92% of cases.

Table 1: Distribution of patients according to circumstances of occurrence

Circumstances of occurrence	Effectif	Percentage (%)
Road traffic accident	33	66
Road accident	5	10
Domestic accident	4	8
Sports Accident	3	6
Aggression	3	3
Workplace Accident	2	4
Total	50	100%

The right side was affected in 27 cases (54%). Six patients were ambulatory and walked with a limp on the affected side. The other patients were semi ambulatory (walking with a pair of walking sticks). Two patients had a 14-degree varus deformity. Fractures were assessed according to standard radiological criteria and classified according to Schatzker's classification [6]. All our patients were operated on under spinal anesthesia with antibiotic prophylaxis. Patients were positioned supine on an ordinary table. An abutment was placed on the lateral aspect of the thigh to prevent external rotation of the hip. Knee positioning devices was placed at the heel of the limb to be operated on, to maintain the knee in 90° flexion. The limb was left free to allow operative controls in extension and flexion. A tourniquet was placed at the root of the thigh. The approaches used were external Gernez, internal Gernez and anteromedial. Osteoclasis combined with screw fixation and external fixator placement was performed in some patients with tibial plateau separation; osteoclasis combined with grafting and Kerboul plate placement was performed in other patients with tibial plateau separation (see Figure 1). Osteoclasis combined with bone grafting and external fixator stabilization was performed in patients with tibial plateau separation and depression. A tibial valgization osteotomy combined with bone grafting and Kerboul plate insertion was performed for patients with varus deformity (see Table 2).

Table 2: Distribution of patients according to surgical procedure

Surgical procedure	Effectif	Percentage (%)
Tibial osteotomy of valgization + bone graft + Kerboul plate	2	4
Osteoclasis + Lift + Bone Grafting + External Fixator	4	8
Osteoclasis + screwing + external fixator	1	2
Osteoclasis + bone graft + Kerboul plaque	43	86
Total	50	100%

Closure was performed plane by plane on a suction Redon drain. The patient was positioned vertically on the third post-

operative day, after removal of the Redon drain. Early rehabilitation was offered as soon as the surgical wound had healed, if necessary. Clinical and radiological assessments were carried out on day one, day twenty, day forty-five, month three, month six, for the first year and then annually until the material was removed. Removal of the osteosynthesis material was considered after consolidation, at least one year after surgery.

Pre and post-operative functional assessment was performed by a non-operator. We used the IKS score [7] to assess functional results. The IKS-kidney and IKS-function scores were judged: excellent between 100 and 80, good between 79 and 70, fair between 69 and 60 and poor below 60. The IKS-global score was judged excellent between 200 and 180, good between 179 and 170, fair between 169 and 160 and poor below 160. The Ahlback classification [8] was used for knee osteoarthritis complications.

Data were entered and analyzed using EXCEL version 2010. SPSS version 24.0 was also used for some statistical analyses. Bivariate analyses were performed to determine correlations, using Pearson's Chi-square test and Fisher's exact test with a significance level of 0.05.

Results

Schatzker type II separation-inclusion fractures accounted for 24 cases (48%) (See Table 3).

Table 3: Distribution of patients according to initial radiological lesions

Classification of SCHATZKER	Number	Percentage (%)
Type I	5	10
Type II	24	48
Type III	6	12
Type IV	3	6
Type V	7	14
Type VI	5	10
Total	50	100

The majority of patients were managed between 21 and 30 days in 31 cases (62%), with the remainder managed between 31 and 60 days in 15 cases (30%) and after 60 days in 5 cases (10%). The external Gernez approach was used in 34 patients (68%), the anteromedial approach in 15 (30%) and the internal Gernez approach in 1 (2%).

Immediate postoperative reduction in this cohort of patients was 100% excellent. All patients achieved clinical consolidation and radiological consolidation at the osteoclastic site at final recoil. There were no cases of immediate or secondary intraoperative or postoperative complications. Three cases of late complications were recorded: two cases of knee osteoarthritis (stages I and III of the Ahlback classification) and one case of quadriceps muscular atrophy. At a mean follow-up of 56 months (8 months and 4 years), the post-operative IKS-knee score was excellent in 23 patients (46%), good in 26 patients (52%) and fair in 1 patient (2%). Postoperative IKS-function score was excellent in all patients. Post-operative IKS-global score was excellent in 19 patients (38%), good in 22 patients (44%) and fair in 9 patients (18%). For the relationship between radiological lesions and IKS-Global score, the Chi-square was 2.351 and the p-value was 0.506 (see Table 4). For the relationship between operative delay and IKS-global score, the Chi-square was 1.654 and the p-value was 0.799 (see

Table 4).

Table 4: Ratio between radiological lesions and IKS-Global score/ratio between operating time and IKS-global score

Radiological lesions and the IKS-Global score					
	Effectif	IKS Global Score			Total
		Excellent	Good	Exact	
Classification of Schatzker	Type I	3	2	0	5
	Type II	12	8	4	24
	Type III	0	4	2	6
	Type IV	0	2	1	3
	Type V	2	4	1	7
	Type VI	2	2	2	5
	Total	19	22	9	50
Operative time and the IKS-global score					
	Effectif	IKS – Global Score			Total
		Excellent	Good	Exact	
Patient Operative Time	J 21 – J 30	9	12	3	24
	J 31-J 60	7	8	5	20
	>J 60	3	2	1	6
	Total	19	22	9	50

Discussion

Delayed osteosynthesis of tibial plateau fractures is a procedure frequently encountered in our practice. These osteosyntheses require adequate preparation in order to avoid or minimize the occurrence of complications from these fractures. Ambulatory patients walking with a limp on the injured side was due to callus consolidation after three months. Separation nonunion fractures of the lateral tibial plateau (Type II of Schatzker's classification) were the most frequent radiological lesions (48%). Selim D *et al.* [9] reported a predominance of Schatzker type V (67%). The violence of the traumas in our patients was at the root of this result. The external Gernez approach was the most commonly used (68%), and osteoclasia associated with bone grafting and Kerboul plate fixation was the most dominant surgical procedure (86%). The predominance of this approach and of osteoclasia associated with bone grafting and Kerboul plate fixation in our series may be explained by the frequency of lesions of the lateral tibial plateau. This approach exposes the knee joint much more, giving the surgeon greater visibility. Postoperative IKS-global scores were excellent (38%) and good (44%), for a total of 82%. Postoperative IKS-global score was excellent or good in 64.5% [10]. Biggi F *et al.* [11] used the Rasmussen score, and the result was good or excellent in 78% of cases. Patient preparation, surgical management and follow-up enabled us to achieve this result. The Chi-square was 2.351 and the p-value 0.506 for the relationship between radiological lesions and the IKS-Global score. There was therefore no significant correlation between radiological lesions and the IKS-Global score.

The Chi-square was 1.654 and the p-value 0.799 for the relationship between operative delay and IKS-Global score. There was therefore no statistically significant correlation between operating time and IKS-Global score. Immediate postoperative reduction in this cohort of patients was excellent at 100%, with clinical and radiological consolidation achieved at the osteoclastic site at final recoil. Our results were similar to those reported by Sundararajan SR *et al.* [12], with 100% consolidation at final follow-up. Adriana M *et al.* [13] had 80% excellent postoperative reduction and 97% consolidation at final follow-up. These good results may be explained by the quality of the management and follow-up of these patients. In addition, surgical treatment enables better anatomical reduction of the malunion of tibial plateau fractures. No cases of intraoperative, immediate or early postoperative complications were recorded in our series.

However, three cases of late postoperative complications were noted, including two cases of knee osteoarthritis (stages I and III of the Ahlback classification) and one case of quadriceps muscular atrophy. Raissouni Z *et al.* [14] reported 8 cases of quadriceps muscular atrophy. Two cases of osteoarthritis were reported [15]. The quality of surgical management resulted in a low complication rate.

Conclusion

The aim of this study was to evaluate the anatomical clinical and therapeutic results of deferred osteosynthesis of tibial plateau fractures. Separation-in-set fractures of the lateral tibial plateau were the most frequent radiological lesions. The external Gernez approach was the most commonly used, and osteoclasia combined with bone grafting and Kerboul plate fixation was the most common surgical procedure. Postoperative IKS-function scores were excellent in all patients, and callus was the most common complication.

Conflicts of interest: None.

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