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Tibial Plateau Fractures: Epidemiological, Clinical, Therapeutic, and Evolutive Aspects in the Orthopedic-Traumatology Department of the Ignace Deen National Hospital

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Abstract

Introduction: Tibial plateau fractures are breaks in the bone continuity of the epiphyseal-metaphyseal cancellous bone at the upper end of the tibia, with at least one line reaching the articular cartilage.

The aim of this study was to determine the epidemiological, clinical, therapeutic and evolutive aspects of tibial plateau fractures.

Methodology: This was a 12-month prospective descriptive study conducted from March 16, 2014, to February 14, 2015, at the Ignace Deen National Hospital in Conakry. All patients admitted, treated, and followed up for tibial plateau fractures in the department during our study period were included in this study.

Results: We recorded 18 patients, representing 0.36% of consultations and 0.42% of hospitalizations. Males predominated in 83% of cases, with a sex ratio of 5. The average age was 35.5 years, with extremes of 11 and 60 years. The 21-30 age group was the most affected, accounting for 38.89%. Road traffic accidents were the most common etiological circumstances, accounting for 66%. Direct impact was the most common mechanism in 89% of cases, and closed fractures were predominant in 71.43% of cases. Unitubercular fractures were the most common in 72.22% of cases. Associated injuries were skin injuries in 16.67% of cases, ligament injuries in 16.67%, and meniscal injuries in 33.33%. Treatment was surgical in 72.22% of cases and orthopedic in 27.78%. The outcome was good in 66.67% of cases, compared with 33.33% of cases involving infection and exposure of the osteosynthesis material.

Conclusion: Tibial plateau fractures are serious joint fractures that affect the functional prognosis of the knee. Whenever possible, treatment should be surgical to allow restoration of the anatomy of the knee. The fundamental and essential step in treatment is early, careful, and diligent rehabilitation of the knee.

Keywords: Clinical; Epidemiology; Fracture; Tibial plateaus; Treatment; Joint; knee; Bone; Articular cartilage

Introduction

Tibial plateau fractures are breaks in the bone continuity of the epiphyseal-metaphyseal cancellous bone at the upper end of the tibia, with at least one line reaching the articular cartilage [1].

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They are a classic example of joint structures in the lower limbs that threaten both mobility and stability, and therefore the functional future of the knee [2,3].

Once considered rare, tibial plateau fractures are steadily increasing in parallel with advances in transportation [4].

They affect an elderly population suffering from numerous comorbidities, but also a younger population with the growing practice of high-risk sports and the resurgence of the use of two-wheeled vehicles [5].

The diversity and complexity of tibial plateau fractures have led to several classifications being proposed. Their prognosis is linked to the risk of stiffness and, above all, malunion leading to post-traumatic osteoarthritis [6].

Fractures of the tibial plateaus are common and increasingly prevalent among young adults, most often resulting from violent trauma, particularly road traffic accidents and sports accidents, which are the main causes [7].

They constitute a therapeutic emergency due to their intra-articular nature and must be treated appropriately in order to prevent the development of osteoarthritis, which is the most serious long-term complication [8].

This pathology has evolved over the last thirty years. In the literature, two main approaches are in conflict: the majority of authors currently believe that restoration of the anatomy of the knee is essential for a favorable long-term functional prognosis. This anatomical restoration most often requires osteosynthesis; Other authors, however, claim that the long-term functional outcome is not necessarily linked to anatomical reduction and that a large number of tibial plateau fractures can therefore be treated orthopedically [9].

The objective of this study was to determine the epidemiological, clinical, therapeutic and evolutive aspects of tibial plateau fractures in our department.

Materials and Methods

This was a prospective descriptive study conducted over a 12-month period from March 16, 2014, to February 14, 2015, at the Ignace Deen National Hospital in Conakry.

All patients admitted, treated, and followed up for tibial plateau fractures during the study period were included in our study.

All patients admitted for tibial plateau fractures who signed the discharge form and all patients admitted and treated for other reasons were excluded from our study.

Our variables were epidemiological (frequency, age, gender, occupation), clinical (reason for consultation, etiology, and associated injuries), paraclinical (imaging: standard radiography: front/profile and external and internal ¾), and therapeutic (surgical or orthopedic method, time to treatment, and length of hospitalization).

We classified tibial plateau fractures according to whether or not there was skin opening (open and closed fractures), then according to the DUPARC and FICAT classification (unitubular, bitubular, spino-tubular, and posterior).

All patients received medication (analgesics, anticoagulants, and/or antibiotics) and orthopedic treatment (leg and foot cast). Surgical treatment was performed under spinal anesthesia, with the patient in the supine position, a pneumatic tourniquet midway up the thigh, and a block under the ipsilateral buttock. Due to the lack of a fluoroscopic amplifier, all our osteosyntheses were performed with an open focus, and the various devices used were: cancellous screws, L-plates, T-plates, and external fixators.

All our patients who underwent surgery were given broad-spectrum prophylactic antibiotic therapy, anticoagulants, and analgesics.

The Redon drain was removed 72 hours after the procedure, the first dressing was changed on day 7 post-op, and the stitches were removed on day 14. Our monitoring parameters were: level of consciousness, condition of the dressing, local heat, temperature, blood pressure, pedal pulse, urine output, sensitivity and motor function of the toes, and follow-up X-ray.

We recorded the following complications: skin necrosis, exposure of osteosynthesis material, and infection.

Our patients were assessed according to the functional criteria of MERLE D'AUBIGNE and MAZAS based on pain, walking quality, knee mobility, and stability -Very good: no pain with normal walking quality, full extension + flexion greater than 90°, and no knee laxity.

-Good: rare and minor pain with normal walking quality or slight claudication after prolonged walking, full extension or flexion less than 20°, and slight laxity in semi-flexion.

-Average: frequent pain with limping when walking (use of a cane), unable to squat on one side, flexion at 60–90°, flexion less than 20°, and laxity in extension.

-Poor: significant pain with inability to walk or walking with two canes, flexion greater than 20° and flexion less than 60°, and severe knee instability.

Results

We recorded 18 patients, representing 0.36% of consultations and 0.42% of hospitalizations. Males predominated in 83% of cases, with a sex ratio of 5. The average age was 35.5 years, with extremes of 11 and 60 years. The 21-30 age group was the most affected, accounting for 38.89%. Schoolchildren and students were the most represented, accounting for 33.33%. Road traffic accidents were the most common etiological circumstances, accounting for 66%. Direct impact was the most common mechanism

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in 89% of cases, and closed fractures were predominant in 71.43% of cases. Unitubular fractures were the most common in 72.22% of cases. Associated injuries were skin injuries in 16.67% of cases, ligamentous in 16.67% and meniscal in 33.33%. Treatment was surgical in 72.22% of cases and orthopedic in 27.78%. The outcome was good in 66.67% of cases, compared with 33.33% of cases involving infection and exposure of osteosynthesis material (Table 1-4).

Table 1: Distribution according to the DUPARC and FICAT classification.

Types	Workforce	Percentage (%)
Uniturous fracture		
type I	4	22.22
type II	1	5.55
type III	6	33.33
Biturositarian fracture		
type I	2	11.11
type II	1	5.55
type III	1	5.55
Spinotuberous fractures		
type I		
type II	3	16.66
type III		
Total	18	100

Table 2: Distribution by type of treatment.

Treatment	Workforce	Percentage (%)
Orthopedic	5	22.78
Surgical Screw	2	11.11
L-shaped plate	5	22.78
T- Plate	4	22.22
External fixator	2	11.11
Total	18	100

Table 3: Distribution by complications.

Complications	Workforce	Percentage (%)
Exhibition of osteosynthesis equipment	3	50
Skin necrosis	1	16.67
Infection	2	33.33
Total	6	100

Table 4: Distribution according to the functional criteria of MERLE D'AUBIGNE and MAZA.

Results	Workforce	Percentage (%)
Very good	12	66.67
Good	5	27.78
Average	1	5.56
Bad	0	0
Total	18	100

Discussion

Tibial plateau fractures accounted for 0.36% of our consultations and 0.42% of our hospitalizations.

Several authors have reported the same results [10,11]. This significant frequency in our study could be explained by the anatomical position of the knee, which makes it more exposed to the trauma often suffered by road users.

Tibial plateau fractures mainly occur in the context of high-energy trauma and are more prevalent in males.

In our series, tibial plateau fractures were present in 83% of men, with a sex ratio of 5. These results are consistent with data in the literature, which show a clear male predominance [12].

However, Keating et al. [13] observed a clear female predominance among elderly subjects, at around 76%, which is partly due to bone fragility during menopause.

Furthermore, Ehliger [14] reported an equal frequency of 10 men to 10 women and a sex ratio of 1.

This male predominance in our series can be explained by the fact that men are more involved in driving motorized two-wheeled vehicles as a means of public transport and are therefore more exposed.

The 21-30 age group was the most represented in our series, accounting for 38.89%, with extremes of 10 and 60 years and an average age of 34.5 years.

According to Ehliger [14], tibial plateau fractures were much more common in young adults, with an average age ranging from 41 to 50. However, Trigo Cabral [15] stated that tibial plateau fractures are rare in young people and, in the case of high-energy trauma, these injuries fall outside the usual scope of tibial plateau fractures.

The high frequency of this age group in our study could be explained by the fact that these groups are the most active and therefore exposed to road accidents on the one hand, and on the other hand by their inexperience and tendency to take risks by driving at excessive speeds or under the influence of alcohol and/or drugs.

Traffic accidents were by far the most common cause, accounting for 66.6% of cases. Some authors [5,16,17] report figures of over 70%. KEATING [13], however, found that falls from height were the leading cause among older people.

The high frequency of traffic accidents in our study could be explained by: the increase in the number of vehicles on the road, the inadequacy and dilapidation of road infrastructure, and the dramatic increase in the number of motorized two-wheeled vehicles on the one hand, and on the other hand by poor vehicle maintenance and ignorance and non-compliance with basic traffic rules.

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In our study, direct impact was the most common mechanism, accounting for 89% of cases, compared with 11% for indirect impact. We noted a predominance of closed fractures, accounting for 83.33% of cases, compared with 16.67% for open fractures.

Karapinar et al. [18] reported similar results in their series, with 14.2% open fractures.

We observed a predominance of single-tuberosity fractures (72.22%) and 27.78% of double-tuberosity fractures.

Bejui [11] reported 58% of single-tuberosity fractures in his series.

In our study, associated injuries were cutaneous in 3 cases (50%), ligamentous in 1 case (16.67%), and meniscal in 2 cases (33.33%). For Barei et al. [19], Stannard et al. [20], the skin opening was well below 50%; ligament damage was around 10% [21,22], and meniscal damage was high, ranging from 14.28% to 40% [23,24].

We believe that systematic and rigorous intraoperative exploration should make it possible to isolate all ligament and meniscal injuries.

In our study, treatment was surgical in 72.22% of cases and orthopedic in 27.78% of cases. In surgical treatment, lateral screw plates were used in 44% of our patients. Hörmandingeret al. [25] used double screw plates in 73.2% of cases in their series.

The high frequency of surgical treatment could be explained by the fact that osteosynthesis allows, in the vast majority of cases, a stable assembly and anatomical reconstruction, enabling early mobilization of the limb, which guarantees better functional results.

Postoperative outcomes:

We recorded 33.33% infection and exposure of the material.

At a mean follow-up of 12 months, our patients were evaluated according to the functional criteria of Merle d'Aubignée and Mazas. Our results were very good in 66.67% of cases and good in 27.78% of cases. Dingamnodji et al. [24] found 45.7% very good results and 42.9% good functional results.

Conclusion

Tibial plateau fractures are serious joint fractures that affect the functional prognosis of the knee. They are most common in young, active individuals, predominantly males. Road traffic accidents are the main cause.

The treatment of tibial plateau fractures is surgical and orthopedic. Rehabilitation is a fundamental and essential step in treatment and must be early, thorough, and diligent in order to restore the knee's previous function.

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