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Research Article

Epidemiological Profile of Floating-Knees at the Renaissance University Hospital-Center in Ndjamena Survey Carried Out on About 29 Cases

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Abstract

Floating knee is a clinical entity characterized by the simultaneous existence of fractures of the femur and tibia on the same side. The aim of our study was to describe the epidemiological and clinical aspects and evaluate the functional results of patients treated for floating knee in our department at the CHUR.

Material and methods: This was a prospective and descriptive study from January 2017 to December 2022, including all patients treated and followed up for floating knee in the Orthopedic and trauma-surgery at the Department of the CHUR. The fractures were classified according to the Fraser classification. The functional and anatomical results were evaluated according to the Karlstrom and Olerud criteria.

Results: There were 29 cases of floating knee out of 1427 cases of pelvic fractures (2.03%), with 27 cases in men (93.1%) and a sex ratio of 13.5:1. The mean age was 33.3 ± 15.7 years (range: 9-70 years). The etiology was dominated by road accidents (93%), involving motorcycles and cars (55.6%). The right pelvic limb was most often affected (55.2%). There were 75.9% open fractures, mostly at the leg (68.2%). The type I fracture according to the Gustilo-Anderson classification was most common at the femur and tibia. The type I fracture according to the Fraser classification was most represented (72.4%), followed by type IIc (13.8%). Surgical treatment (93.1%) was performed using plate fixation at the femur (62.1%) and tibia (48.3%). Complications were dominated by stiffness (60%). With a mean follow-up of 32 months, the anatomical and functional results were satisfactory (excellent: 31% and good: 44.8%).

Conclusion: Floating knee is a rare and serious clinical entity. Treatment should be surgical and early.

Keywords: Fractures; Tibia, Femur; Homolateral

Introduction

Floating knee is a clinical entity first described by Blacke McBryde in 1975 to describe the simultaneous existence of fractures of the femur and tibia on the same side. This means that the knee joint is free between a femoral and tibial discontinuity. "Floating knee" is the designation of this clinical entity by English-speaking authors.

Materials and Methods

Type and Period of Study

This was a prospective, analytical and descriptive study over a period of 6 years, from January 1, 2017, to December 31, 2022.

Inclusion Criteria

We included all patients of both sexes, of all ages, treated and followed up in the Orthopedic and trauma-surgery department of the CHUR, presenting with floating knee.

Data Gathering

Data were collected using a pre-established survey form from medical records, emergency department registers, operating room registers and external dressing follow-up notebooks.

Variables Studied

1. Socio-demographic variables

Sex, age, occupation, residency, admission deadline as well as care-modes when admitted.

Clinical Variables

Circumstances, mechanisms, side affected, patient history, associated injuries.

Para-Clinical Variables

Radiological assessment only.

Classification of Injuries

The injuries were classified according to the Fraser classification meaning into 4 groups (Table 1).

Type 1	Ipsilateral non-articular fractures of tibia and femur	1
Type II-A	Ipsilateral fractures of the femur and tibia with articular involvement affecting the tibia	2
Type II-B	Ipsilateral fractures of femur and tibia with articular involvement affecting the femur	3
Type II-C	Ipsilateral fractures of tibia and femur with articular involvement affecting both the femur and the tibia	4

Table 1: Fraser classification in group study 4.

Therapeutic Variables

1. Types of clinical treatments
2. Duration of hospital overall stay

Evolutionary Variables

1. Early and late complications
2. Anatomical and functional outcomes

Functional Outcome Evaluation

We used the Karstrom and Olreud criteria to evaluate the survey outcomes.

Excellent Outcome:
- No pain - Normal walking - Return to work and exercising - No deceptive and no loss of articular mobility and exercising
Good Outcome:
- Minimal pain - Normal warlking - No work loss but less physical activity and exercising - Deceptive with angulation rotation <10° , shortening <1 cm with less mobility <20° hip and knee
Satisfactory Outcome:

- Loss of function due to pain - Limited walking distance - Work change to a less physical demanding activity - Deception with angulation or rotation <10° and <20° shortening - 1 cm and 3 cm along with mobility loss >20° and 40° hip and knee
Bad Outcome:
- Almost total loss of function due to pain - Walk with stick - Cannot stand instability - Deceptive >20°, shortening > 3 cm and loss of mobility over more than 40° at the hip and the knee

Table 2: Criteria evaluation based on Karlstrom and Olreud criteria.

Data Analysis

The data were entered and processed using Word and Excel 2019, then analyzed with the French version of SPSS software (2018). Quantitative variables were expressed as means, while qualitative variables were described in percentages.

Ethical Considerations

To carry out this study, we obtained informed consent from the patients and/or from the parents in the case of children.

Results

Epidemiologicalaspec

Frequency

Out of a total of 1,427 cases of hospitalized pelvic limb fractures, 29 cases of floating knee were identified, representing a frequency of 2.03%.

Age

The average age of the patients was 33.3 ± 15.7 years, with extremes ranging from 9 to 70 years (Fig. 1).

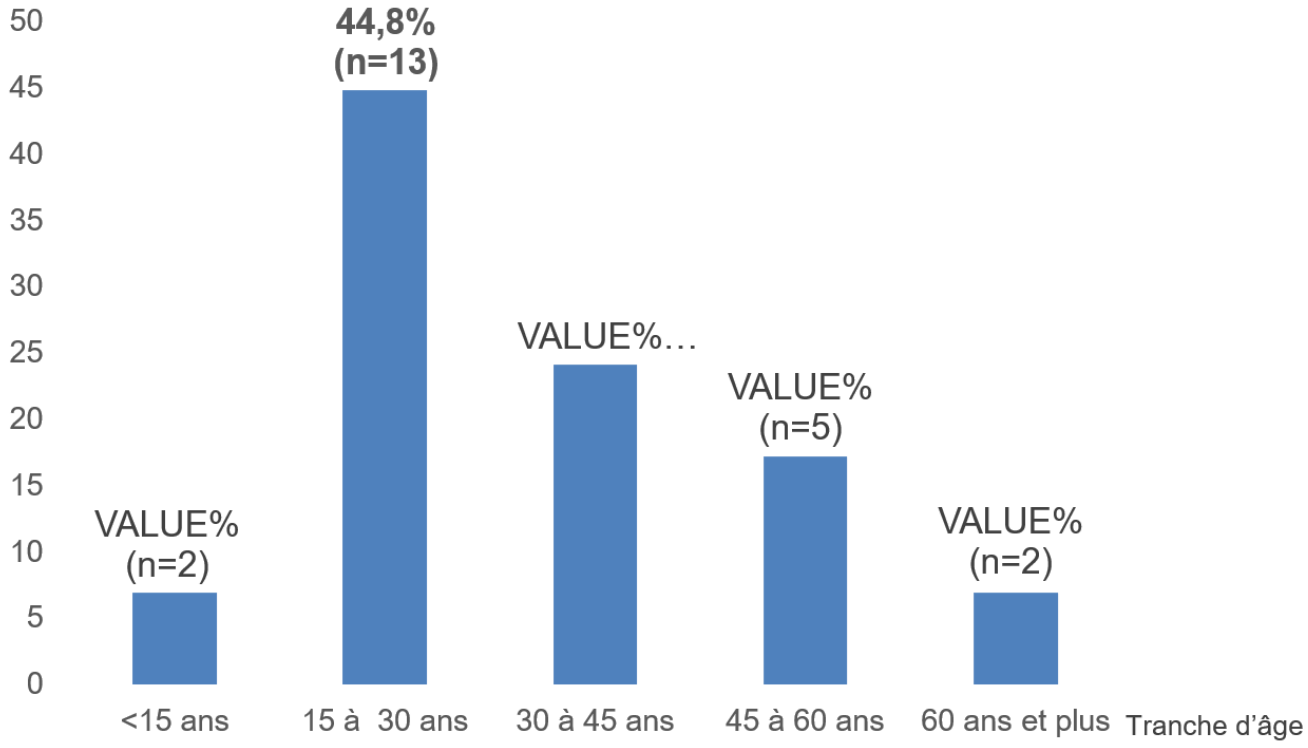

Figure 1: Patients classification per age.

A male-to-female sex ratio of 13.5 was in favor of men.

Patients Origin
Twenty-two patients (75.9%) came from urban areas, six (20.7%) from rural areas and one (3.4%) from abroad.

Mode of Admission
Sixteen patients (55.2%) were brought directly to the Emergency department of CHUR.

Time to Admission
The average time to admission was 32 hours, with extremes ranging from 1 hour to 69 hours.

Etiological Circumstances
Road traffic accidents were the cause in twenty-seven (27) patients, representing 93% of cases; while one (1) case was due to an altercation (3.5%) and one (1) case involved a firearm (3.5%).

Vehicles Involved
In 26 cases, the accident involved a motorcycle, either exclusively or in association with a car.

Clinical Aspects
Type of Injuries
Twenty-two (22) patients had open fractures, representing 75%.
The skin openings were located exclusively on the leg in 15 cases, on the thigh in 4 cases and on both the thigh and leg in 3 cases

Associated Fractures (Table 3)

Associated Injuries	Number of Injuries	Percentage
Fracture of the upper limb	7	41.10%
Contralateral femoral fracture	3	17.60%
Ipsilateral hip dislocation	2	11.80%
Ipsilateral femoral neck fracture	2	11.80%
Malleolar fracture	1	5.90%
L1 vertebral fracture and compression	1	5.90%
Fracture of foot bones	1	5.90%
Total	**17**	#######

Table 3: Distribution of patients according to types of associated injuries.

Lesional Aspects
According to the FRASER classification:
21 patients were classified as Type I and 8 as Type II (including 3 Type IIa, 1 Type IIb and 4 Type IIc).

Therapeudic Aspects
Time To Management
The average time to management of the floating knee was 10.02 ± 10.1 days, with a range from 1 to 27 days.

Treatment Provided by the Trauma-Orthopedics Department
All patients received surgical treatment, including (Fig. 2,3):
1. Plate and screws in 32 patients
2. External fixator in 17 patients
3. Intramedullary nailing in 4 patients
4. Dynamic compression plate in 1 patient

Figure 2: Osteosynthesis with plate and screws (archive photo).

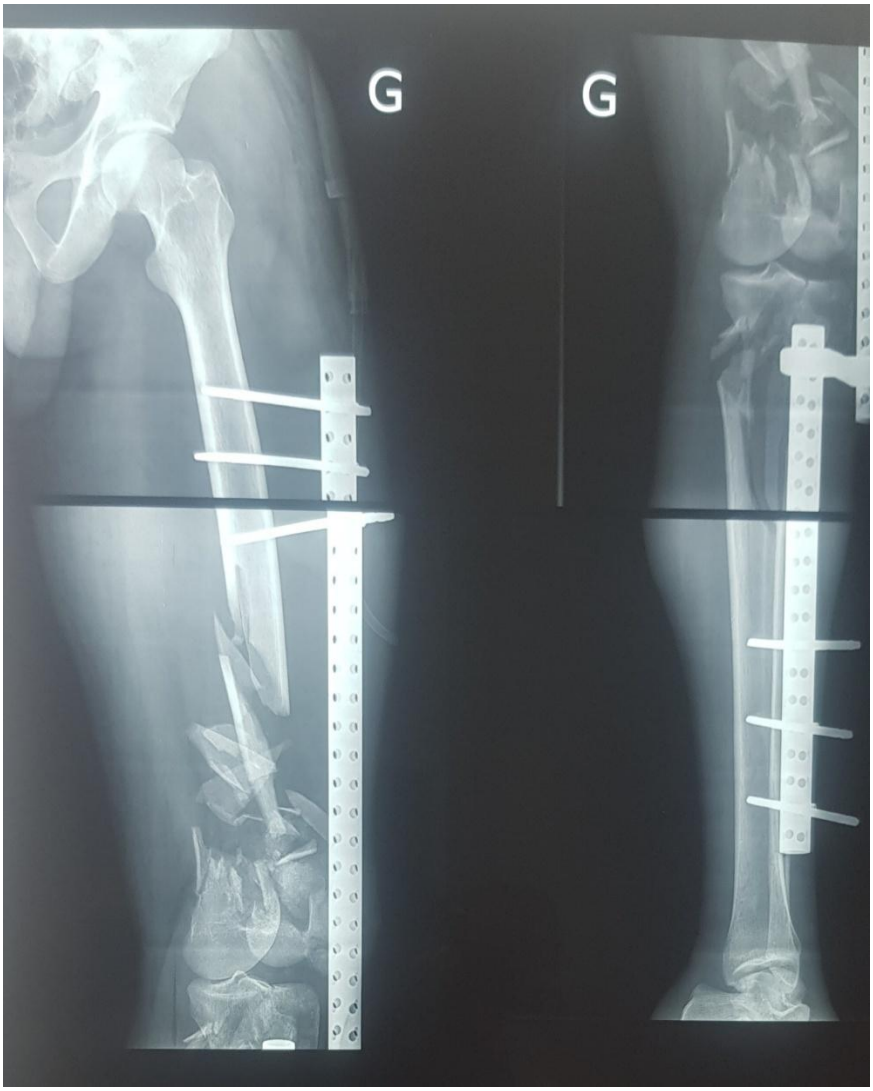

Figure 3: Osteosynthesis with external fixator (archive photo).

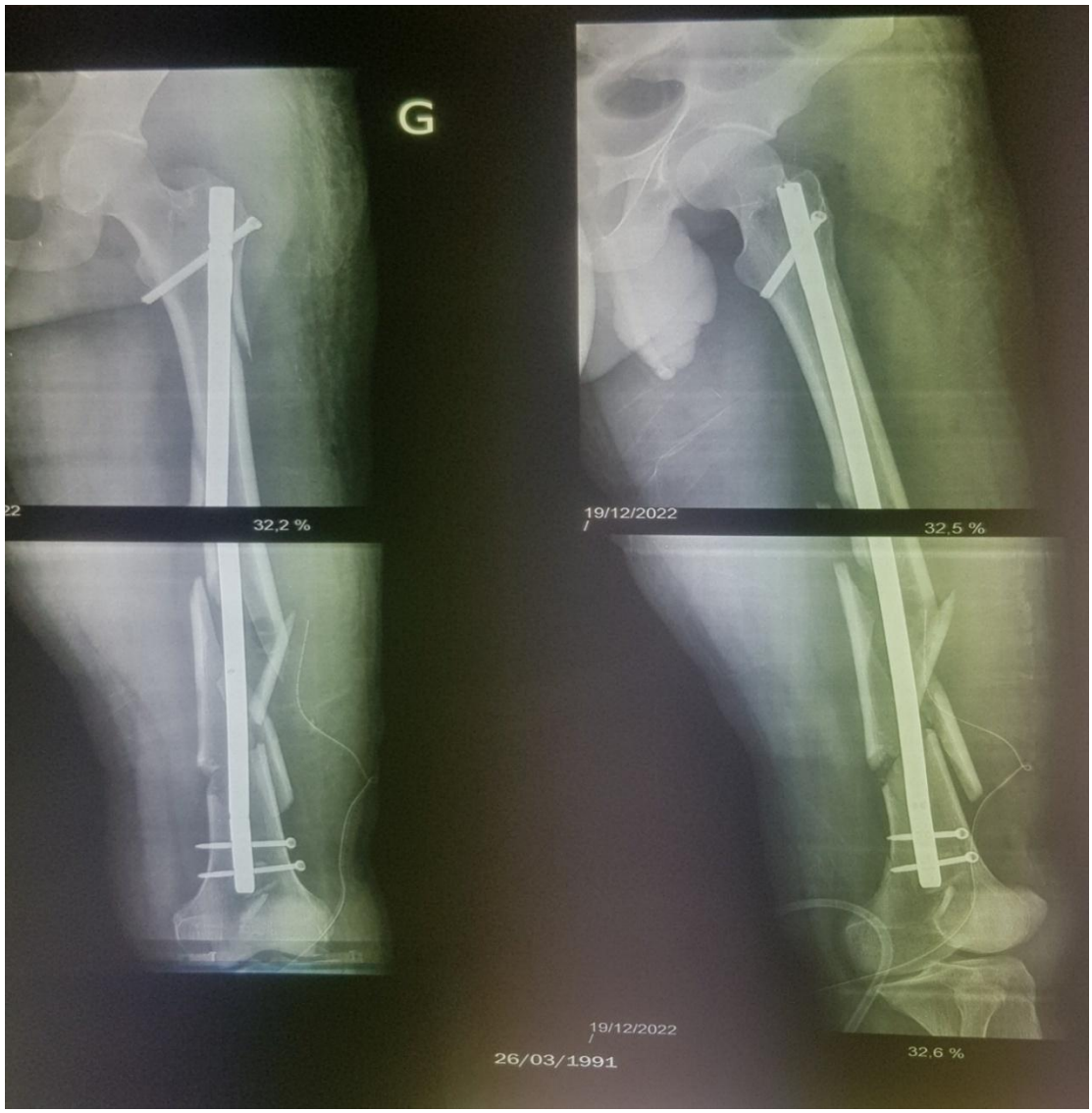

Figure 4: Osteosynthesis with intramedullary nailing (archive photo).

Discussion

The floating knee, defined as the fracture association of the femur and the ipsilateral tibia, remains an uncommon lesion entity in most African countries. Indeed, Monka [27 years old] in Congo and Essomba [5 years old] in Mali report proportions of 2.4% and 2.8% of all pelvic limb fractures. Mohammed, et al., in Niger recorded even lower frequencies of 0.47% and 1.91% [6]. In our Traumatology-Orthopedics department at the CHUR, it accounts for only 2.03% of all pelvic limb fractures. The floating knee is a serious traumatic injury resulting from high-energy trauma. In our series, the most frequent cause was road traffic accidents, most often involving motorcycle taxis, which accounted for 97% of cases.

The average age of our patients was 33 years, with a sex ratio of 13 in favor of men. This observation can be explained by the fact that this age group is the most active and therefore the most exposed to road accidents. The predominance of road traffic accidents may be due to the exponential growth in the number of two-wheeled vehicles and especially the emergence of motorcycle taxis, compounded by poor road conditions and non-compliance with traffic regulations.

Road traffic accidents are also the most frequently reported cause by other authors in Africa and elsewhere, such as Rollo and Albert. [36 years old] in Italy, Cyril [10 years old] in Burkina Faso, Mohammed [21 years old] in Niger and Essomba [28 years old] in Mali, who reported similar rates of 92.8%, 95%, 97.4% and 94%, respectively. Andrade-Silva [29 years old] in Brazil, Yadav [7 years old], Eone [31 years old], Traoré [32 years old] in Mali, Oudrhiri [30 years old], Hung, et al., [33 years old] in Taiwan (2007) and Ouédraogo, et al., also support this [7-19].

Because the floating knee usually results from high-energy trauma, it is generally associated with other injuries such as skin openings and fractures in other parts of the skeleton. Skin opening was the most frequently associated lesion in our series, affecting nearly three-quarters of the patients. Ouédraogo [34 years old] in Burkina Faso and Tékpa [38 years old] in the Central African Republic report even higher rates of 84.5% and 90%, respectively. Fraser Type I fractures were the most common in our series, representing nearly three-quarters of the cases.

Conclusion

This observation is also noted by other authors such as Traoré [32 years old], Essomba [28 years old], Mohammed [21 years old] and Yadav [7 years old]. All our patients received surgical treatment. Plate-and-screw osteosynthesis was the most commonly used surgical method for both the femur and the tibia. This allowed us to obtain a stable fixation in the majority of cases, enabling early rehabilitation. Our patients' hospital stay was relatively long, as in most African series-Mohammed, et al., [21 years old] in Niger, Monka, et al., Tékpa, Ouédraogo, Cyril, Oudrhiri, Tékpa [27,30,34,38]. Our functional and anatomical results were satisfactory in more than three-quarters of the cases according to the KARLSTROM and OLREUD criteria. Knee stiffness was the most commonly observed complication, affecting more than half of the patients in our series. Ouédraogo in Benin and Chavda reported lower proportions, with 34.4% and 41% of cases, respectively. The mixed treatment approach combining osteosynthesis and plaster immobilization was the leading cause of knee stiffness in our study. This could be explained by the fact that the limb remained immobilized for a longer period.

Conflict of Interests

The authors declare that there is no conflict of interest related to this study.

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