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Leg Fractures at the Niamey General Reference Hospital (HGR): Epidemiological and Injury Aspects

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ABSTRACT

Leg fractures are very common, accounting for 15 to 20% of all fractures [1, 2]. The aim of this study was to describe the epidemiological and lesion-related aspects of leg fractures at the referral hospital. This was a single-center, retrospective and prospective study. Patients were admitted between March 2018 and May 2020 for open or closed fractures of the tibia or both lower leg bones. The information collected included, for the epidemiological component, sex and age, and for the lesion-related component, the etiological characteristics of the fracture, medical and surgical history, admission time, clinical signs at admission, and radiological characteristics of the injuries, including injuries associated with the leg fracture. We used the Gustilo-Anderson and the Osteosynthesis Association classifications as classifications**.** During the study period, we recorded 846 admissions to the trauma and orthopedic surgery department of the HGR, 90 of which (10.63%) had a leg fracture as the reason for admission; these were the subject of our study. The average age of the patients was 34.58 years and male sex (85.6%) predominated. Women represented 14.4% of the patients. The etiologies were dominated by road traffic accidents (65.6%), which affected more young adults, women being more prone to domestic accidents. In 83% of cases, two-wheelers (motorcycles) were involved in the occurrence of leg fractures. The patient admission time was less than 12 hours. In our series, two patients had a medical history, including 1 hypertensive patient and another hypertensive and diabetic, (2.2%). Only one patient had a history of surgery (1.1%). He was operated on for a fracture of the right leg. Functional signs (pain and functional impotence) were present in almost all patients. Only 7.8% did not present deformity of the affected limb on admission. The right side was the most affected with 56.7% (n=51), its middle third (34.45%) most often; the left side was affected in 42.2% (n=38) and 1 patient with bilateral involvement (1.1%). Open fractures (24.4%) were less represented than closed fractures (75.6%) and among open fractures, 54.6% were classified as type II according to the Gustilo-Anderson classification. Types I and III represented 18.3% and 27.2% respectively (IIIA=22.7; IIIB=4.5%). The most common type of displacement was overlapping, and according to the Osteosynthesis Association (AO) classification, type 42A3 was the most common, with 32.22% (n=29). Femoral injuries had the highest incidence of associated injuries. Conclusion: In the Orthopedic and Trauma Surgery Department of the HGR, leg fractures were more common in young males with road traffic accidents. Patient admission times varied considerably. Open fractures were less common and were dominated by type 2 fractures according to GA. Type 42A3 of the AO classification was more common, and the most frequently identified displacement was overlapping.

INTRODUCTION

Leg fractures are very common and represent 15 to 20% of all fractures [1, 2]. These fractures predominate in subjects aged 18 to 40. The diagnosis is most often obvious, confirmed by X-rays. It is necessary to know how to choose an attitude, judge it on its results and trust it. [3] The epidemiology of fractures is evolving rapidly. It varies from one country to another because of differences in culture and lifestyle [9 10]. Several pidemiological and injury studies have been conducted in developed countries [4, 5, 6, 7] and in developing countries [8, 9, 10, 11]. In this influx, leg fractures occupy a prominent place with 21–29% of all casts performed in the plaster room of Gabriel Touré Hospital in 2006 [3]. In France, they occupy the first place among all traumas with a frequency of 25% [1].

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The leg is the most frequent location of open fractures in adults [12] due to the subcutaneous location of the medial aspect of the tibia. Leg fractures are secondary either to low-energy trauma, without associated soft tissue injury, or to high-energy trauma, where the severity is primarily related to soft tissue injury. [13] They are generally serious and most often occur after a road traffic accident [2], which is generally the leading cause of leg fractures. The severity of a leg fracture is not due to the fracture lesion, but to immediate (cutaneous or vascular), secondary, or delayed complications. [13]. Knowledge of the epidemiological profile of these injuries in our workplace could help with treatment planning, priority setting, and understanding these complex injuries [3,8]. The aim of this study was to describe the epidemiological and lesion-related aspects of leg fractures at the Niamey Higher Regional Hospital (Niger).

PATIENTS AND METHODS

This is a retrospective and prospective, descriptive, single-center study conducted in the Trauma and Orthopedic Surgery Department of the Niamey General Referral Hospital over a period from January 2018 to May 2020. The Niamey General Referral Hospital is a 4th-level referral hospital located in the Tchangarey district of Niamey, the capital of Niger. Its core missions include: Providing quality care and services to the Nigerien population; Participating in research in all areas of health; Serving as a referral center for other 3rd-level health facilities in the country; and Providing tertiary care and services to outpatients and inpatients. The orthopedics-traumatology department that served as our study setting has a capacity of 37 inpatient beds and a nursing staff composed of: Three (3) orthopedic surgeons, One assistant surgeon, Four (4) paid interns, Thirteen (13) independent agents, Three (3) laborers. The fractures were diaphyseal, extra-articular, and recent of the tibia or both leg bones. Patients consented. We did not include patients diagnosed with pathological fractures, neglected fractures, or incomplete records. Information collected from patient records included age, gender, circumstances, type of collision in the case of a road traffic accident, admission time, injured side, type of fracture, description of the skin opening and associated injuries, and radiological characteristics of the fractures. The fractures were classified according to the AO19 classification. Skin opening was described according to Gustilo and Anderson. Data analysis was performed using Excel version 2016 software. The mean and standard deviation were used to describe quantitative variables. An association between variables was made with the Chi-square test followed by the p-value in order to determine risk factors. The significance threshold was set at a p-value < 0.05. Statistical analyses were performed with a 95% confidence interval.

RESULTS :

Of the total number of patients admitted to the trauma-orthopedic department of the general referral hospital, we recorded 90 leg fractures during our study, representing a frequency of 10.63%. The mean age was 34.58 years ± 15.299, with a range of 3 to 75 years (Table 1). We found 77 male patients, or 85.6%, and 13 female patients, or 14.4%. The sex ratio (males/females) was 5.92. Most of them were civil servants, with 15.6% (Figure 1). Public road accidents were the most observed circumstances of occurrence (65.6%). Among public road accidents, car-motorcycle accidents were the etiology of the leg fracture in 21 patients, i.e. 35.6%, followed by motorcycle-motorcycle accidents in 14 patients (23.7%) (Tables 1 and 2). The fracture mechanism was direct in 62 patients, or 68.9%, and 28 patients had leg fractures by indirect mechanism, or 31.1% (Figure 2). In our study, two patients had a medical history, including one with hypertension and another with hypertension and diabetes, representing 2.2%. Only one patient had a history of surgery, representing 1.1%. He underwent surgery for a right leg fracture, and all patients in the series presented with pain and functional impairment in the affected pelvic limb upon admission. The right side was most affected, with 56.7% (n=51), the left side being affected in 42.2% (n=38), and one patient with bilateral involvement, representing 1.1%. (Figure 2) The time to admission was less than 12 hours in the majority of patients, representing 58.9%. The mean time to admission was 11.42 hours, with a range of 30 minutes to 6 days. (Table 4) The overwhelming majority, 92.2% (n=83), of patients presented with a deformity. Among the 90 cases studied, skin opening was observed in 22 patients (Figure 3) or 24.4% and more than half of the skin openings were classified as type 2 according to the Gustilo-Anderson classification, or 54.5%. Most patients with type 2 skin opening had a direct mechanism (Table 5). The majority of patients had no associated lesion, or 81.1%. However, femur involvement was common with 7.8%. Middle third leg fractures were the most common, accounting for 24.4%. Most patients had a diaphyseal fracture with a transverse line, thus being classified as 42A3, (30.7%); most male patients were at stage 42A3, with 24 cases (Table 6). Most patients aged 21-30 years were stage 42A3 with 14 cases (Table 7) and were male. In our series, 70 patients had displaced fractures, either patients or 77.7%. Overlapping was the most represented type of displacement with 57.14% (n=40). (Table 8)

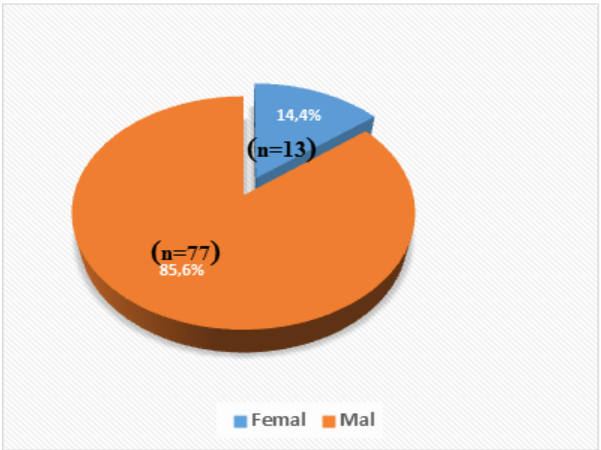

Figure 1: Distribution of patients by sex

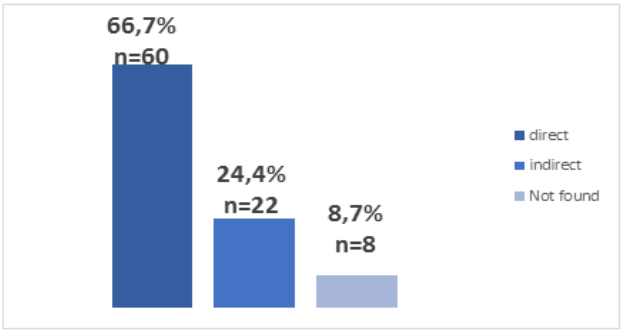

Figure 2: Distribution of patients according to fracture mechanism

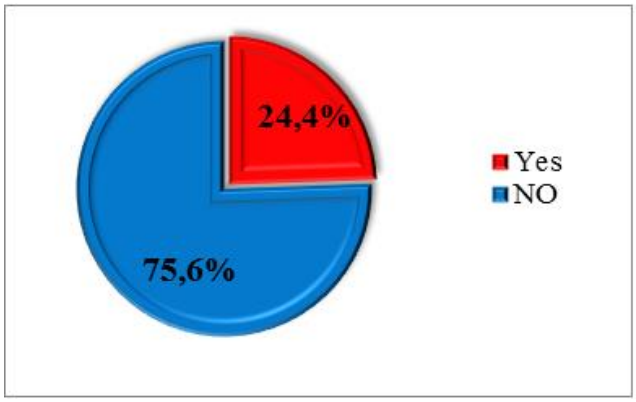

Figure 3 : Distribution of patients according to the presence or absence of skin opening

Table 1 : Distribution of patients by age

Age (years)	Number	Percentage
0-10	7	7,8
11-20	6	6,7
21-30	29	32,2
31-40	19	21,1
41-50	14	15,6
51-60	12	13,3
>60	3	3,3
Total	90	100,0

Table 2 : Distribution of patients according to the circumstances of occurrence of the fracture

Circumstances of occurrence	Number	Percentage
ACR	59	65,6
Fall	15	16,7
Sports accident	8	8,9
Work accident	3	3,3
Firearm	3	3,3
Domestic accident	1	1,1
Non-traumatic (pathological bone)	1	1,1
Total	90	100,0

Table 3 : Distribution of patients according to the type of ACR

Type d'ACR	Number	Percentage
Car-motorcycle	**21**	**35,6**
Motorcycle-motorcycle	**14**	**23,7**
Motorcycle knocked over	**12**	**20,3**
Car-pedestrian	**5**	**8,5**
Car knocked over	**4**	**6,8**
Motorcycle-pedestrian	**2**	**3,4**
Car-car	**1**	**1,7**
Total	**59**	**100,0**

Table 3 : Distribution of patients according to the type of ACR

Type d'ACR	Number	Percentage
Car-motorcycle	21	35,6
Motorcycle-motorcycle	14	23,7
Motorcycle knocked over	12	20,3
Car-pedestrian	5	8,5
Car knocked over	4	6,8
Motorcycle-pedestrian	2	3,4
Car-car	1	1,7
Total	59	100,0

Table 4 : Distribution of patients according to admission time

Admission time	Number	Percentage
<12 hours	53	58,9
12-24 hours	7	7,8
>24 hours	8	8,9
NA	22	24,4
Total	90	100,0

Table 5: Relationship between skin opening and mechanism

Skin Opening	Mechanisms		Total
	Direct	Indirect	
Type 1	4	0	4
Type 2	11	1	5
Type 3a	3	2	11
Type 3b	1	0	1
Type 3c	0	1	1
Total	18	4	22

Table 6: Relationship between AO classification at the tibial level and sex

Anatomy and Pathology (AO Classification)	Gender		Total
	Female	Male	
41A1	0	2	2
41A2	0	3	3
41A3	0	1	1
41B1	1	3	4
41B3	0	1	1
41C3	0	1	1
42A1	2	6	8
42A2	0	6	6
42A3	3	26	29
42B2	1	5	6
42B3	0	3	3
42C2	2	2	4
42C3	0	13	13
43A1	2	3	5
43A3	0	1	1
43B1	1	2	3
Total	12	78	90

DISCUSSION:

This study aims to describe the epidemiological aspects of leg fractures at the Niamey General Hospital. Leg fractures accounted for 10.63% of hospitalizations in the Orthopedic and Trauma Surgery Department of the General Hospital. This frequency reflects the public health problem that leg fractures represent in our practical context. In the same context, this frequency varies between 15 and 20% of all fractures. [1, 2] Young male subjects are primarily affected by leg fractures in our series, as in those of OMAR Keita, DRISSA D, and YAO M et al., who successively reported age ranges of 16-30 years,

21-30 years, and for the latter, a mean age of 30 +/- 32 years. Men were more affected, with 86.6% and 14.4% for women, with a sex ratio (MALE/FEMALE) of 5.92. This same male predominance has been found by some authors in the literature, such as LEMERRINII and ZEROUK Soumiya, with 82% and 76%, respectively. Motorcycle drivers are generally young adult males 4, 11. Motorcycles are involved in most road traffic accidents, which are the main etiologies for leg fractures. Road accidents were the most observed circumstances of occurrence in our series, at 65.6%, and in 83% of cases, two-wheelers were the cause. Authors have already reported this etiology as the main cause of leg fractures, such as MARUIS MK (95%), BERREDA MA (80%), MIDOUNE M (67%), and GUEYE (65%). Motorcycle drivers are vulnerable. Their legs are exposed to impact during collisions. These road users do not respect the highway code and do not have a driver's license (14). Their educational level was low. In our series, the right side was most often injured (56.7%), a characteristic proven in the literature by the series of DIOA, SECK, and BERREDA MA (51%, 51%, 59%). This could be explained by the fact that most people tend to lean on the right pelvic limb during accidents, which, remember, involve two-wheeled vehicles, with maximum leg vulnerability. Our study found that the time to admission was less than 12 hours in the majority of patients, or 58.9%. The average time to admission was 11.42 hours, with extremes ranging from 30 minutes to 6 days. The wide variation in admission times for leg trauma victims could be explained by the fact that some patients spend time in peripheral health centers in the capital and in regional hospitals in the interior of the country before being referred to the HGR, while others attempt self-indicated, generally traditional, home treatments before being admitted to a health center. Closed fractures accounted for 75.6% (n=68) of cases, compared to 24.4% for open fractures (n=22). According to Gustilo-Anderson, type I fractures accounted for 18.3%, type II fractures dominated with 54.5% of cases, and type III represented 27.2% of cases. The same predominance of type II was reported by BERREDA MA (23.52%), TOURE et al (47.05%), and DJOUBALO Traoré (48.84%). The fracture line was located in the middle third of the leg in the majority of cases. This characteristic was already common in series reported in the literature (FARIJ - 43.18%; AHMED and AL - 63.6%; MADOUGOU and AL - 29.3%). This predominant involvement of the middle third could be explained by the existence of a zone of weakness in the anatomical structure of the tibia; the latter, it should be remembered, constitutes the largest bone in the leg. According to the AO classification, type 42A3 (32.22%; n=29) was more represented in our series; some authors in the literature report the predominance of other types (AMOUSSOU and AL - 35.6% of A1 and 14.8% of A3; BERREDA MA - 18% of A2). In 57.14% of cases (n=40), displaced fractures were overlapping, with angulation in 11.43% of cases (n=8); 28.57% (n=20) presented translation, and 2 patients (2.86%) presented rotations. This aspect has already been studied in the literature, as is the case in the series by Djoubalo Traore, who found 22.9% overlap, 4.65% angulation, 16.28% rotation, and 56.98% translation. Zerrouk Soumiya found that displacement was overlapping in 46.15% of cases. The displacement was translational in 25%, rotational in 3 cases,na percentage of 5.77%, angulation in 11.54%, association in 1 case, a percentage of 1.92% and no displacement in 5 cases, a percentage of 9.61%.

CONLUSION

In this study, lower leg fractures were common in young adult males who were victims of road traffic accidents. Motorcycle accidents were the most common etiology of these fractures. Type A fractures predominated and were most often located in the middle third of the tibial shaft. Type II and III open fractures were the most common. Patients were admitted late and often had no associated injuries.

REFERENCES

1. D le Nen Open Leg Fractures: Twenty Years of Experience in Internal Fixation and Flap Surgery; e-Memoirs of the French National Academy of Surgery, 2011, 10 (1) p: 025-032
2. Kihal M. Open Leg Fractures (Signs, Diagnosis, and Treatment); http.EMconsult.com (Google accessed 4-4-2020) P: 1, 2, 4, 5, 6, 7, 9
3. Court-Brown C M, Rimmer S, Prakash U, McQueen MM. The epidemiology of open long bone fractures. Injury1998; 29:529-34
4. Court-Brown C M, Caesar B. Epidemiology of adult fractures: A review. Injury 2006; 37:691-7.
5. Court-Brown CM, Bugler KE, Clement ND, Duckworth AD, McQueen MM. The epidemiology of open fractures in adults. A 15-year review. Injury 2012; 43:891-7.
6. Court Brown CM, McBirnie J. The epidemiology of tibial fractures. J Bone Joint Surg1995; 77B:417-2.
7. Peres Arruda LR, de Campos Silva MA, Galves Malerba FG et al. Open fractures: prospective and epidemiological study. Acta Ortop Bras 2009; 17:326-30.
8. Saied AR, Mobarake MK. Epodemiology of extraarticular tibia fractures, Shahid Mohammadi hospital -Bandar Abass 6 Iran 2002, 2003. J Appl Sci 2007; 7:3823-6.
9. Amin MQ, Ahmed A, Imran M, Ahmed N, Javed S, Aziz A. Tibial shaft fractures Epidemiology. A 5-year study in Ghurki Trust Teaching Hospital, Pakistan. Professional Med J 2017; 24:75-81.
10. Madadi F, Farahmandi, Eajaz A et al. Epidemiology of adult tibial shaft fractures: A 7-year study in a major referral orthopedic center in Iran. Med Sci Monitor 2010; 16:217-22
11. AMZA MA. Management of Traumatic Fractures of the Leg Shaft in the Surgical Emergency and Trauma-Orthopaedic Surgery Departments of the National University of Niamey. Medical Thesis, UAM-Niamey. 2018 P: 92-100
12. Merle D'aublgné R. Leg Trauma. In: New Guide to Surgical Pathology. Paris: Masson; 1995: 639-50.
13. Madougou S, Chiglo PS, Tchomtchoua AS, et al. Incidence and Impact of Road Accidents Among Motorcycle Taxi Drivers in Tropical Environments. Rev Chir Orthop 2016; 102:211-4.