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Epidemiological profile of leg fractures due to road traffic accidents (RTA) at Owendo University Hospital

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Abstract

Road traffic accidents (RTA) have been heavily implicated in the occurrence of leg fractures, especially in low-income countries due to poor road conditions. In Gabon, few studies concern leg fractures in relation to CA. Thus, a prospective, descriptive, analytical, monocentric study was carried out. Statistical analysis was performed with SPSS version 24 software. The significance threshold was set at 5%.

A total of 64 patients including 39 men and 25 women. The age group of [25-64 years] were the most represented (75%) with an average age of 33.58 years. 83% received in emergencies lived in urban areas. In 72% of cases, RTAs were caused by light vehicles. 84% of patients had suffered direct trauma. Closed fractures were the majority (62%) and the majority of open fractures were Cauchois 2 type openings. (%), and unique in 55% of cases. During fibular injuries, the middle third was the most affected (59%), the fracture line was most often transverse, i.e. 38%, and unique in 24% of cases.

Ultimately, leg fractures due to RTA have a prevalence of 42.7%. Closed fractures are more representative than open fractures. It is a fracture which concerns the young adult in full activity.

Keywords: Road traffic accidents (RTA), leg fracture, light vehicles, tibial injuries, fibular damage

Introduction

Leg fractures are solutions of continuity of the diaphysis of the tibia and/or the fibula. They are included between an imaginary horizontal line passing immediately below the anterior tibial tuberosity, under an imaginary line passing horizontally a few centimeters above the tibiotarsal joint [1]. Traumatology in Africa and in the world is dominated by fractures with a prerogative pushed for those of the extremities of the limbs [2, 3]. With 15 to 20% of all fractures according to Merle d'Aubigné [4], leg fractures are the most frequent in the lower limb in France. The exact incidence of road traffic accidents responsible for leg fractures is difficult to obtain, but some details allow us to have a projection of it. About 30-86% of trauma received in hospitals in Africa is due to RTAs, with Côte d'Ivoire and Nigeria holding the records [5]. Road traffic accidents have been reported as a cause of these fractures especially in low-income countries [6]. The damage caused is physical, social and financial, harming the victims, their families, the insurance companies and the government [7]. These fractures predominate in young adults in full activity and constitute a traumatological emergency especially when the fracture is displaced with a cutaneous opening or a threat of opening. The prognosis is thus linked both to the lesional assessment and to the iatrogenic complications of inappropriate treatment. According to the WHO, throughout the world, RTAs have been heavily implicated in the occurrence of leg fractures, especially in low-income countries because of poor road conditions [6]. In Gabon, few studies concern leg fractures in relation to RTA, the incidence is not known. Given the frequency of this pathology and given the importance of its management in the emergency room, we were motivated to study this subject.

Material and Methods

Study framework

We carried out our study at the CHUO located in the town of Owendo south of Libreville, in the Akournam II district.

The CHUO was inaugurated on July 8, 2016 by the presidential couple, with the aim of having a specialized and even hyper-specialized unit in orthopaedics-traumatology for specialized management of all these pathologies referring to it as well as the maxillofacial disease-facial.

Type of Study

We carried out a prospective, descriptive, analytical, single-centre study over a period of 11 months from January 1, 2022 to November 1, 2022.

Inclusion and non-inclusion criteria

We included in our study all patients presenting to the traumatological emergencies of the CHUO for a leg fracture after RTA. Were excluded all patients consulting for leg fractures due to another cause

Data collection

The data was collected from patients consulting in the emergency department of our hospital who met the inclusion criteria for our study, namely a fracture of one or both bones of the leg during an RTA, the data were recorded on a pre-established form, the data could be supplemented by a telephone call thanks to the various contacts mentioned in the medical files. The data collected was recorded on an individual sheet previously designed and validated by our masters. The parameters studied appear in the data collection sheet appended to this work. The patients hospitalized during the consultation carried out by the emergency doctors were regularly seen to obtain new information and note the elements of their evolution. Patients treated on an outpatient basis received telephone calls to note possible post-consultation and treatment events, some of them were seen again during the last consultation attesting to their recovery.

Statistical analysis

Data were entered using Excel 2019 software. Statistical analysis was performed using SPSS version 24 software. Categorical variables were expressed as a percentage and quantitative variables as mean and standard deviation. The association between qualitative variables was assessed by the Chi2 test (or Fisher test for small numbers). The significance threshold was set at 5%. A multivariate analysis, by descending logistic regression step by step, made it possible to determine the results of our specific objectives fixed after selection of the significant factors at the threshold of 20% in

the bivariate analysis.

Results

We collected a total of 64 patients, namely 39 male participants and 25 female participants, with an M/F ratio: 1.56 in favour of the male sex. Patients in the 25 to 64 age group were the most represented, at 75%. The average age was 33.58 years with extremes between 6 and 63 years. The majority of patients in our study were unemployed, ie 22% of the study population. The majority of patients had no medical history, and represented 88% of patients (Table 1).

Among the different patients, single people represented 44% of the total study population, making them the most represented in this category. The patients seen in the emergency room resided most in urban areas, either greater Libreville or the other towns around them, and represented 83% of the study population. Patients from rural areas were those coming from outside Libreville and all of them, or 17%, from a landlocked area. Light vehicles were the most incriminated in the RTA in our study, up to 72%. The patients in our study had suffered direct trauma up to 84%. The majority of patients were hospitalized for better management of their traumas and represented 62% of the study population. The majority of patients had no surgical history, representing 58% of the population (Table 2).

Closed fractures were the majority at 62%, followed by closed fractures at 34%. The right side was the most affected side at 56%, and the majority of open fractures were Cauchoux-type openings 2. Cranial lesions were the most represented when there was an association lesion, and the majority of patients had a Glasgow coma score greater than 13, i.e. 83% of patients (Tables 3).

The majority of the patients had carried out an X-ray and biological examinations, that is to say, 88% of the study population. During tibial damage, the middle third was the most affected at a rate of 49%, the fracture line was most often transverse, i.e. 40%, and the fracture line was unique in 55% of cases, thus giving 2 fragments represented by the same percentage, the displacement was more represented by a translation, i.e. 47%.

During fibular injuries, the middle third was the most affected at 59%, the fracture line was most often transverse at 38%, and the fracture line was unique in 24% of cases. The majority of fibular lesions resulted in 2 fragments, i.e. 72% of the total lesions of this bone, and there was generally no displacement (41%) (Table 4).

Table 1: Distribution of patients according to sex, age groups, profession and medical history

	Settings	Not	%
Sex	Feminine	25	39.0
	Male	39	61.0
Age range	[6-17]	8	12.0
	[18-24]	8	12.0
	[25-64]	48	75.0
Occupation	Trader	12	18.8
	Pupil	10	16.0
	Entrepreneur	13	20.0
	Student	6	9.4
	Official	9	14.0
	Without	14	22.0
Medical history	None	56	88.0
	Diabetes	4	6.2
	High blood pressure	4	6.2
Total		64	100

Table 2: Distribution of patients according to their marital status, area of residence, machine involved in the accident, mechanism, hospitalization, habit and lifestyle and surgical history.

Settings		Not	%	95% CI
Status Matrimonial	Bachelor	28	44.0	31.6 - 56.7
	Cohabitant	16	25.0	15.4 - 37.7
	Married	18	28.0	17.9 - 41
	Widow	2	3.1	0.5 - 11.8
Residence area	rural	11	17.0	9.3 - 29.1
	Urban	53	83.0	70.9 - 90.7
gear implied In the accident	Motorbike	11	17.0	9.3 - 29.1
	weight vehicle _ light	46	72.0	59 - 82.1
	weight vehicle _ AVERAGE	7	11.0	4.9 - 21.8
Mechanism	Direct	54	84.0	72.7 - 91.9
	Indirect	10	16.0	8.1 - 27.3
Hospitalization	No	24	38.0	26 - 50.5
	Yes	40	62.0	49.5 - 74
Habit and life style	Alcohol	36	56.0	43.3 - 68.4
	Alcohol-tobacco	10	16.0	8.1 - 27.3
	None	18	28.0	17.9 - 41
Background Surgical	No	58	91.0	
	Yes	6	9.4	

Table 3: Distribution according to the type of fracture, the side affected, the type of opening, the types of associated lesions and the Glasgow coma score

Variables		Not	%
Type of fracture	Farm	40	62.0
	Closed / open	2	3.1
	Opened	22	34.0
Coast hit	Bilateral	2	3.1
	LAW	36	56.0
	LEFT	26	41.0
Type of opening	Cauchoix 1	5	7.8
	Cauchoix 2	12	19.0
	Cauchoix 3	9	14.0
	Not opened	38	59.0
Lesions associated	Osteoarticular	6	9.4
	Cranial	11	17.0
	Thoracic	1	1.6
	Abdominal	2	3.1
	None	44	69.0
Glasgow Coma Score	< 7	2	3.1
	7-13	9	14.0
	> 13	53	83.0

Table 4: Distribution according to tibial and fibular involvement.

Settings	Achievement tibial		Achievement fibular			
	Not	%	Not	%	%	
Fracture site	Lower tier	14	23.0	Lower tier	10	26.0
	middle tier	30	49.0	middle tier	23	59.0
	Middle-tier / lower tier	2	3.3	Upper Tier	6	15.0
	Upper Tier	12	20.0			
	Upper-tier / middle tier	3	4.9			
Line of the fracture	butterfly wing _	1	1.7	Complex	4	10.0
	Complex	7	12.0	Oblique	10	26.0
	Oblique	13	22.0	Spiroid	10	26.0
	Spiroid	15	25.0	transverse	15	38.0
	Transverse	24	40.0	Unique	24	62.0
Number of lines	Double	14	23.0	Double	9	23.0
	Multiple	13	22.0	Multiple	6	15.0
	Unique	33	55.0	Unique	24	62.0
Shift	Angle	3	5.0	Angle	12	31.0
	Angulation, overlap	3	5.0	Overlap	3	7.7
	Overlap	5	8.3	Spin	1	2.6
	Translation	28	47.0	Translation	7	18.0
Number of fragments	No	21	35.0	No	16	41.0
	1	3	5.0	1	1	2.6
	2	33	55.0	2	28	72.0
	3	14	23.0	3	4	10.0
	>= 4	10	17.0	>= 4	6	15.0

Discussion

Patient frequency

In total during the period of our study, we collected 64 years old patients with leg fractures due to RTA, out of a total of 150 patients with leg fractures during the same period, giving a frequency of 42.7%. This frequency is lower than that of several authors, notably in the study by Mbouopda and collaborators in Mali ^[8], which found a frequency of 84.6%. These results can be explained by the difficulty of returning patients (discharges against medical advice) and non-compliance with appointments for those who are referred to specialists.

Sex and age

We collected a total of 64 patients over a period of 10 months, these patients were mainly men, namely 61%, with a sex ratio M/F: 1.5:1, and an average age of 33.56 years. These results corroborate with those found by Palle John Ngunde and collaborators in a prospective study over 03 months concerning 411 patients carried out in the northwest of Cameroon which found a ratio of 1.4: 1 in favours of men and an average age of 33.30. (+/- 16.04) ^[9].

Occupation

Patients without professions represented 22% of the population of our study, followed by entrepreneurs who represented 20%. These results are contrary to those found in a study carried out in Ethiopia, on the characteristics of victims of AVP, finding 41.3% of daily workers as victims ^[10]. The results of this study concerning the involvement of pupils in RTAs are on the other hand similar to ours, namely 12.2% in our study and 16% in theirs. These results can be explained firstly by the overall size of the population, which is larger in this country, and also by the absence of consideration of the very young population in their study. The pediatric population is little represented in our study surely by the presence of a hospital dedicated to the mother and the child in the capital Libreville and having a pediatric traumatology service.

Causal gear

The machines involved in RTA were most represented by light vehicles responsible for 46% of injuries. Results corroborating several studies where vehicles remain the leading cause of trauma in RTA ^[6, 11]. These results are also related to the type of vehicle fleet in the country, because motorcycles are more represented in countries where their fleets are larger, such as Nigeria, Burkina Faso, or Iran. RTAs still remain for many a problem of developing and underdeveloped countries.

Type of fracture

The patients collected in our study presented the most closed fractures, namely 40%, a result corroborating those found in Nigeria ^[12] with 63.1% of closed fractures found, moreover, these results are contrary to those found by Manga Otomba JDD and collaborators ^[13] in Congo, finding 57% of open fractures with several other authors corroborating their results, which can be explained by motorcycles being the most represented as the causal agent of trauma.

The affected side was the right leg the most in our study at 36%, a result contrary to those of Mehmet Ata Gokalp and collaborators in Turkey ^[14] who rather found left involvement at 46.6% without valid reason and significance, explaining that some authors attribute to the left foot the support foot for

walking.

Cranial lesions were mainly found in our study at 11% when there was a lesion associated with leg trauma. Result corroborating the majority of studies such as that of Maga Otomba JDD and collaborators ^[13] with 42% cranioencephalic involvement, Tekpa BJD and collaborators ^[15] in Bangui with 53.66% the majority with good clinical evolution.

Concerning bone damage, tibial damage was the most represented in our study, the characteristics of tibial and fibular damage were mainly damage to the middle third in terms of seat and a transverse fracture line. These results are comparable to those of Nouhoum A Diallo and collaborators ^[16, 17], explained by a closer anatomical proximity between the 02 bones at their middle part, thus, a shock at this level having more chance to concern the 02 bones rather than just one.

Conclusion

Leg fractures by RTA are a frequent reason for consultation in traumatological emergencies. Our prospective study aimed to determine the hospital incidence of leg fractures due to CA. Our study led to the following conclusions; with a frequency of 42.7%, fracture due to RTA is a frequent fracture in the department. And there are more closed fractures (62%) than open fractures (38%). It is a fracture that concerns the young adult in full activity

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Declarations

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Conflict of interest: The authors have no conflicts of interest to declare.

Ethical approval: Authorization for the study was obtained from the competent authorities of the CHUO, as well as the head of the orthopaedic-traumatology department of the said hospital. Provisions have been made for the implementation of the study to guarantee confidentiality. The consent of the patients or their families in the event of their incapacity was given. Patient anonymity was respected.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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