

Trauma Emergencies at University Hospital of Brazzaville, Congo

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Abstract

Background: Trauma is the main reason for consultation in the emergency unit. They deserve particular attention in the Congo where road accidents and violence of all kinds are increasingly observed. **Methods:** This study who carried out in the surgical emergencies at the University Hospital of Brazzaville, aims to analyze the epidemiological and etiological aspects, the anatomical lesions encountered; to describe their management, as well as to evaluate the induced mortality while emphasizing their place in all surgical emergencies. The prospective and analytical study included 2127 patients admitted to a traumatic emergency unit from January 1 to June 30, 2018. Medical records served as data sources. The measure of trauma severity was determined using Champion's Trauma Score. The epidemiological, clinical and therapeutic parameters were studied. **Results:** The population most affected was adolescents and young adults (mean age, 27.3 years) with a male predominance: 1318 men (*i.e.* 61.9%) for 809 women (*i.e.* 38.1%). Road accidents ($n = 819$, or 38.5%) were the main cause of injuries, followed by violence ($n = 702$, or 33%) and falls (27.3%). The skull, limbs, thorax and abdomen are the main targets. The most observed lesions were limb fractures ($n = 344$, *i.e.* 16.1%), intracranial hematomas and contusions ($n = 315$, *i.e.* 14.8%), thoracic and abdominal wounds ($n = 28$, *i.e.* 1.3%). Mortality was evaluated at 0.6%, and was correlated with the severity of the lesions and the type of trauma. **Conclusion:** Trauma is very common in emergency consultations in Congo, with a hospital frequency of 75.1% of all emergencies. Preventive actions are essential to reduce their frequency.

Keywords

Emergencies, Trauma, Accidents, Public Road, Violence

1. Introduction

The demographic growth of the large urban cities in Africa is the consequence of an intense rural exodus. It is at the root of the increase in health problems that characterize large cities. These problems, particularly assaults and road traffic accidents, thus constitute a major public health concern. It is in this context that trauma represents one of the main reasons for consultation in surgical emergencies in African settings [1] [2] [3], as elsewhere [4] [5] [6]. In Congo-Brazzaville, they deserve special attention because of the constantly increasing increase in violent acts and aggressive behavior observed during the socio-political and armed conflicts of 1992 and 1998 [7], coupled with juvenile or even senile delinquency, the depravity of mores, the disorganization of the police force and the appearance of young people groups prone to attacks with firearms and bladed weapons [8] [9]. This explains the growing criminality in the main cities of the Congo, including Brazzaville. Furthermore, according to a report by the regional office of the World Health Organization for Africa (WHO-AFRO), up to 725,000 people died as a result of road traffic accidents [10], a figure which represented 7% of all deaths recorded on the continent. The increase in the car fleet contributes to the occurrence of road traffic accidents (RTA), major sources of trauma, even if the causes of RTA, although multiple, are not yet documented, unlike in other countries [11] [12]. In Congo, the University Hospital of Brazzaville participates mainly in the admission of victims. Hence the present study covers 2127 files of patients admitted to surgical emergencies' unit during a period of 6 months. We analyze the epidemiological aspects, the etiological circumstances, the anatomical lesions encountered and describe their therapeutic management as well as their place in all surgical emergencies.

2. Methods

The prospective and analytical study enrolled 2127 traumatized patients out of a total of 2833 patients admitted to the emergency surgical unit of the University Hospital of Brazzaville, during 6 months period from January to June 2018. All patients with physical trauma were included in the study. Subjects consulted for non-traumatic emergency were excluded. Medical observations at the time of transfer and hospitalization were the main sources of data that were analyzed in this study.

Trauma severity was assessed using Champion Trauma Score [13]. It made it possible to specify the repercussions of the lesions on the vital functions. Age, socio-professional status, sex of the patients, modalities of transportation of the injured, causes of injuries, injuries observed, therapeutic management and mor-

tality related to injuries were studied.

The results are presented as numbers and percentages for the qualitative variables, as mean \pm standard deviation for the quantitative variables. Student's t test was used for comparing two means, Spiegel's t test using to compare two percentages and Sokal's S test to compare more than two percentages. The relationship between the severity of some injuries and the type of injury was analyzed using Pearson's χ^2 test. Data entered on Epi Info version 5.1.0 were processed using SPSS D5.0 software. The threshold for statistical significance for all tests was set at $p < 0.05$.

3. Results

3.1. Epidemiological Aspects

A total of 2127 trauma patients were included in the study.

Sex and age

Table 1 reports the distribution of patients by age and sex. The most affected population was aged between 20 and 39 years old ($p < 0.05$). The sex ratio revealed a significant superiority of men (1318 against 809 women, *i.e.* M/F equal to 1.6). The mean age of the patients was 27.3 ± 14.2 years (range: 1 - 84 years).

Socio-professional category

Table 2 reports the distribution of patients according to socio-professional category.

3.2. Patient Transport

Patient transport was provided mainly by non-medical vehicles in 94% of cases

Table 1. Distribution of patients as function as age group and gender.

Age (ans)	Males (n)	Females (n)	Total [n (%)]
0 - 19	295	181	476 (22.4)
20 - 39	789	485	1274 (59.9)*
40 - 59	214	133	347 (16.3)
60 - 79	17	9	26 (1.2)
80 - 89	3	1	4 (0.2)
Total	1318	809	2127 (100)

Abbreviations: * $p < 0.05$ according to the Sokal test.

Table 2. Socio-professional category.

Socio-professional category	Effective	Percentage
Workers	89	4.2
Retirees	30	1.4
Pupils and students	1276	59.9
Unemployed	732	34.5
Total	2127	100

(n = 2000). It was more taxis and private cars (n = 1621, or 76.5% of cases). The use of an ambulance was only required in 6% of cases (n = 127).

3.3. Etiological Circumstances

Among the causes of trauma, road accidents (n = 819; 38.5% of cases) ranked first. Physical attacks (brawls, fights) were 513 (24.1%). The other causes were assaults with firearms and stabbings (189, or 8.9%) and falls (580, or 27.3%). Burns accounted for 1.2% of cases (n = 26). Two groups of victims made up all the patients (**Table 3**): polytraumatized and monotraumatized.

3.4. Clinical Data

Trauma-related injuries

Cranial, spinal and limb injuries (**Table 4**) were dominant (1479/2127, *i.e.* 69.5%; $p < 0.05$). Among these, we found mainly and in decreasing order: fractures of the limbs and/or vertebrae (442, *i.e.* 20.8%), contusions of the limbs

Table 3. Lesion assessment.

Lesions	Effective	Percentage
Polytrauma	97	4.6
Skull-abdomen	45	46.4
Thorax-abdomen	32	33.0
Other associations	20	20.6
Monotrauma	2030	95.4 ^a
Skull	400	19.7
Other	1630	803 ^{**}

Abbreviations: ^a $p < 0.05$; ^{**} $p < 0.01$.

Table 4. Effectives and percentages of patients with head, spine and limb injuries.

Lesion	Effective	Percentage
Fractures (limb, vertebrae)	442	20.8
Limb bruises	344	16.1
Injuries due to head trauma (bruises, hematoma, concussion, wounds, fractures)	315	14.8
Wounds (neck and limbs)	108	5.1
Maxillofacial trauma (bruises, wounds, fractures)	84	3.9
Sprains	84	3.9
Dislocations	41	1.9
Spinal bruises	39	1.8
Eye bruises	13	0.6
Amputations	9	0.4

(344, *i.e.* 16.1%), injuries due to head trauma (315, or 14.8%), wounds (108, or 5.1%), sprains and maxillofacial trauma (84 cases each, or 3.9%), dislocations (41, or 1.9%) and spinal contusions (39, or 1.8%). Cranial involvement was found in 10 patients and 9 cases of limb amputation were noted.

Regarding injuries to the thorax, abdomen and pelvis (**Table 5**), there were 648 (30.5%). They preferentially consisted of simple thoracic contusions (65, *i.e.* 3%), abdominal contusions without visceral injury (39, *i.e.* 1.8%), wounds of the abdominal wall (21 cases, *i.e.* 1%), chest wall (17, or 0.8%), fractures of the pelvis (15, or 0.7%) and ribs (13, or 0.6%).

Abdominal trauma that came after head trauma concerned 72 patients (72, or 3.4%); they were isolated or associated with other disorders. The distribution of patients according to the type of trauma and severity is recorded in **Table 6**.

The application of the Chi-square test revealed a significant association between

Table 5. Lesions of the thorax, abdomen and pelvis.

Lesions	Effective	Percentage
Simple chest bruises	65	3
Abdominal contusions without visceral lesions	39	1.8
Hemothorax	21	1
Abdominal wall wounds	21	1
Chest wall wounds	17	0.8
Pelvic fractures	15	0.7
Rib fractures	13	0.6
Pelvic bruises	11	0.5
Hemoperitoneum (ruptured spleen, liver wound, mesentery wound)	11	0.5
Pneumothorax	6	0.3
Bladder rupture	1	0.05

Table 6. Distribution of patients according to type and severity of trauma.

Type/Severity	Serious (n)	Moderate (n)	Minor (n)	Total (n)
Limb trauma	10	294	378	682
Skull trauma	21	180	114	315
Polytrauma	72	25	0	97
Chest trauma	18	53	0	122
Spinal trauma	7	25	7	39
Abdominal trauma	16	31	24	71
Total	97	655	523	1326

Distribution of patients according to type and severity of trauma.

the severity of the trauma and the type of trauma ($\chi^2 = 21.27$; $p = 0.0213$).

Therapeutic aspects

Among 2127 trauma patients, 1457 of them (68.5%; $p < 0.05$) received medical treatment and 457 (21.4%), orthopedic treatment. Only 216 patients (10.1%) received a surgical treatment depending on the lesions.

Mortality

A total of 32 patients died during the study period. Trauma-related mortality was estimated at 0.6% within 24 hours. Deaths were mainly related to polytrauma in 92% of cases ($n = 29$). Mortality was correlated with the severity of Champion's Trauma Score: it increased inversely with the index (22 patients with severe status, 7 with moderate status and 3 with minor severity).

4. Discussion

4.1. Epidemiological Aspects

Traumatic emergencies are the main reason for consultation in the emergency unit of the University Hospital of Brazzaville, with a frequency of 75.1% of all emergencies. In sub-Saharan Africa, studies by Korsaga *et al.* [14] in Burkina Faso in 2019, Abdou Raouf *et al.* [15] in 1998 in Gabon also report that traumatic urgency is the first reason for consultation with respectively 81.9% and 86.3% of cases. Our finding is similar in France where according to the Ile-de-France Regional Hospitalization Agency, traumatic emergency was the first reason for consultation in emergency unit's admissions in 2019, with 57% of all emergencies [16].

We found in our study a male predominance (61.9% of cases), an observation which is in line with that of other authors. For example, Degas *et al.* in Sudan [17], Sima Zué *et al.* [18] in Gabon report a male predominance with 85.6% and 65.9% respectively. In the Congo, the excessive number of men driving vehicles and their involvement in most armed conflicts, brawls and other violent acts are undoubtedly explanatory factors for this trend. We also found that the population most affected by trauma is young people and adults aged 21 - 40 years old (59.9% of cases; $p < 0.05$), one of the most active social strata in the economic development of the country. Among these, we find in the first rank students, workers, merchants, teachers and senior state executives as well as the liberal professions. Our observations agree with those of Degas *et al.* [17] in Sudan where workers represent 43.3% of the cases followed by pupils and students (23.3%). Laurent [19] in France also reported a predominance of schoolchildren, workers, transport professionals and brokers in the occurrence of head and bone and joint injuries.

4.2. Etiological Aspects

In our series, road accidents predominated with 38.5% of cases; falls, physical assaults and assaults with firearms and stabbings followed with 27.2%, 24.1% and 8.8% respectively. In sub-Saharan Africa, Moba *et al.* [20] in the Democratic

Republic of Congo, Diakité *et al.* [21] in Guinea-Conakry, Korsaga *et al.* [14] in Burkina Faso and Degais *et al.* [17] in Karthoum (Sudan) had also reported a predominance of road traffic accidents. This observation was found in Algeria [22], Brazil [23] and in several Western countries [24] [25]. In China, studies by Zhang *et al.* [26], from the Chinese Ministry of Public Security [27] report respective rates of trauma per road traffic accident of 88.6% and 87%. In western India, Gandon *et al.* [28] found in a study carried out in 1994 that road accidents accounted for 52% of injuries, against 20% for intentional blows and injuries and 20% for other etiologies.

In addition, it appears from the study by Moba *et al.* [20] in relation to the injury assessment that fractures predominated (26% of cases against 20.8% in our series), followed by various wounds (23.3%). They were preferentially localized to the limbs and the belt (55.4%), the head and the neck (31%), to the trunk (13.6%). The limbs and the belt accounted for more than half of cases (55.4%). Polytraumas were much rarer compared to isolated lesions (8% versus 92%). However, in our series, their rate is scarced with a frequency evaluated at 27.4%. The factors who explained the high frequency of injuries by road accident in Congo are multiple: excessive speed of vehicles; heterogeneity of road network users (drivers of motorized vehicles, pedestrians, passengers); non-compliance with the Highway Code by drivers and pedestrians, and the passages reserved for the latter; excessive overloading of public transport vehicles for the sole purpose of gain; long working hours of drivers and consequent loss of vigilance; movement of second-hand vehicles not subject to the usual technical inspection. In addition, the human factor also appears to be an important factor of road accidents, as indicated by a road safety report in 2005, which established the responsibility for fatigue, drowsiness, drunkenness and drug use by drivers.

The young age of victims of road traffic accidents, between 20 and 39 years in our study, is in line with other studies [29] [30] [31]. The high risk of road accidents among our subjects could be explained by their greater mobility and their activities of a diverse nature that characterize African youth in general, Congolese in particular in search of survival. In addition, the birth rate is high in Congo and life expectancy is around 51 years [32]; the young population is therefore the largest. The high frequency of road traffic injuries in this age group, the most active and productive, thus constitutes a serious economic loss for the community.

With regard to injuries caused by intentional blows and injuries and assaults (by firearms and bladed weapons), they are attributable to delinquency in all forms, to the increased poverty of households, the depravity of morals and the loss of the habits and customs of the Congo's peoples (Kongo, Mbosi, Téké, Vili). As regards the first two factors mentioned, they were also found in Mexico by Moye-Elizaide *et al.* [33].

The falls which represent 27.2% in our series, are consecutive to falls from a height (trees, stairs), found in the majority of cases at home.

Assaults by firearms rank fourth in our series (n = 189; 8.8%). Hugenberg *et*

al. [34] in 2007 in Nairobi (Kenya) reported over a period of 24 months, a frequency of 17.5%.

As for the mode of transport of patients to the emergency room, 94% of cases were transferred from the accident site to the hospital by land and by private individuals, without initial care, without medicalization of the transfer vehicle and without prior warning of the admissions' unit of emergencies (corollary with congestion in the surgical emergency unit). This situation reflects an insufficiency or even absence of any first aid in the Congolese health system.

4.3. Type of Trauma and Severity of Injuries

We found a significant association ($p = 0.0213$) between trauma severity and trauma type. Indeed, polytraumas, isolated traumas of the skull and spine were the most serious in our series. Polytraumas were 97 in number in our study, *i.e.* 4.6% of all traumas. Abdou Raouf *et al.* [15] reported trauma to the limbs and/or pelvis in 48%, the skull and face in 22% of cases, polytrauma representing a total of 10% of cases. On the other hand, Diakit  *et al.* [21] report a predominance of skull trauma with 50% of cases. This predominance of trauma to the limbs and the skull can be explained by the high exposure of these segments and body surfaces in the mechanisms of trauma, compared to other parts of the body.

In relation to the severity of the lesions, the Champion's Trauma Score made it possible to classify our patients into 3 groups: 1) patients who suffered from severe trauma and suffered from one or more vital distresses (Champion's Trauma Score ≤ 10). In our series, these emergencies accounted for 13.5% of cases. There were 21 severe head injuries, 12 patients with cervical spine fractures and 2 patients with severe chest injury. Abdou Raouf *et al.* [15] reported 12% of cases falling under this category of emergencies. 2) Patient victims of trauma not immediately threatening the life of the injured person, but which may be the cause of subsequent death or significant sequelae (Champion's Trauma Score between 11 and 13). In our series, 22.4% of cases were related to these emergencies compared to 27% in the study by Abdou Raouf *et al.* [15]. 3) Minor traumatic emergencies (with a Champion Trauma Score between 14 and 16). This was the batch of traumatology found in our study, with patients presenting with wounds, muscle contusions, sprains and simple lesions of the extremities (64.1% of cases; $p < 0.05$). Abdou Raouf *et al.* [15] also report a predominance of minor trauma, with 61% of cases.

4.4. Mortality

Thirty-two patients, or 15.04%, died: 13 in the first 24 hours and 19 during their stay in intensive care. Five deaths were due to isolated head trauma. Deaths following polytrauma resulted from two associations: head trauma and abdominal contusion ($n = 18$); abdominal contusion and chest involvement ($n = 9$). The mortality proportionally linked to the Champion's Trauma Score is suggestive of the limited resources (neurosurgeons and medical imaging), which make the man-

agement of traumatic brain injury difficult in African countries [35] [36].

5. Limitations of the Study

Trauma severity was determined in our study by Champion's Trauma Score. However, most studies of trauma emergencies use the Injury Severity Score (ISS), Abbreviated Injury Score (AIS), and TRISS methodology. The latter makes it possible to better estimate the probability of survival for each patient, using two indices: the Revised Trauma Score (RTS) and the ISS [37] [38]. This methodology could not be applied in our series. In addition, we were unable to obtain data relating to the average stay in intensive care for patients, as well as on the methodologies used in anesthesia-resuscitation. Notwithstanding these weaknesses, the data obtained do not affect the power of the observations in this survey, the most representative in number of patients in Congo to our knowledge.

6. Conclusion

Traumatic emergencies represent 75.1% of medical and surgical emergencies in Congo. The predominance of young adults and men, the problems of pre-hospital and even hospital care, the lack of medical transport, the inadequacy of care at the level of emergency units and the lack of equipment and qualified doctors make part of the results obtained. Consequently, the training of specialized personnel, the technical and/or financial accessibility to complementary means of exploration and the provision of adequate surgical material could reverse this trend.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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