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Prognostic Factors for Operated Traumatic Brain Injury at the Yaounde Emergency Center

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Abstract

Introduction: Head injuries constitute a public health problem in Cameroon and everywhere else in the world. They represent 23% of admissions to the Yaounde emergency center (CURY), which is a center exclusively dedicated, since 2014, to emergency care in Yaounde. In the management of trauma brain injuries at CURY, several are operated on. However, to date, no evaluation of these operated patients has yet been made. **Goals:** The objective of this study was to highlight the prognostic factors in patients operated for TBI at CURY. **Methodology:** We conducted a descriptive study whose data collection was done retrospectively over 2 years (01 January 2021 to 31 December 2022) at CURY. Data was collected from the registers of operative reports. **Results:** We enrolled 105 medical reports of patients who were victims of TBI operated on. The male gender predominated with a sex ratio of 3/1. The average age of the patients was 37.5 ± 18.83 years. Public road accidents were the leading cause of TBI in 75.2% of cases. The means of transport of the victims were mostly non-medical 97.1%. 45.7% of patients were admitted in less than 6 hours following injury. The initial clinical evaluation found 45.8% of patients with a Glasgow Coma Score (GCS) between [14, 15], and 13.2% of patients had a GCS 8. The indications for surgery were extradural hematoma (30%), followed by acute subdural hematoma (24%). The major complication was postoperative infection (25%). The mortality rate of the series was 7.9%. Poor prognostic factors were the depth of the coma on admission, advanced age and postoperative complications. **Conclusion:** The results of this study suggest that most

patients operated on for TBI at CURY had a favorable outcome. The poor prognostic factors were the depth of the coma on admission, advanced age, postoperative complications and comorbidities.

Keywords

Operated TBI, Prognosis, Yaounde Emergency Center

1. Introduction

Traumatic brain injury (TBI) is defined as any damage to the integrity of the cranium and/or the brain following a direct or indirect mechanical attack by an external agent [1]. The trauma can subsequently have repercussions on the neurological, circulatory and respiratory systems, among others. Traumatic brain injuries remain a public health problem worldwide. Morbi-mortality remains high in the world. It is the main cause of death in young adults [2] [3]. 70% of head injuries result from road accidents [4]. In the USA, the number of patients admitted to emergency departments is estimated at around 1.5 million per year with an annual incidence of around 98/100,000 inhabitants. The worldwide incidence of TBI is 235/100,000 with great disparity in its distribution [5]. In Africa, TBI is also a major public health problem. In Cameroon, the incidence of head trauma is estimated at 572 per 100,000 inhabitants [6]. They represent 23% of admissions to the Yaounde emergency center (CURY), which is a center exclusively dedicated, since 2014, to emergency care in Yaounde. In the management of traumatic brain injuries at CURY, several are operated on. However, to date, no evaluation of these operated patients has yet been made.

2. Methods

We conducted a retrospective descriptive study over a period of 2 years and enrolled from January 1st 2020 to 31st December 2022, TBI patients operated at the Yaounde emergency center. We included files of all patients operated upon for TBI and excluded all files of patients managed conservatively and incomplete medical reports were excluded. This study was approved by the hospital's ethics committee. In our study, favorable evolution was considered as patients without any postoperative complication or patients with postoperative complication who recovered without sequelae after management at discharge and patients with GCS of 14 - 15 at discharge. Unfavorable evolution for patients with neurologic sequelae at discharge, patients with postoperative complications who recover with sequelae, patients with GCS of less than 14 at discharge or patients who died.

Medical records of patients operated for TBI were selected from hospitalization register and operative reports, names of patients noted, and files were searched at

the archive unit. Once found, the information from medical reports were recorded according to the studied variable using a data collection sheet.

Data collected was entered and analysed using SPSS version 23.0 software. Categorical variables were expressed as numbers and proportions and compared using Chi-square or Fisher's exact test, when necessary, with a significant threshold of 5%. Quantitative variables were expressed as mean with standard deviation when they had a normal distribution. Otherwise, they were expressed as median with the first and third quartiles. Multivariate analysis was used to analyse independent predictors and associated confounders

3. Results

A total of 105 files of TBI patients were retrospectively evaluated. The mean age of the studied population was 37.5 ± 18.83 years (range from 2 to 81 years). Our studied population was predominantly made up of male patients (75.0%) with a sex ratio of 3 male/1 female. Road accidents accounted for 75.2% of cases as the mechanism of injury. 45.7% of patients were admitted within 6 hours following accident (Figure 1). Initial GCS at arrival 45.8% had a score of (14 - 15), 41.0% had a score ranging from (9 - 13) and 13.2% had an initial score below 8. Head CT scan findings 44.7% had intracranial lesions, 35.3% had skull fractures and 20% were mixed lesions. Subdural hematoma was present in 49% of cases, epidural hematoma in 43.5% and intraparenchymal hematoma in 7.5%. Epidural hematoma accounted for 30% of surgical indications (Table 1), subdural 24%, penetrating TBI 14.3% (Figure 2, Figure 3) and depressed skull fracture 14.3%.

We found that (45.7%) of patients were admitted within 6 hours following trauma.

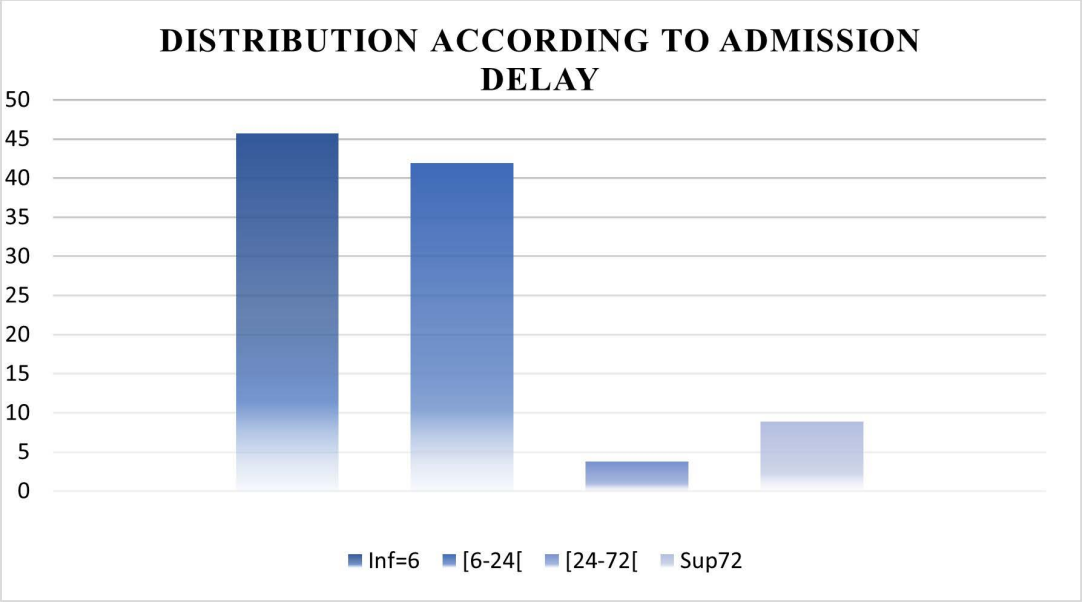

Figure 1. Distribution according to admission delay.

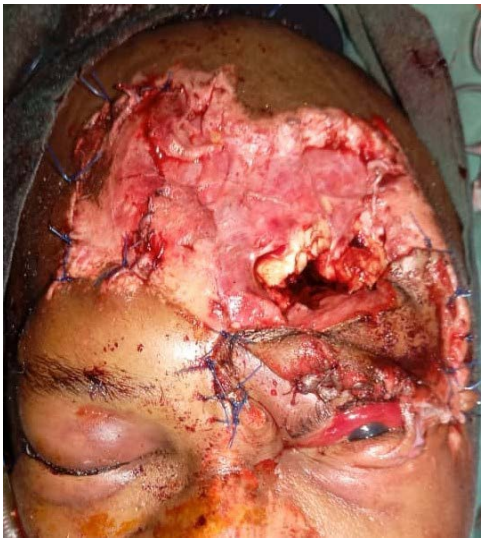

Figure 2. Penetrating brain injury.

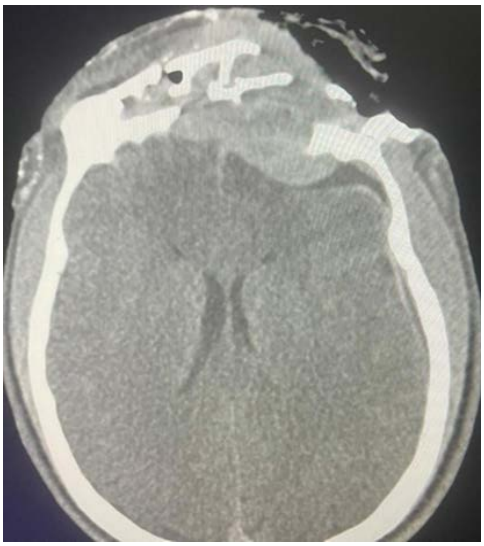

Figure 3. Head CT scan of a penetrating brain injury.

Table 1. Distribution of surgical indications.

Variables	Modalities	Numbers (N = 105)	Frequency (%)
Surgical indications	Epidural hematoma	32	30
	Subdural hematoma	25	24
	Penetrating brain injury	15	14.3
	Depressed skull fracture	15	14.3
	Chronic subdural hematoma	11	10.4
	CSF leak	4	4
	Intraparenchymal hematoma	2	2
	Intraventricular hematoma	1	1
Total		105	100%

As for post-operative complications, seizures were present in 12.5% of cases, pulmonary infection 25% and 10% had hemorrhage. 90.5% had a favorable evolution and 9.5% had an unfavorable evolution. 4.9% underwent reintervention. We noted a significant association between increased mortality with age range [50 - 60] years, patients with GCS less than 8 on entry. Subdural hematoma increased the risk of poor outcome by 6 (Table 2). Postoperative rebleeding and reintervention were associated with the worst outcome.

Table 2. Association between cranial lesions and death.

Variables	Death (N = 92; n (%))	Survival (N = 92; n (%))	OR (CI 95%)	p
Subdural hematoma	9 (26.5)	25 (73.5)	**6.03 (1.70 - 21.34)**	**0.004**
Epidural hematoma	1 (3.4)	28 (96.6)	0.19 (0.02 - 1.54)	0.075
Intraparenchymal	1 (20.0)	4 (80.0)	1.83 (0.18 - 17.79)	0.491

4. Discussion

Our study aimed to assess the prognostic factors of operated TBI patients at the Yaounde Emergency Center.

The mean age of the patients was 37.5 ± 18.83 years, with extremes of 2 and 81 years. This result is similar to that of Eyenga *et al.* in their study, who had a mean age of 36.88 ± 20 years [7]. This result is different from that of Hissene *et al.* in a study in Niamey, where they had an average age of 26.36 years for extremes of 9 months and 86 years [8]. This could be explained by the fact they conducted a prospective, descriptive study over a period of 6 months and studied all patients admitted to the emergency department for head trauma, and having done a head CT scan, we excluded patients with incomplete files and studied only those who underwent surgical intervention.

The male sex was predominant (75.2%) with a sex ratio of 3 men for 1 woman (3/1). This male predominance was also found by Motah *et al.* in 2011 in a study on the management of isolated head trauma at the Douala General Hospital which found a sex ratio of 2.82 [9]. This finding is also similar with a study carried out in Mali by Samaké *et al.* which found a sex ratio of 3.1 in favor of the male sex [10].

In our series, the most frequent mechanism of injury was road accidents in 75.2% of cases. This finding is similar to that found by Motah *et al.* in their study, they found that 74.04% of traumatic brain injuries were caused by motor vehicle accidents [9]. This is in concordance with many studies in the literature.

The mode of transportation from the place of the accident to CURY was by non-medicalized means in 97.2% of cases. Motah *et al.* in their study showed that in 54.32% of cases, patients with head trauma were transported to health facilities by non-medicalized means. This result shows the functionality of the mobile

emergency and resuscitation service (SMUR), a medical transport service for patients within the CURY, which is not yet fully effective and transfer between different health facilities occurs mostly by non-medicalized means this could lead to poor handling of TBI patients during transportation by untrained persons.

In our study, 45.7% of patients admitted for traumatic brain injury were admitted within 6 hours. Takoukam *et al.* in their series, found out that 38% of patients were admitted within 6 - 12 hours after the onset of trauma [6]. This could be explained by the fact that most patients were initially received at other health facilities where initial management was done before referral and also long-distance transportation of patients with poor road conditions to Yaounde emergency center could account for the delay in admission. As a result, only 2.9% of patients were driven to the hospital in an ambulance, and just 45.7% of patients were admitted within 6 hours of the accident. Time to hospital and the quality of pre-emergency care are critical to the outcome of patients with TBI, which is way above the golden hour of severe TBI. In our study 45.8% of patients had a Glasgow coma score between 14 and 15, 41.0% of patients had a Glasgow coma score between 9 and 13. 13.2% of patients with a Glasgow Coma Score ≤ 8. This observation is consistent with data from the literature [10] [11]. 44.7% of our studied population presented with intracranial lesions, 35.3% had skull lesions and 20% had mixed lesions. This finding is similar to that found by Anhum Konan *et al.* in their study on computed tomography aspect of head trauma in Abidjan, who found that skull lesions were less important than the intracranial lesions where 34.2% of patients had skull lesions [12].

Regarding intracranial lesions, they were dominated by acute subdural hematoma 49%, followed by extradural hematomas in 43.5% of patients. This result is similar to that of Alali *et al.* in their series they found that subdural hematomas represented the majority intracranial lesions in 68% of cases [13]. These results are similar to those found in the literature [11]. The main surgical indication was intracranial lesions, particularly hematomas, of which extradural hematoma comes first in 30% of cases, followed closely by acute subdural hematoma in 24 % of cases. The postoperative complications that we raised throughout our study were: respiratory infections (aspiration pneumonia) in 25% of patients, and bedsores in 15% of the patients. Neurological complications were dominated by seizures present in 12.5% of the patients. Surgical site infections were found in 5% of the population. These results are similar to those found in the series by Bengono *et al.* in which infections were among the most frequently found postoperative complications, occurring in 14.6% of the population in their series [14]. In Ethiopia Tsegazeab Laeke *et al.* in a prospective study for traumatic brain injury 17% of patients presented with pot operative complications with cerebrospinal fluid leak, the most common complication in 7.9% with infection of surgical site in 3.6% [15]. In addition, postoperative complications for head trauma are diverse. 4.9% of the population of study required reoperation for causes such as rebleeding and herniations. The postoperative evolution was favorable in 90.5% of patients, and

this could be explained by prompt action and the combined experience of neurosurgical team working at the health facility. We were able to demonstrate that there was a strong correlation among patients with an age group between [50 - 60[(P value: 0.035) and an increased risk of death. A strong correlation between a Glasgow coma score of less than 8 (P value: 0.014) on admission and death in the postoperative period. Subdural hematomas in our study were associated with higher risk, 6 times higher than other types of lesions. Reintervention was also a factor in poor prognosis. Errai *et al.* in their study showed results consistent with ours; they highlighted as prognostic factors: age, Glasgow coma score on admission, and presence of cerebral edema [16].

Study Limitations

This study was a retrospective study over 2 years at a single center, information on prehospital care couldn't be obtained since it wasn't well documented in medical reports.

5. Conclusion

Traumatic brain injury remains a major public health problem. We found out that 90.5% of operated TBI patients had favourable outcomes. Prognostic factors included age above 50, GCS less than 8 on admission, acute subdural hematoma, and post-operative complications such as rebleeding, which were the most lethal factor. Acute subdural hematoma remains the most lethal pathology. We recommend that multicentric prospective studies be carried out to gain more insight into these factors. Improve management of mobile emergency and resuscitation service (SMUR) within our local environment to reinforce continuous training of health care personnel in prompt management of these conditions.

Conflicts of Interest

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

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