Neurosurgical Emergencies at a Tertiary Referral Center in a Sub-Saharan African Country

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Abstract

Background The practice of neurosurgery in a teaching hospital requires modern diagnostic tools and a rigorous organization of care.

Objectives To present and discuss the management of neurosurgical emergencies in a teaching hospital in poor and low-income country.

Patients and Methods This is a retrospective and descriptive study from April 2015 to March 2017 and includes traumatic and nontraumatic neurosurgical emergencies. Epidemiological, diagnostic, operative, and outcome data were evaluated.

Results During the study period, 397 cases of neurosurgery were admitted. One hundred seventy-five of them were emergencies (43%), including 168 (96%) of traumatic origin. The average age was 32.5 years (1–80 years) with a male predominance: 149 men for 26 women, the sex ratio was 6.68. The cause of the neurotraumatological emergency was mostly road accidents with 143 cases (85.1%). The trauma was brain injury in 155 patients (92.3%) and spine injury in 13 patients (7.7%). In 64.3% of cases, diagnostic imaging was done beyond 48 hours. Surgery time was more than 48 hours when it was performed (21 cases). Outcome was good for 19 patients. Overall and postoperative mortality were, respectively, 34.5% (58 cases) and 9.5% (2 cases).

Conclusion Neurosurgical emergencies care at the Departmental Teaching Hospital of Ouémé–Plateau has become a common activity with encouraging operating results despite difficult practice conditions.

Keywords
- trauma
- spine
- emergencies
- neurosurgery

Introduction

The practice of neurosurgery requires the use of essential diagnostic tools. Neurosurgery at teaching tertiary referral center, Departmental Teaching Hospital of Ouémé–Plateau, in Porto-Novo, like other countries in the subregion,[1,2] is fairly recent and still suffers from the lack of material resources and qualified personnel for the management of neurosurgical emergencies.[3-5] We suggest reporting an overview of this management in this center.

Patients and Methods

It was a descriptive study with retrospective data collection from April 1, 2015, to March 31, 2017, at the teaching tertiary referral center of Ouémé–Plateau, in Benin Republic. This hospital located in South-East Benin and serves two departments, Ouémé and Plateau, for a population of nearly 1,700,000 inhabitants. It was created in 1906 and has become a university hospital by decree since August 2014 as a result of the extension of the university hospital space

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in Benin. Care, teaching, and research activities are therefore performed. Its capacity is currently 334 beds. The study involved all patients admitted to the Departmental Teaching Hospital of Ouémé–Plateau for a traumatic or nontraumatic neurosurgical emergency. A survey form was completed for this purpose for each patient. The evaluated parameters were epidemiological, diagnostic, therapeutic, and outcome. The collected data were entered in the form of a database with the software EPI data 3.1. The analysis was made by software SPSS version 21.0, and the tables and graphs for the organization of the results by Microsoft Excel 2013. Outcome was considered favorable when the patient left hospital without neurological aftereffect which could cause dependence toward their circle.

Results

During the study period, 397 patients were treated for neurosurgical pathology. Among them, 175 cases constituted emergencies or 43% of admissions for neurosurgery. The origin was traumatic in 96% of cases (168 patients). The average age of patients was 32.5 years with extremes ranging from less than 1 year to 80 years. There was a male predominance with a sex ratio of 5.73 (149 men/26 women). Accidents on the public highway were at the forefront of traumatic etiologies (143 cases, 85.1%). A two-wheeled vehicle was involved in 88 cases (61.53%). The site of the trauma was cranial in 92.3% of the cases (155 patients) and spine in 7.7% of the cases (13 patients). Among the cranial trauma victims, 73 patients had a serious trauma (47.09%). The average delay to admit these emergencies was 6 hours in 14% of cases (►**Table 1**); in 33% of cases, this delay was not specified. Diagnostic imaging was performed more than 48 hours on average after admission in 63.4% of the cases. The brain scan was performed on 52 cranial trauma victims (33.54%). The traumatic lesions were essentially a cerebral contusion (32 patients, 61.53%), a cranial fracture (30 patients, 57.69%), and an intracranial blood collection in 20 patients, that is, 38.46% of the cases. In the spine, it was a vertebral fracture (eight patients) and/or a dislocation (six patients). These lesions are listed in ►**Table 2**.

Seven patients (4%) were admitted for a nontraumatic neurosurgical emergency (►**Table 3**). Among them, three cases of cerebral convexity meningioma, only of women, presented on admission a deterioration of consciousness, a state of convulsive disease, or a malignant HTIC.

Table 1 Distribution of patients by time of admission (n = 175 patients)

Delay	Frequency	Percentage (%)
< 6 h	25	14.28
6–24 h	56	32
> 24 h	37	21.14
Not specified	57	32.57

Table 2 Distribution of patients by lesions on computed tomography scan (skull: n = 52 patients; spine: n = 13 patients)

Lesions	Frequency	Percentage (%)
Skull fracture	30	57.69
Brain contusion	32	61.53
Cranial hematoma	20	38.46
Subarachnoid Hemorrhage	5	9.61
Vertebral fracture	8	61.53
Vertebral dislocation	6	46.15

Table 3 Distribution of nontraumatic emergencies (n = 7)

Nature	Frequency
Meningioma	3
Hydrocephalus	2
Spinal cord compression	2

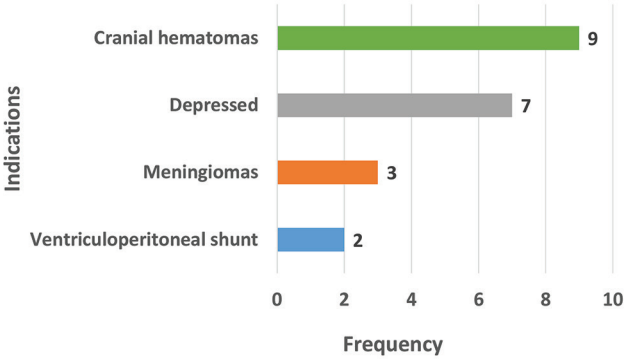

Fig. 1 Distribution of surgery indications for emergencies in cranial pathology.

Table 4 Distribution of surgical indications of spinal emergencies

Indications	Frequency
Laminectomy	3
Spine fusion	4
Total	7

Therapeutically, 85 patients (48.57%) were put in intensive care with an average stay of 5 days (1–60 days). Twenty-eight patients were operated on (16%): 21 for a cranial pathology (►**Fig. 1**) and 7 for a spinal pathology (►**Table 4**). The average operating deadline was 10 days. Surgery was performed beyond 48 hours for all emergencies operated on. Three patients received orthopaedic treatment.

The outcome was favorable for 98 patients (56%). Among patients operated on meningioma, two had a recovery without aftereffect and resumed their activities; the third died

72 hours after surgery. The overall mortality of the series was 33.71% (59 patients). Postoperative mortality was 14.28% (4 patients). The average hospital stay was 11.5 days.

Discussion

Difficulties of the Study

Due to its retrospective nature, this study was not without pitfalls. Nearly a hundred files were unexploited due to insufficient data and due to weaknesses in files archiving policy within the Departmental University Hospital Center of Ouémé-Plateau (lack of staff and facilities, storage conditions, and absence of electronic archiving).

Epidemiology

The young age of patients and the male predominance of neurotraumatic emergencies admitted to the Departmental Teaching Hospital of Ouémé–Plateau are constantly reported by the literature. The same applies to the predominant etiology of road accidents.[6-9]

Neurotrauma Due to Two-Wheeled Vehicles

The phenomenon of taxis is widespread in Benin and in the subregion. This partly explains the increasing number of road accidents involving the motorcyclists. Rabiou et al[2] and Tidjani et al[10] reported, respectively, a rate of 70.28 and 57.9% compared with 61.53% in our series. The cost of wearing a helmet was 5.15 and 3.5%, compared with 9.1% for our study and no patient for Nwadiaro et al.[11] Compliance with traffic rules by users has greatly favored the occurrence of these accidents. In addition, risky behaviors can be aggravating factors of traumatic lesions. A recent study performed on a population of 310 cranial trauma victims, drivers or passengers of two-wheeled motorcycles, reported that only 11 were wearing a helmet at the time of the trauma.[10] It also mentioned that the primary cranial lesions were more serious in patients without a helmet and the frequency of these primary lesions requiring surgery. In this regard, it should be noted here the reluctance of users of two-wheeled vehicles in Benin to comply with wearing a helmet despite the promulgation of the law. Even we notice a "forced" awareness in Cotonou after the repressive phase, it is not the same yet in Porto-Novo.[12] The corollary is high percentage of severe cranial trauma that results from it: 47.09% in our series against 29.42% for Rabiou et al[2] and 25.9% for Fatigba et al.[7] This absence of helmet use is a recurring problem in the subregion; the impact of wearing a helmet on the seriousness of cranial injuries is no longer to be demonstrated.[10,12-15] Accidents on the public highway are also causes of spinal cord injury. Even if standard radiography was sufficient in the majority of cases for their diagnosis, their management remains essentially confronted with the financial inaccessibility of implants for the stabilization of the spine.

Prehospital and Hospital Care

Prehospital management of neurotrauma in developed countries helps reduce morbidity and mortality.[2] This remains a thorny issue in an African context where resources are limited. The delay for admission to neurosurgical emergencies was beyond 24 hours for more than half of the patients in this study. This delay remains high and can be superimposed on that reported by the majority of African series where the organization of treatments and the prehospital and hospital care of emergencies still encounters many difficulties.[2,16-19]

Regarding the diagnosis of neurotraumatic emergencies, the difficulties remain the same in terms of availability and accessibility to modern neuroimaging tools. Lesions due to cranial and/or spine injury are also superimposable in the various studies.[18-23]

The difficulties to provide quality care (management delay, availability of staff, and the appropriate technical platform) are the same in West and Central African subregion. Added to this is the absence of universal health insurance for populations who are required to insure their own health expenses.[24,25] An outline by Dechambenoit published in 2002 gave a good account of this situation.[26]

Nontraumatic Emergencies

Three cases of cranial meningioma benefited from an emergency Simpson I resection despite difficult working conditions (lake of operating room consumables and resuscitation). Among the cases of hydrocephalus, there was a 14-year-old girl, who underwent emergency ventriculoperitoneal shunt for a rapidly progressive decompensating hydrocephalus due to a known Dandy–Walker malformation. Her outcome was good. The management of nontraumatic neurosurgical emergencies at the Departmental Teaching Hospital of Ouémé–Plateau mainly suffers from the weakness of the technical platform, the unavailability of consumables and poor accessibility to diagnostic neuroimaging. This results in a biased assessment of the reality of these emergencies and a poorer provide care to the population.

Treatment and Outcome

Surgery rate, the type of surgical procedure, the delay, and the outcome parameters are usually reported in many sub-Saharan African studies. Surgery perform ranged from 16% (our series) to 75.8%[9,19] and hospital mortality from 3.3%[2,9,19] to 37.71% (our series). The high mortality rate in our study reflects the efforts that remain to be made to reduce it and offer better chances of survival to our populations.

Conclusion

This work presents an overview of the management of neurosurgical emergencies which has become a common activity at teaching tertiary referral center of Ouémé–Plateau in Porto-Novo. Despite encouraging operating results in difficult practice conditions, the essential improvement in the technical platform would contribute to more efficient care of these neurosurgical emergencies.

Conflict of Interest
None declared.

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