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Perioperative Management of Neurosurgical Emergencies at the Owendo University Hospital Center, Gabon

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Abstract

The perioperative management of neurosurgical emergencies presents a challenge for the anesthesiologist-intensivist. The objective of this study was to describe the perioperative management of patients undergoing emergency surgery for neurosurgical conditions at the Owendo University Hospital Center. **Methodology:** This was a descriptive cross-sectional study with retrospective data collection. The records of patients who underwent emergency surgery for neurosurgical conditions within the first 24 hours following diagnosis were included. Clinical data, surgical indications, and anesthesiological management data were analyzed. Statistical analysis was performed using SPSS version 23. **Results:** During the study period, 109 patients were included. Their mean age was 42 ± 24.5 years, with a male predominance. Patients under 10 years of age represented 13.8%. Acute subdural hematoma (35 patients, 32.1%) and acute hydrocephalus (14 patients, 12.8%) were the main surgical indications. The mean Glasgow Coma Scale (GCS) score was 12. Regarding anesthetic risk, 25 patients (56%) were classified as ASA 1. General anesthesia with orotracheal intubation was the standard procedure. Propofol (80%), suxamethonium (79%), and sufentanil were the most frequently used anesthetic drugs. The mean duration of anesthesia was 176 ± 70 minutes, and the mean duration of surgery was 119 ± 65 minutes. A mortality rate of 35.8% was recorded. **Conclusion:** Perioperative management of neurosurgical emergencies is multidisciplinary. Traumatic emergencies are predominant.

Keywords

Anesthesia Emergencies, Neurosurgery, Management

1. Introduction

The perioperative management of neurosurgical emergencies relies first and foremost on the diagnosis of lesions requiring urgent treatment and the prioritization of their management. The goal of anesthesia is to ensure optimal operating conditions for the surgeon, minimize the risk of cerebral ischemia, and maintain cerebral homeostasis. This optimized management requires optimal preoperative preparation and the appropriate choice of anesthetic agents. These emergencies can be traumatic or non-traumatic. Intracranial hypertension (ICH) is the cornerstone motivating emergency management. Its treatment is a priority. The shorter the duration of ICH, the better the chances of a favorable outcome [1]. At the Owendo University Hospital Center (CHUO), the country's only trauma center, the anesthesiological management of neurosurgical emergencies is a frequent occurrence. This management presents a challenge for the anesthesiologist-intensivist due to the neurological, cardiovascular, and even respiratory physiological changes associated with the pathology, as well as the severity of the patient's clinical condition. The objective of our study was to identify the epidemiological, clinical, and therapeutic aspects of the perioperative management of neurosurgical emergencies.

2. Materials and Methods

This was a retrospective, cross-sectional descriptive study conducted from January 1, 2020, to December 31, 2023. The Anesthesia and Intensive Care Unit of the Owendo University Hospital Center (CHUO) served as the study site. The study population consisted of patients who underwent emergency surgery for traumatic and non-traumatic neurosurgical conditions within 24 hours of diagnosis. Patients who underwent emergency neurosurgery more than 24 hours after diagnosis and those with missing or incomplete anesthesia records were excluded.

Anesthesia records, medical files, and the hospitalization register served as our data sources. The study variables were: sociodemographic data and clinical data such as Glasgow Coma Scale score, blood pressure (BP), mean arterial pressure (MAP), and heart rate. Surgical indications, the assessment of anesthetic risk by the American Society of Anesthesiology (ASA), the patient's preoperative preparation, the anesthesia technique, the time to admission to the operating room, the anesthetic drugs used, any recorded intraoperative incidents and accidents, the intraoperative resuscitation performed, the duration of surgery and anesthesia, and the postoperative outcome were all recorded. Data were entered into an Excel© file and analyzed using SPSS version 23. Results were expressed as numbers,

percentages, and means. We obtained permission from the institutional ethics committee and the hospital's medical director to carry out this work.

3. Results

During the study period, 327 patients underwent neurosurgical intervention. Anesthesia for neurosurgical emergencies was administered to 124 patients, of whom 109 records were included, representing a frequency of 33.3%. The study population consisted of 63 men (57.8%) and 46 women (42.2%), for a male-to-female ratio of 1.4. The mean age was 42 ± 24.5 years, with a range from 1 month to 88 years. Patients under 10 years of age represented 13.8% of cases (Table 1).

Table 1. Distribution of patients by age group.

Age range	Number (n)	Percentage (%)
1 - 10 years	15	13.7
11 - 20 years	13	12.0
21 - 30 years	12	11.0
31 - 40 years	11	10.1
41 - 50 years	10	9.2
51 - 60 years	14	12.8
61 - 70 years	19	17.4
>70 years	15	13.8
Total	**109**	**100**

In this study, 42 patients (38.5%) had a medical history. Hypertension was the most common predisposing condition, affecting 27 patients (24.7%), followed by diabetes in 7 patients (6.42%). The main neurosurgical indications were dominated by cranial pathologies, affecting 98 patients (89.9%), and spinal pathologies, affecting 11 patients (10.1%). Acute subdural hematoma (SDH), affecting 35 patients (32.1%), followed by chronic subdural hematoma in 20 patients (18.3%), and acute hydrocephalus in 14 patients (12.8%), were the main intracranial pathologies. Vertebral fracture associated with spinal cord compression was the main indication for emergency spinal surgery, affecting 6 patients (54.5%). The surgical indications are shown in Table 2. The preoperative neurological clinical data revealed neurological findings; the mean Glasgow Coma Scale (GCS) score was 12. The GCS score was 8 or lower in 6 patients (5.7%), and between 13 and 15 in 67 patients (63.2%). Pupil examination revealed anisocoria in 24 patients (58.7%). Motor deficits were noted in 25 patients (22.9%). Hemiplegia was noted in 15 patients (13.7%), followed by hemiparesis in 10 patients (9.2%). Hemodynamically, the mean arterial pressure (MAP) was 89 ± 34.4 mmHg, with a range of 57 to 178 mmHg. It was strictly greater than 80 mmHg in 94 patients (86.2%) and less than 80 mmHg in 15 patients (13.8%) (Table 3). All patients received a pre-anesthetic consultation; 25 patients (56%) were classified as ASA 1, 15 pa-

tients (33%) as ASA 2, and 5 patients (11%) as ASA 3. General anesthesia with orotracheal intubation was the rule. Preoperative blood tests revealed a mean hemoglobin level of 12.9 ± 1.97 g/dL, with a range of 7.80 to 16.70 g/dL. A hemoglobin level of 9 g/dL or less was found in 19 patients (17.4%). All patients underwent an anesthesiology consultation; 71 patients (65.1%) were classified as ASA 1, 21 patients (19.3%) as ASA 2, and 17 patients (15.6%) as ASA 3. General anesthesia with orotracheal intubation was the standard procedure. In the operating room, all patients underwent multiparameter monitoring, including electrocardiogram, pediatric pulse oximetry, capnography, and non-invasive blood pressure measurement. Intracranial pressure was not measured. Preoperative preparation consisted of inserting two large-bore intravenous lines in all patients. Intracranial hypertension was treated by administering mannitol 20% at a dose of 0.5 g/kg over 20 minutes via slow intravenous injection to 54 patients (49.5%) prior to craniotomy. Preoperative blood transfusion was performed in 8 patients (7.3%) with a hemoglobin level below 8 g/dL. The average time to admission to the operating room was 10 hours. Seventy-three patients (45.9%) were admitted to the operating room more than 18 hours after the surgical indication was established, and 29 patients (26.6%) were admitted within 6 hours. Regarding the intraoperative phase, general anesthesia with orotracheal intubation was the standard. Rapid sequence induction was performed in 87 patients (80%) and conventional sequence induction in 22 patients (20%). Propofol was the hypnotic used in 87 patients (80%), ketamine in 18 patients (16.5%), and etomidate in 4 patients (3.5%). Suxamethonium was the muscle relaxant used in 79% of cases and rocuronium in 21% of cases. For maintenance of anesthesia, sufentanil was the main opioid used in 69% of cases; regarding halogenated anesthetics, isoflurane was used in 86 patients (78.9%) at a minimum alveolar concentration (MAC) ranging from 1.15 to 1.5 and sevoflurane in 23 patients (21.1%) at a MAC of 2.05 to 3. Intraoperative resuscitation was performed via fluid administration; isotonic saline was used in all patients with a mean volume of 1350 ± 750 ml. Mannitol 20% osmotherapy was administered to 22 patients (20.2%). Blood transfusions were performed in 67 patients (61.5%) with a mean volume of 350 ± 275 ml to compensate for intraoperative blood loss. Antibiotic prophylaxis was administered with cefazolin. Intraoperative incidents included hypertension (36 cases), hypotension (14 cases), and tachycardia (23 cases). Awakening and extubation were performed on the operating table in 65 patients (59.6%) and delayed in the intensive care unit in 44 patients (40.4%). The mean duration of anesthesia was 176 ± 70 minutes (range: 60 - 420 minutes), and the mean duration of surgery was 119 ± 65 minutes (range: 30 - 330 minutes). The main complications recorded in intensive care were ventilator-associated pneumonia in 20 patients, anemia in 12 patients, and hyponatremia in 10 patients. The postoperative outcome was marked by a favorable outcome, with 70 patients (64.2%) being discharged from the hospital and 39 patients dying, representing a mortality rate of 35.8%. Two patients died during the procedure, and 37 died in the intensive care unit.

Table 2. Surgical indications.

Indications chirurgicales	Number (n)	Percentage (%)
Cranioencephalic Indications	**98**	**89.9**
Acute SDH	35	32.1
Chronic SDH	20	18.3
Acute Hydrocephalus	14	12.8
Acute SDH and EDH	16	14.7
Embedding Fracture	5	4.6
Acute EDH	5	4.6
Intracranial Abscess and Empyema	3	2.7
Spinal Indications	**11**	**10.1**
Fracture with Spinal Cord Compression	**6**	5.7
Fracture-Dislocation	3	2.6
Vertebral Body Fracture	2	1.8
Total	**109**	**100**

Table 3. Clinical data of patients.

Clinical data	Number (n)	Percentage (%)
Glasgow Coma Scale (GCS)		
<8	6	5.5
9 - 13	66	60.5
14 - 15	37	34
Pupil size		
Normal	84	77.1
Anisocoria	24	22.0
Bilateral mydriasis	1	0.9
Motor function		
Normal	60	55.0
Hemiplegia	16	14.7
Hemiparesis	13	12.0
Paraplegia	12	11.0
Tetraplegia	8	7.3

4. Discussion

Anesthetic management for neurosurgical emergencies at Owendo University Hospital Center represents 33.3% of neurosurgical procedures. Young males were the most affected population. The predominance of this young population is consistent with the demographics of the African population. This young population is the most active and exposed to the risks of trauma that can lead to neurosurgical

injuries requiring emergency care. Beyond the age of fifty, chronic subdural hematomas can occur, with risks of intracranial hypertension (ICH) and herniation, which can be life-threatening and also necessitate urgent neurosurgical intervention. The predominance of males found in our study has also been reported by other authors [2] [3]. The explanation is that the exposure of men to risky daily activities would be the primary factor. In this study, the main neurosurgical indications were dominated by cranioencephalic emergencies, with 98 patients (90%), and spinal emergencies, with 11 patients (10%). In the group of traumatic pathologies, the surgical indication mainly concerned acute post-traumatic subdural hematomas, accounting for 32.1% of cases, followed by chronic subdural hematomas (20.4%). In their study, Obame *et al*. in Gabon found subdural hematoma to be the most frequent urgent cranioencephalic neurosurgical pathology, representing 14.3% of cases [4]. However, in Mali, depressed fractures (24.8%) and hematomas were the most frequent. Extradural (14.3%) injuries were the most frequent cranio-encephalic neurosurgical emergencies. The predominant post-traumatic cranial lesions in all these studies could be explained by the lack of skull protection during road traffic accidents, resulting in head-on collisions. Acute hydrocephalus (12.8%) primarily affected the pediatric population, mainly infants. Gandaho *et al*. in Benin made the same observation, with respective rates of 50.8% and 34.6% in children under 1 year old, and then 25.9% and 27.1% in children aged 5 - 14 years [5]. This confirms that acute hydrocephalus is the most common malformation found in infants. In this study, preoperative neurological signs revealed a mean Glasgow Coma Scale (GCS) score of 12. It was less than or equal to 8 in 6 patients (5.7%), and between 13 and 15 in 67 patients (63.2%). Altered consciousness in the context of neurosurgical emergencies is indicative of cerebral damage. This result is similar to that of Bemora *et al*. in Madagascar, who found a GCS score greater than 13 in 70.17% of their patients and between 12 and 13 in 12.28% [6]. Signs of localization in an intracranial expansive process. Hematomas (EDH, DHS) were found in 49 patients (45%). Anisocoria (49%) and motor deficit (51%) are poor prognostic factors reported by some authors [7] [8]. In this study, preoperative preparation was performed in all patients. Its aim was to correct vital organ failure, treat intracranial hypertension with mannitol osmotherapy, and prevent secondary systemic brain injury (SSBBI). This was in accordance with various recommendations, including those of the SFAR [9]. The exclusive use of mannitol in our study is explained by its availability in our context. The average time to admission to the operating room was 10 ± 6.2 hours. The majority of patients (45.9%) were admitted to the operating room between 18 and 24 hours after diagnosis. Only 29 patients (26.6%) were admitted to the operating room within the first six hours. The management of neurosurgical emergencies must be carried out within a relatively short timeframe. This significant delay before admission to the operating room is related to the difficulties often encountered in obtaining surgical supplies (gowns, surgical drapes). These supplies, which are expensive, are often borne by the patient's parents and not covered by the country's health

insurance. The anesthetic management of a patient undergoing neurosurgical emergency is a high-risk procedure. This is especially true since the patient is most often in critical condition, poorly prepared, and with a full stomach. Therefore, the perioperative management of these patients requires close involvement from anesthesiologists and intensivists in the selection of monitoring equipment, the type of induction, and the choice of anesthetic drugs. In this study, all patients underwent multiparameter monitoring, including non-invasive blood pressure, pulse oximetry, and electrocardiogram. Capnography was used in 58 patients (53.2%). Continuous monitoring of exhaled CO_2 ($EtCO_2$) is essential for normocapnia control under anesthesia. The absence of $EtCO_2$ measurement in all our patients was due to sensor failure. In this study, no traumatic brain injury patient was able to benefit from intracranial pressure (ICP) measurement. The value of intraoperative ICP measurement lies in its ability to adjust the treatment of intracranial hypertension and facilitate the surgical procedure by creating less traumatic initial conditions for the parenchyma [10]. The lack of consumables and integrated software in the multiparameter monitor may be one of the causes. In this study, general anesthesia with orotracheal intubation was the standard practice for all patients. This practice is similar to that of Bemora *et al*. [6]. However, some authors recommend the use of local anesthesia, particularly in elderly or frail patients [11]. Rapid sequence induction was performed in 87 patients (80%) and conventional sequence induction in 22 patients (20%). Rapid sequence induction (RSI) should be used due to the full stomach, with the use of etomidate or ketamine combined with succinylcholine to ensure the hemodynamic stability necessary for maintaining CPP. The sympatholytic effect of anesthetic agents should be anticipated by initiating effective fluid resuscitation and vasoactive amines early, prior to anesthetic induction. Barbiturates and propofol should be avoided for induction due to their deleterious hemodynamic effects, particularly arterial hypotension, which leads to a decrease in cerebral perfusion pressure. Ketamine and etomidate are the agents of choice due to the hemodynamic stability of their effects. In this study, propofol was the most frequently used induction agent due to its availability. Intraoperative resuscitation consisted of fluid resuscitation with isotonic saline. Blood transfusion (61.5%) was used to compensate for blood loss and optimize hemoglobin levels. We recorded a high mortality rate (29.1%). Ventilator-associated pneumonia was implicated.

5. Conclusion

Anesthesia for neurosurgical emergencies presents a challenge for anesthesiologists and intensivists in resource-limited settings. Difficulties related to monitoring intracranial pressure and depth of anesthesia are compounded by delays in treatment. In this study, traumatic neurosurgical emergencies were predominant. Young people were the most affected population. Subdural hematoma was the primary indication. Infectious complications and the severity of the clinical presentation may explain the high mortality rate observed in this study.

Conflicts of Interest

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

References

[1] Güiza, F., Depreitere, B., Piper, I., Citerio, G., Chambers, I., Jones, P.A., *et al*. (2015) Visualizing the Pressure and Time Burden of Intracranial Hypertension in Adult and Paediatric Traumatic Brain Injury. *Intensive Care Medicine*, **41**, 1067-1076. https://doi.org/10.1007/s00134-015-3806-1

[2] Motah, M., Charlotte, S.N., Beyiha, G., Belley Priso, E., Malongte Nguemgne, C. and Gonsu Fotsin, J. (2013) Prise en charge des traumatismes craniens isoles a l'hopital general de douala. *Health Sciences and Disease*, **12**, 1-6.

[3] Kone, N., Sy, O. and Ahmed Baba, E.V. (2020) Bilan Des 11 Premiers Mois D'activités Neurochirurgicales Au Centre Hospitalier De Kiffa (Mauritanie). *Journal de Neurochirurgie*, **15**, 9-13. https://asjp.cerist.dz/en/article/114767

[4] Obame, R., Nze, O., Mba, M., *et al*. (2019) Prise en Charge Initiale des Traumatismes Crâniens de l'Adulte au Service d'Accueil des Urgences d'un Hôpital à Vocation de "Trauma Center" de Libreville. *Health Sciences and Diseases*, **20**, 80-83. https://www.hsd-fmsb.org/index.php/hsd/article/view/1446

[5] Gandaho, H.J., Soumaila, M., Hoinsou-Hans, I., Djrolo, G.M., Zevounou, A.A. and Adeleye, A.O. (2016) Main Neurosurgical Pathologies in Benin Republic. *Journal of Neurosciences in Rural Practice*, **7**, S52-S56.

[6] Bemora, J.S., Rakotondraibe, W.F., Raelison, J.G., *et al*. (2019) Anesthésie en chirurgie des hématomes sous-duraux chroniques vus au Centre Hospitalier Universitaire Joseph Ravoahangy Andrianavalona Antananarivo. *Revue d'Anesthesie-Reanimation, Medecine d'Urgence et Toxicologie*, **11**, 22-23. https://www.rarmu.org/publications/11(1)/full_text/11(1)_22-23.pdf

[7] Bapteste, L. and Lukaszewicz, A.-C. (2017) Anesthésie du patient pour urgences cérébrales neurochirurgicales. *Essential Conference Congress*, Paris. https://sfar.org/wp-content/uploads/2017/10/Lukaszewicz-Anesthesie-du-patient-pour-urgences-cerebrales-neurochirurgicales.pdf

[8] Rasolonjatovo, E.C., Tsiaremby, M.G., Rakotondraibe, W.F., Ratovondrainy, W, Rabarijaona, M. and Andriamamonjy, C. (2016) Management of Craniocerebral Wounds at the CHU Joseph Ravoahangy Andrianavalona, Antananarivo-Madagascar. *Revue D'Anesthésie-Réanimation, Médecine D'Urgence et Toxicologie*, **8**, 4-7. http://www.rarmu.org/

[9] Qureshi, H., Mithaiwala, H., Ezell, J. and Maurtua, M. (2017) Anesthetic Management of Traumatic Brain Injury. *Clinical Medical Reviews and Case Reports*, **4**, Article No. 159. https://doi.org/10.23937/2378-3656/1410159

[10] Geeraerts, T., Velly, L., Abdennour, L., Asehnoune, K., Audibert, G., Bouzat, P., *et al*. (2018) Management of Severe Traumatic Brain Injury (First 24 Hours). *Anaesthesia Critical Care & Pain Medicine*, **37**, 171-186. https://doi.org/10.1016/j.accpm.2017.12.001

[11] Cohadon, F., Castel, J.-P. and Richer, E. (2002) Les traumatisés crâniens: De l'accident à la réinsertion. 2nd Edition, Arnette. https://ulysse.univ-lorraine.fr/discovery/fulldisplay/alma991004053799705596/33UDL_INST:UDL