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# Epidemiological, Clinical, Paraclinical, and Evolutionary Characteristics of Non-Traumatic Subarachnoid Hemorrhage in Intensive Care Units in Libreville

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## Abstract

**Objective**: The study aimed to describe the epidemiological, clinical, and paraclinical aspects of severe non-traumatic meningeal hemorrhage in the intensive care units of the Libreville and Owendo University Hospital Centers. **Materials and Methods**: This is a cross-sectional, descriptive, and retrospective study from January 1, 2017, to December 31, 2024. The patients included were over 16 years old and hospitalized for non-traumatic subarachnoid hemorrhage. **Results**: Overall, meningeal hemorrhage accounted for 11.72% of strokes in the intensive care unit. The average age of the patients was 46.61 ± 11.59 years with a sex ratio of 0.43. Hypertension, alcohol, and tobacco were the risk factors identified. A severe consciousness disorder was present in 40% of cases and hemodynamic instability was present in 82%. Meningeal syndrome was found in 27% of patients, and motor deficits were associated in 48%. Brain CT scans were performed within 24 hours in 67% of cases. The severity scores WFNS and modified FISHER showed that 55% and 52% of patients, respectively, were classified as grade IV. The mortality rate was 67%. **Conclusion:** Non-traumatic subarachnoid hemorrhage has a low prevalence in intensive care and affects young adults. Clinical manifestations are dominated by consciousness disorders. Ventricular flooding is often associated.

## Keywords

Subarachnoid Hemorrhage, Intensive Care, Libreville, WNFS, Modified Fisher

## 1. Introduction

Meningeal hemorrhage is the passage of blood into the subarachnoid spaces (between the arachnoid and the pia mater), due to the rupture of a blood vessel located in this space. It can be either spontaneous, with the main cause being the rupture of an intracranial aneurysm, or traumatic [1]. It accounts for 5 to 10% of strokes and is the leading cause of non-traumatic adult disability in industrialized countries [2]. It is a diagnostic and therapeutic emergency, with an overall mortality rate reaching 40% within the first 48 hours [3]. The prognosis of patients remains associated with early multidisciplinary medical and surgical management. This depends on the performance of cerebral angiography and the availability of interventional radiology facilities [4]. In the era of widespread availability of these diagnostic and therapeutic means, we focused on this very little-documented neurovascular pathology in Gabon. The objective was to describe the epidemiological, clinical, and paraclinical aspects of severe non-traumatic adult subarachnoid hemorrhage in the intensive care units of the University Hospitals of Libreville and Owendo.

## 2. Patients and Methods

This is a retrospective study with a descriptive aim over an 8-year period from January 1, 2017, to December 31, 2024. Data collection was carried out in several steps. The first consisted of identifying patients using hospital admission records. The second involved sorting the files, and the third step consisted of collecting information from medical observations, test results, and treatment records. The target population consisted of patients admitted to intensive care units for the management of a subarachnoid hemorrhage. Patients over the age of 16 hospitalized for non-traumatic subarachnoid hemorrhage were included. The diagnosis of subarachnoid hemorrhage was established based on the confirmation of the presence of blood in the subarachnoid spaces on brain CT scan, and the non-traumatic context was retained insofar as the circumstances of occurrence contained in the medical history did not indicate the existence of a cranial trauma. The parameters studied were sociodemographic data (age, sex, occupational activity), risk factors (hypertension, diabetes, active smoking, alcoholism, combined oral contraception, use of anticoagulants), the delay in admission to intensive care, the delay in performing the brain scan. The clinical data studied were those found at the patient's initial examination; the selected paraclinical tests were those performed at admission. Severity was studied based on the clinical severity score according to the World Federation of Neurological Surgeons (WFNS), and the paraclinical severity score according to the modified Fisher classification. The epidemiological, clinical, and paraclinical data were used to create a database using Microsoft Excel 2016. Tables and data analysis were performed using R software, version R.4.4.0. Qualitative variables were presented as frequencies expressed in percentages, and quantitative variables as means and standard deviations. Approval from the administrative heads of the two university hospitals was obtained

beforehand. Confidentiality and anonymity were maintained.

## 3. Results

During the eight years corresponding to the study period, 45 cases of subarachnoid hemorrhage were found among 384 cases of hemorrhagic strokes, representing a prevalence of 11.72%. After analysis, 7 files were incomplete and 5 others were in favor of post-traumatic subarachnoid hemorrhage. In total, 12 files were excluded, including 7 women and 5 men with an average age of 42.58 ± 5.65 years. The selected sample therefore included 33 cases of non-traumatic subarachnoid hemorrhage (Figure 1).

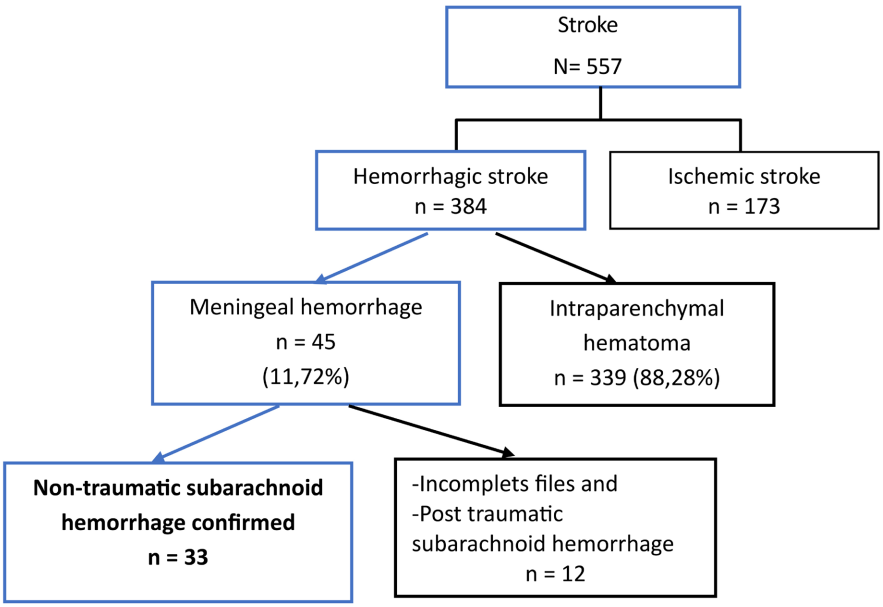


Figure 1. Flow diagram.

The average age of the patients was 46.61 ± 11.59 years with a sex ratio of 0.43. Unemployed patients accounted for 60% (n = 20). No neurosurgical or family history of subarachnoid hemorrhage was found. The identified risk factors were hypertension in 67%, alcohol consumption in 42%, and smoking in 18%. In 52% of cases (n = 17), patients were admitted to the emergency department more than 24 hours after the onset of the first symptoms, which were represented by disturbances in consciousness, headaches, and seizures in 58% (n = 19), 46% (n = 15), and 24% (n = 8) of patients, respectively (Figure 2).

From a hemodynamic standpoint, the mean arterial pressure (MAP) was below 100 mmHg in 46% (n = 15) and above 120 mmHg in 36% (n = 12). Consciousness assessment using the Glasgow Coma Scale showed impairment in 97% (n = 32), with coma in 40% (n = 13). Meningeal syndrome was present in 27% (n = 9), motor deficit in the form of hemiparesis in 24.2% (n = 8), aphasia in 15.2% (n = 5), and central facial paralysis in 9.1% (n = 3). Brain CT scans were performed within 24 hours of the first symptoms in 67% of patients (n = 22) and after 24

hours in 33% (n = 11). Cerebral CT angiography was performed in 21.2% (n = 7) and revealed a ruptured arterial aneurysm in 6 cases, or 85.7% (Table 1).

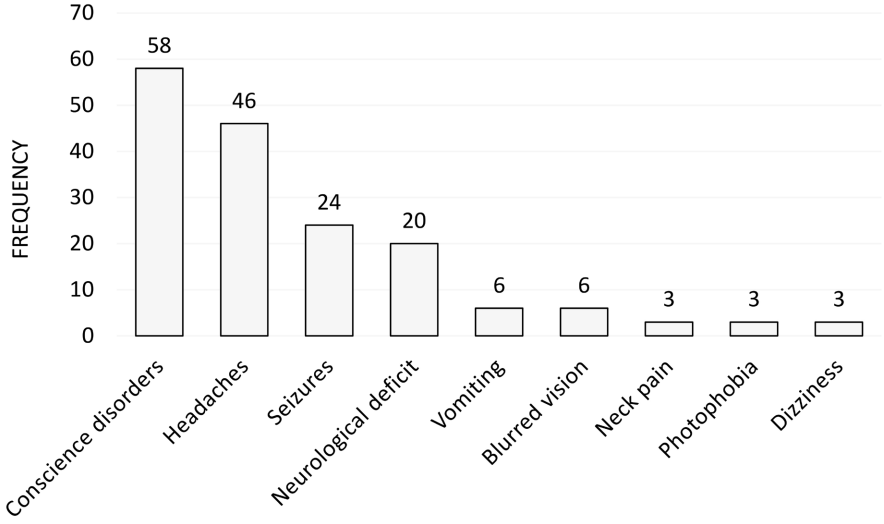


Figure 2. Distribution of patients according to clinical manifestations.

Table 1. distribution of patients according to the results of the cerebral CT angiography.

| Result of the CT Angiography | N | % |
|---|---|---|
| Right anterior cerebral artery aneurysm | 2 | 28 |
| Middle Cerebral Artery Aneurysm | 2 | 29 |
| Unruptured Aneurysm of the Left Posterior Cerebral Artery | 1 | 14 |
| Ruptured aneurysm of the anterior communicating artery | 1 | 14 |
| Normal | 1 | 14 |
| **Total** | **7** | **100** |

Table 2. distribution of patients according to severity scores.

| Severity Score | N | % |
|---|---|---|
| **WFNS Classification** | | |
| Grade I | 2 | 6 |
| Grade II | 8 | 24 |
| Grade III | 5 | 15 |
| Grade IV | 18 | 55 |
| **Modified Fisher scale** | | |
| Grade I | 0 | 0 |
| Grade II | 2 | 6 |
| Grade III | 14 | 42 |
| Grade IV | 17 | 52 |

The hemostasis assessment was normal in 94% (n = 31). The distribution of patients according to severity showed 55% of patients (n = 18) as grade IV according

to the WFNS classification and 52% of patients (n = 17) as grade IV according to the modified Fisher scale (**Table 2**).

The treatment was purely symptomatic. Rebleeding and delayed ischemia were complications found in 33% of patients. The average hospital stay was 12.5 ± 7.2 days. Mortality was 67%.

## 4. Discussion

The retrospective nature of the collection did not allow for comprehensive data and led to the exclusion of patients, thus reducing the sample size. A prospective survey would help to correct these various biases. However, this study focused on a topic that is little documented in our context and reports multicenter results over a long period of care.

In this study, non-traumatic meningeal hemorrhage represents a small proportion of strokes in intensive care and occurs more frequently in young adults. This trend is also observed in Togo by Ahanogbe *et al.* [4]. The African population in general, and the Gabonese population in particular, is predominantly composed of young adults who can also be affected by meningeal hemorrhage. The female predominance could be explained by the decrease in estrogen and progesterone in this age group, whose protective vascular role has been demonstrated [5] [6]. A significant proportion of patients were found to be unemployed. This socio-economic factor must be taken into account. Precariousness can limit access to preventive care and delay medical management, thereby increasing vulnerability to complications. Hypertension followed by alcohol consumption were the main risk factors. This result is similar to that of Razafindraibe *et al.* in Madagascar, and Ahanogbe *et al.* in Togo, who reported frequencies of 64% and 48%, respectively [4] [7]. The role of arterial hypertension is clearly demonstrated, as it increases the risk of a hemorrhagic stroke by 2.5 times [8]. Its association with smoking is synergistic and multiplies the risk of subarachnoid hemorrhage by 15 [9]. Consciousness disorders were the primary reason for admission to intensive care, as also reported by Razafindraibe *et al.* [7]. They constitute an aggravating factor for the pathology when they last more than 1 hour [10]. More than 80% of patients had a MAP outside the recommended range of 100 to 120 mmHg, aimed at preventing the risk of cerebral infarction due to vasospasm in case of low MAP and the risk of hemorrhagic transformation in case of excessively high MAP. Fluctuation of MAP outside this range reveals the severity of cases of meningeal hemorrhage admitted to intensive care. Meningeal syndrome predominates in literature as a physical sign [4]. However, in this study, it is preceded by motor deficit. This reversal can be explained by the study being limited to intensive care, where admitted patients are critically ill and sometimes have a consciousness disorder that hinders proper neurological examination. Motor deficit is associated with the presence of an associated parenchymal hematoma [11]. Non-contrast brain CT is undoubtedly the first-line examination for diagnosing subarachnoid hemorrhage. The majority of patients in this study underwent it within 24 hours of symptom

onset. The accessibility of this examination in several facilities in Libreville, thanks to partial or full coverage by insurance, is a major asset for the rapid diagnosis and urgent management of these patients. Cerebral arteriography is considered the "gold standard" for etiological diagnosis. In the Gabonese context, this examination is unavailable, and cerebral CT angiography stands out as an effective alternative, although it is rarely performed. Indeed, once the patient is admitted to intensive care, the priority given to neurological, respiratory, and hemodynamic stabilization makes performing this examination dependent on the patient's progress. Thus, more than three-quarters of the patients did not have an etiological diagnosis. The cerebral CT angiography performed in a very small proportion favored an aneurysmal etiology, with a majority localization on the middle cerebral artery and the anterior cerebral artery. Data from the literature indicate that about 85% of subarachnoid hemorrhages are of aneurysmal origin [12]. Other causes include, among others, arteriovenous malformation, dural arteriovenous fistula, and mycotic aneurysm. More than half of the patients were classified as Grade IV according to the WFNS score, indicating severe neurological impairment and a guarded prognosis. This result is similar to that reported by Razafindraibe *et al.* [7]. Intensive care units generally receive much more severe cases of subarachnoid hemorrhage, while Grade I cases are most often admitted to neurology departments. Furthermore, the modified Fisher scale, used to predict the risk of cerebral infarction, shows that almost all patients were classified as grade III and IV. Cases of subarachnoid hemorrhage admitted to intensive care are therefore likely to develop delayed ischemia or hydrocephalus in the immediate or medium-term course. Management is hampered by very limited technical resources, justifying purely symptomatic treatment in the face of the impossibility of performing neurosurgical or interventional radiological procedures. More than 20 years ago, Baité *et al.* [13] already highlighted this situation, which required systematic medical evacuation of patients to developed countries. In this study, no patient had benefited from a medical evacuation, even though a national health insurance and social security fund has existed for several years. This results in difficulties in providing comprehensive care for patients, leading to high mortality. The neurovascular unit at Libreville University Hospital is limited by difficulties in accessing diagnostic and treatment resources.

## 5. Conclusion

Non-traumatic subarachnoid hemorrhage represents a small proportion of strokes in intensive care in Libreville. It affects a predominantly young, hypertensive female population. The clinical manifestations and various classifications indicate that these patients are initially in a severe condition. Treatment that is solely symptomatic should be reinforced by neurovascular management.

## Conflicts of Interest

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

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