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The Short-Term and Medium-Term Prognosis of a Stroke and the Factors of Poor Prognosis in Liberville

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Abstract

Objectives: was to determine the factors influencing stroke prognosis in Libreville. **Methods:** This was a multicenter study prospective with a descriptive and analytical focus carried out from March 1st to July 31, 2014. Recruitment was systematic and exhaustive. The data collected was processed and analyzed using Epi-Info 3.3.5 software. **Results:** This study involved 66 patients including 27 male (40.9%) and 39 female (59.1%). Mean age was 55.1 +/− 15.3 years, mostly female. There were 57.5% ischemic stroke, 42.5% hemorrhagic stroke. The mean NIHSS was 7.8 +/− 6.6 at admission. Intra-hospital stroke mortality rates at 1 and 3 months were 7.6% and 9.1% respectively, ranging from 18.2% to 31.8%. The following factors were identified as associated with death at 1 month: age, high NIHSS at admission, high blood pressure, leukocytosis, hyperthermia and delay in admission. As for functional outcome, patients were relatively autonomous at discharge and factors associated with poor functional outcome (Rankin < 2) at 1 month were: age, high NIHSS, blood glucose and length of hospital stay. Factors associated with mortality and follow-up at 3 months could not be assessed due to 9 lost to follow-up (living or dead). **Conclusion:** This study highlights many factors influencing prognosis of stroke. The poor prognostic factors were age, high NIHSS at admission, high blood pressure, hyperthermia, blood glucose, leukocytosis, delay in admission and length of hospital stay. Addressing these factors in the acute phase management strategies may improve the prognosis of stroke patients in Gabon.

Keywords

Prognosis, Stroke, Libreville

1. Introduction

Stroke is a neurological deficit with acute onset, related to focal or global brain dysfunction with apparent vascular cause [1]. It is the most common neurological condition and a serious medical emergency. Stroke is a major cause of morbidity and mortality. It is the leading cause of permanent motor and intellectual disability, the second leading cause of dementia and depression, and the third leading cause of death after cardiovascular disease and cancer [2]. In developing countries (DCs), they occupy the same place behind cardiovascular diseases and ahead of infectious diseases, pulmonary or diarrheal infections, tuberculosis, AIDS, or malaria [3].

The World Health Organization (WHO) estimates that by 2030, 80% of all strokes will occur in people living in low- and middle-income (LMIC) countries, where they will account for 7.9% of mortality total [4]. Studies show that mortality remains high in our regions. In Uganda the 30-day mortality was 43.8% [5], 41% in Gambia [6] and 40% in Nigeria [7]. Half of stroke survivors remain dependent on others for activities of daily living such as eating, bathing, and dressing. In Africa, it is particularly about young people.

Predictive factors of stroke survival and functional outcome are the subject of much controversy, but there appears to be relative consensus regarding the predictive factors of poor vital and functional prognosis. In a context of underdevelopment and scarcity of resources for improved diagnostic and therapeutic management, we felt it was important to make a contribution to the broad field of stroke research. The objective of this study is to participate in the documenting of factors influencing stroke prognosis.

2. Methods

Our study took place in three referral hospitals of Libreville: Centre Hospitalier de Libreville, Centre Hospitalier Universitaire d'Angondje, Hôpital d'Instruction des Armées OMAR BONGO. It was a longitudinal, prospective, descriptive and analytical study, it was carried out from March 1st, 2014 to May 31st, 2014. The study population included all stroke patients confirmed by imaging and hospitalized in one of the three hospitals during the study period after giving consent (or consent of a close relative) to participate in the study. A systematic and comprehensive recruitment was conducted of patients who met the inclusion criteria. The endpoint was defined by mortality, at 1 and 3 months. Functional prognosis is defined as a two-modality variable according to the Rankin score.

The patients were considered independent for a rankin score less than or equal to 2 and dependent for a rankin score greater than 2. The data collection tool was a questionnaire survey. The form was completed after an initial interview and a full clinical examination at patient admission. For aphasic patients, parents' hetero-anamnesis helped collecting the necessary information.

Collected data included sociodemographic data (Age, Gender, Occupation), vascular risk factors (Hypertension, Diabete, Alcohol use, Tobacco use, Migraine,

Dyslipidemia, Hormonal contraception, Stroke recurrence, TIA, Obesity), clinical data on admission (Delay time from onset to admission to the primary care system, Mode of transport to hospital, Glasgow score, NIHSS, Vegetative constants, Weight, Height, Body Mass Index), Paraclinical data (cerebral CT and cerebral MRI, biology), factors related to complications (Pneumopathy, Phlebitis, Swallowing disorders, Pulmonary embolism, Urinary tract infection), therapeutic factors (Outpatient treatment), evolution factors at one and three months (Survival or death, Autonomy, Barthel score, NIHSS).

Data processing and analysis: The collection of data was processed with Epi-data and statistical analysis were performed using Epi-Info 3.3.5. Statistics used to describe the data included percentages for categorical variables and means (with standard deviation) for numerical variables. Differences between variables were assessed by the Student t test for means and the Chi-square test (or Fisher exact test) for proportions. A p value < 0.05 was used to determine statistical significance.

3. Results

Sixty-six (66) patients were included, of which 27 men (40.9%) and 39 women (59.1%) with a sex ratio of 0.69. Patients age ranged from 7 to 88 years with a mean age of 55.1 +/− 15.3 years. Stroke patients between 50 and 60 years old were predominant and represented 34.9% of the study population. Socio-demographic data are summarized in Table 1. A majority of 51.5% patients were subject to mandatory health insurance through CNAMGS registration, which covers medical expenses in Gabon according to social class. Three (3) patients had private health insurance, but (43.9%) had no healthcare coverage. A majority of 68.2% patients went by taxi to the hospital, 16.7% by personal car, 12.1% by medical transport and 3% by boat from Port-Gentil. Admission delays at any of the three structures ranged from 30 minutes to 6 days with an average of 9.7 h (+/−22.8 h). A total of 51 (77.3%) patients were admitted within 3 hours. However, faced with the difficulties of technical platforms, alteplase was not offered only aspirin. Vascular risk factors are summarized in Table 2. Hypertension was observed in 78.8% patients, alcohol use in 22.7% and stroke recurrence 19.7% cases. On admission, the NIH Stroke Scale to assess patients neurological deficit ranged from 0 to 24, with a mean of 7.8 +/− 6.6; as shown in Table 3. Patients admitted to the various departments were mostly conscious with a mean Glasgow score of 14.4 +/− 1.3, blood pressure was high with a mean systolic blood pressure (SBP) of 158.5 +/− 33.2 diastolic blood pressure (DBP) at 89.9 +/− 14.5. Some patients had hyperthermia, hyperglycemia and were overweight with a mean body mass index of 25.8 +/− 4.0. During hospital stay some patients had complications related to prolonged bedrest with pneumopathies (7.6%), urinary tract infection (3%), pulmonary embolism, phlebitis or swallowing disorders in one patient.

Out of 66 patients, 51 (77.27%) had a brain CT scan and 15 (22.73%) had a brain MRI scan. Ischemic stroke was the most common type of stroke representing

Table 1. Socio-demographic data.

Age groupe	Effectif	Percentage (%)
<40	6	09.1
[40 - 50[	14	21.2
[50 - 60[	23	34.9
[60 - 70[	14	21.2
>70 ans	9	13.6
Total	66	100
Sex		
Male	27	40.09
Feminin	39	59.1

Table 2. Vascular risk factors.

Antecedent	Effectif	Percentage (%)
High Blood pressure	52	78.8
Alcohol	15	22.7
Recidive stroke	13	19.7
Diabetes	8	12.1
Tobacco	5	7.6

Table 3. clinical parameter.

setting	Mean	Standar deviation	Minimum	Maximum
NIHSS	7.8	6.6	0	24
Glasgow score	14.4	1.3	10	15
Systolique blood pressure (mm Hg)	158.5	33.2	100	260
Diastolic blood pressure (mm Hg)	89.9	14.5	60	130
Temperature (˚C)	37.2	0.5	37	40
Glucose (mmol/l)	6.3	2.4	2.3	15.5
BMI (kg/m²)	25.8	4.0	15	35

57.5% of cases. The length of hospital stay ranged from 2 to 30 days with an average of 12.7 days (+/−6.6 days). Five patients died during hospitalization and mortality rate was 7.6% (RANKIN = 6). Sixty-one (61) patients (92.42%) were discharged home with an average NIHSS of 7.1 (+/−7.3). Based on disability score, 44 (72.1%) patients were autonomous (RANKIN < 2). At discharge BARTHEL score ranged from 45 to 100 with a mean value of 84.4 (+/−19.7).

At one month, six patients had died, representing a mortality rate of 9.1%. The mean NIHSS was 4.5 (+/−4.0) with extremes of 0 and 20. Out of 60 survi-

vors at 1 month, 83.3% were autonomous. The BARTHEL score ranged from 25 to 100 with an average of 85.4 (+/−22.3). From 60 survivors at 1 month, only 51 were controlled at 3 months. One patient was evacuated to France. The remaining 9 patients were lost to follow-up (status unknown whether dead or alive). Assuming minimal bias if all 9 patients are alive the 3-month mortality rate is 18.22% but assuming maximum bias if all 9 are deceased, the 3-month mortality rate is 31.8%. Actual rate regardless of status of the 9 lost to follow-up at 3 months ranged between 18.2% and 31.8%. Among the 51 patients controlled, Rankin could only be assessed for 37 patients, of which 29 (78.4%) were autonomous. They had a BARTHEL score ranging from 45 to 100 with a mean of 89.8. The deceased patients were significantly older than the survivors with a higher NIHSS. Their temperature was high and they came to the hospital later. Intra-hospital mortality data are summarized in Table 4. Patients deceased at 1 month were older than living patients, and their NIHSS was significantly higher. Blood glucose levels were high as well as temperature and leukocytosis. Older patients with lower NIHSS were the most autonomous. Patients with shorter hospital stays were more likely to be autonomous at 1 month. Data on functional prognosis are summarized in Table 5.

Table 4. Intra-hospital mortality.

Variables	Deceased Mean (+/−Standard deviation)	Alive Mean (+/−standard deviation)	P
Age (yeard)	67 (+/−14.9)	54 (+/−14.7)	0.06
NIHSS at input	16.2 (+/−5.2)	7.1 (+/−6.2)	0.0024
Systolic blood pressure (mm Hg)	176.4 (+/−22.7)	157.0 (+/−33.9)	0.214
Diastolic blood pressure (mm Hg)	94.8 (+/−14.3)	89.5 (+/−14.5)	0.43
Glucose of admission (mmol/l)	5.6 (+/−1.7)	6.4 (+/−2.5)	0.43
Temperature (˚C)	38.2 (+/−1.3)	37.1 (+/−0.3)	0.0000
Admission Time (hour)	20.2 (+/−29.5)	8.8 (+/−22.2)	0.09
Duration hospitalisation (days)	10.2 (+/−5.9)	12.9 (+/−14.7)	0.39

Table 5. Data on functional prognosis.

Variables	Deceased Mean (+/−standard deviation)	Alive Mean (+/−standard deviation)	P
Age (ans)	53.4 (+/−14.5)	55.7 (+/−15.7)	0.58
NIHSS at input	5.1 (+/−5.5)	11.8 (+/−5.4)	0.0001
Glucose on l'admission (mmol/l)	6.0 (+/−2.2)	7.3 (+/−3.1)	0.1
Admission time (hour)	10.5 (+/−25.2)	4.6 (+/−11.3)	0.357
Duration of hospitalisation (days)	11.5 (+/−6.0)	16.3 (+/−7.2)	0.01

4. Discussion

Our prospective study, conducted on a small size sample, found an intra-hospital mortality rate of 7.6%, which is low compared to that obtained by several African authors such as Mapouré in Cameroon [8], Touré K and al.in Senegal, who estimated their rates at 24.8% and Napon and al. in Burkina Faso, who found a higher rate of 28.21% [9] [10]. This observation may suggest there is better stroke management in Libreville compared to other countries in the subregion. Far from it, but this means a recruitment bias and the observed difference is also related to the small sample size and probably the difference in methods of study. The prognostic score of neurological recovery at discharge was favourable. Out of 61 discharged survivors, 44 (72.1%) were autonomous (RANKIN < 2). Balogou AAK and al. observed a Rankin of >2 among 95.5% of stroke survivors with ischemic stroke at admission versus 79.5% on discharge and 90.5% of hemorrhagic stroke survivors at admission versus 67.9% on discharge [11]. Daddah S and al. in 2009, studied stroke patients' life quality in Senegal, and found that among 70% of individuals with ischemic stroke and 30% with hemorrhagic stroke, 66% had a Barthel score at 6 months between 60 - 100, 24% between 40 - 60 and 6% between 0 - 20. This score was better in younger subjects [12]. At one month, six patients had died, resulting in a one-month mortality rate of 9.1%. Most studies have reported mortality rates after stroke at 1 month, but there are significant disparities worldwide, ranging from 10% to 30%, and reported rates is depending on the type of stroke. In the vast majority of studies, early mortality was higher for cerebral hemorrhage (25% - 50%) compared to cerebral infarction (10% - 25%) but was also depending on the etiologic mechanism [11]. In sub-Saharan Africa, Sène Diouf F and al. in Dakar, Napon C and al. in Ouagadougou in 2013 found a 29% mortality rate of [10] [13]. Ossou Nguiet PM and al. in Brazzaville reported a mortality rate of 25% among stroke patients [14].

At 3 months, the mortality rate ranged from 18.2% to 31.8%, with 9 patients lost to follow-up (alive or deceased). A study in Nigeria based on stroke registry showed that out of 318 patients, 207 were alive at 3 weeks but only 76 (24 %) at 1 month and 36 (11%) at 12 months [15]. This result highlights the difficulty to follow up patients after discharge in Africa. In our study, deceased patients had an average admission time delay of 20.2 hours compared to 8.8 hours for living patients, but 51 patients arrived within 3 hours. Toure K and al. found an admission time delay ranging from less than 1 day to 365 days with an average of 8.4 days, and 219 patients were admitted at least two days after stroke [9]. A Gambian hospital study estimated the average admission time delay to be 29 hours, and more than one quarter of patients arrived at the hospital after one week [16]. For Zenebe and al. in 2005, very few patients arrived at the facility within the first six hours Cultural and economic reasons contributed to this delay [17]. Also Thorogood and al. in South Africa have shown that about one third of patients first consult a traditional practitioner before coming to see the doctor [18]. This is common in Africa, particularly in sub-Saharan countries.

Moreover, the low level of knowledge regarding symptoms and warning signs partly explains the delay times to access hospital facilities. A research in southern Nigeria, in 2008, found that only 39.6% of individuals monitored for hypertension and diabetes were able to identify at least one of the signs and symptoms of stroke [19], while Ajayi AO and Ojo OO reported similar results [20]. Education and gender were factors associated with signs identification, men being more able, but these two parameters are probably related in Africa: girls' access to school education is not guaranteed [21] [22]. In Gabon, educational levels are the same for men and women, but the misidentification of signs and the poor quality of our communication network are responsible for the delays in receiving adequate treatment. All epidemiological studies agree that improvement of vital and functional prognosis is based on early management of strokes [23]. We noticed that age was also related to life prognosis of stroke patients, in addition to being a major risk factor for stroke which is doubled after age 55. Several studies show the negative influence of age on the prognosis of stroke. A study in Asia, specifically in Thailand, showed that stroke was the leading cause of death in people aged 60 years or older [24]. A high NIHSS is a factor associated with mortality in this study. Ossou nguiet PM and al. in Brazzaville made a similar observation [14]. An NIHSS greater than or equal to 16 has been shown to be a poor prognosis. Hypertension is a poor prognostic factor in our study, mortality rates increase by 3.8% for every 10 mmHg above 150 mmHg and by 17.9% for every 10 mmHg below 150 mmHg [25]. The role of hypotensive drugs in reducing stroke mortality is well established [26]. Hyperthermia is a poor prognostic factor. In 2000, and Wang and al. showed that hyperthermia (>37.5˚C) was associated with increased mortality at one year in ischemic stroke, independent of other clinical severity variables [27]. It is recommended, in case of ischemic or hemorrhagic stroke management, that any temperature above 37.5 should be treated. But hyperthermia can be neurogenic or central and the result of thermoregulation dysfunction [28]. Bruandet M, in his study on the risks of hyperglycemia in the acute phase of infarction showed that hyperglycemia was associated with higher mortality rates [29]. Hyperleukocytosis is a poor prognosis factor, as observed in many other studies. Many different mechanisms may explain it: vessel obstruction; release of hydroelectrolytic enzymes, oxygen free radicals or thrombosis initiation [30]. Age is a factor of poor functional prognosis in our study. Granger and al. suggested that high age is a factor of poor functional recovery and a longer stay in rehabilitation [31]. In our study, hyperglycemia is a poor functional prognosis factor. Length of stay is mainly associated with poor functional outcome. The same was true in the work of Kelly and al. and Katrak and al. [32] [33]. NIHSS also turns out to be a poor functional prognosis factor, according to Jorgensen *et al.* in 2000, Denmark [34].

5. Conclusion

Stroke is a public health problem in Africa in general and in Gabon in particular.

Each day, stroke kills thousands of people around the world and not only generates many orphans but impoverish Africa by crippling the forces of economic production. Our study highlights many factors influencing prognosis of stroke. The poor prognostic factors were age, high NIHSS at admission, high blood pressure, hyperthermia, blood glucose, leukocytosis, delay in admission and length of hospital stay. Addressing these factors in the acute phase management strategies may improve the prognosis of stroke patients in Gabon.

Authors' Contributions

All the authors have read and approved the manuscript.

Conflicts of Interest

The authors declare no competing interest.

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