

Prognostic Factors for Mortality by Ischemic Stroke at the Treichville University Hospital in Abidjan

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Abstract

Objectives: This paper aims to determine the predictive factors of mortality from ischemic stroke in the internal medicine and neurology departments of the Treichville University Hospital. **Materials and Methods:** This was a retrospective, descriptive and analytical cross-sectional study over one year concerning patients hospitalized for an ischemic stroke and therefore the evolution at the end of hospitalization was known. The data were collected on a survey form and the EPI-INFO 7 software was used for statistical analysis. The variables were first compared with the Chi-Square or Fischer tests and then the logistic regression test. **Results:** A total of 120 patients were recruited. Their age mean was 60 years with a male predominance (55.87%). The mean admission time was eight days. Cardiovascular risk factors were dominated by high blood pressure (72%), history of stroke (63%), and diabetes (36%). Impaired consciousness was the most common clinical sign. The fatality rate of stroke was 24.11%. Factors associated with death were history of stroke (0.023), Glasgow score less than 13 ($P = 0.023$), length of stay greater than 20 days ($P = 0.01$), and aspiration pneumonia (0.004). After logistic regression, only history of stroke ($OR = 7.77$) and prolonged stay ($OR = 14.43$) were independently associated with mortality from stroke. **Conclusion:** The analysis of predictive factors of mortality allows a better understanding of the management of this condition on a national scale. The burden of stroke remains heavy for our states. Management in intensive care units as well as prevention of stroke recurrence are decisive for improving the prognosis.

Keywords

Ischemic Stroke, Mortality, Prognosis, Treichville

1. Introduction

The phenomenon of globalization has contributed to the emergence of chronic non-communicable diseases through urbanization and lifestyle changes. We are therefore witnessing a high prevalence of cardiovascular diseases, including stroke, a real public health problem due to its increasing prevalence. Stroke is thus the 2nd leading cause of death in the world (11%) [1]. In Ivory Coast, it is responsible for 9.3% of deaths in public hospitals [2]; however, despite their potential seriousness, no study has been conducted on the predictive factors of intra-hospital mortality by stroke in our context. Knowledge of the factors that can allow us to better understand the management of this condition, our study therefore aimed to study the different risk factors for mortality during stroke at the University Hospital Center of Treichville.

2. Materials and Methods

This was a retrospective cross-sectional study with a descriptive and analytical aim in the internal medicine and neurology departments of the University Hospital from November 9, 2020 to November 9, 2021. All patients hospitalized for symptoms suggestive of a ischemic stroke, confirmed by brain imaging, were included. The non-inclusion criteria concerned patients transferred to another department or discharged against medical advice, and those who did not have brain imaging or incomplete records regarding the patient's clinical evolution.

The diagnosis of stroke was based on clinical and computed tomographic criteria. Thus, any patient presenting signs and symptoms related to a neurological deficit that occurred suddenly and persisted for more than 24 hours associated with signs of ischemia on brain imaging was considered a case of stroke.

Data collection was carried out on an operating sheet including socio-demographic data: history of the stroke, personal history and cardiovascular risk factors, clinical data in the emergency room and in the reception department, comorbidities, paraclinical and evolutionary data: discharge or death. The state of consciousness was assessed during the first clinical examination in the medical emergency room using the Glasgow score, a value of less than 8 of which indicated a coma. Certain complications were sought; these were urinary tract infection defined by the presence of leukocytes and nitrites on the urine strip and/or by the existence of pathogenic germs on the cyto-bacteriological examination of the urine and inhalation pneumonia: defined in our study by the presence of bronchial congestion rales associated with the onset of fever in a patient with stroke with the presence of swallowing disorders.

The data were analyzed using Epi info statistical software version 3.5.4.

We used the binary variable model (Yes/No) or numerical variables (biological data). The statistical tests used were the Chi-square test ($P < 0.05$). The means of

quantitative variables were compared by the ANNOVA or WILCOXON test.

Risk factors were identified by the linear regression method. Then the variables that obtained a p-value less than or equal to 0.05 were compared using the logistic regression method in order to identify the ODDS RATIO.

3. Results

A total of 120 ischemic stroke cases (see **Figure 1**) were analyzed. The age of the patients was 62 years \pm 12 with a majority of patients over 60 years (63.56%). There was a rather male predominance (55.83%). More than two thirds of the patients resided in the city of Abidjan. More than half of the patients (60%) had been transported to University Hospital by ambulance of the Treichville. The distribution according to socio-demographic characteristics is given in **Table 1**. Regarding clinical characteristics: the mean time of admission to the Hospital was six days. Only 9% of patients were admitted less than 24 hours after the stroke, almost half (46%) of patients arrived 72 hours after the stroke (**Figure 2**).

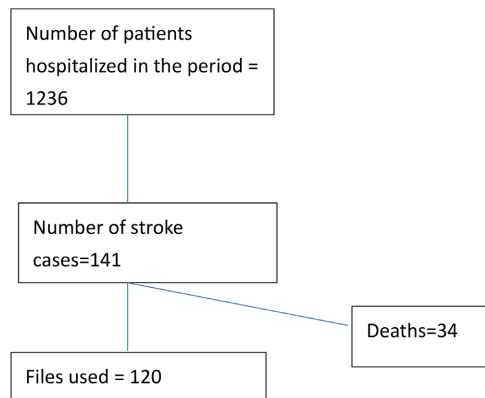


Figure 1. 120 ischemic stroke cases.

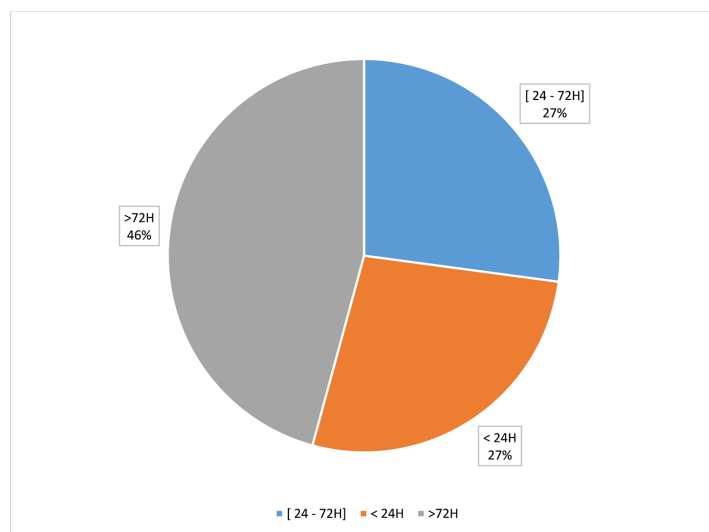


Figure 2. Distribution of cases according to the time between the first symptoms and admission.

Table 1. Distribution by epidemiological, clinical, paraclinical and bivariate characteristics.

Variables	Effective or average n = 120 (%)	Living n(%)	Deceased n (%)	P (OR)
Average age (years)	62+/-12	61.9+/-12.8	63.7+/-13.9	0.46
Gender M	67 (55.83)	47 (70.15)	20 (29.85)	0.72
Gender F	53 (44.17)	39 (73.58)	14 (26.42)	
Average admission time (days)	6+/-2.3	5.24+/-2.9	7.96+/-2.02	0.36
Background				
HTA	87 (72.5)	60 (69)	27 (31)	0.44
Diabetes	38 (31.66)	26 (68.42)	12 (31.58)	0.73
Stroke	48 (40)	30 (62.5)	18 (37.5)	0.013
Associated signs				
Glasgow Score (Emergency)	11.72+/-2.48	12.09+/-2	10.68+/-2	0.023
PA (emergency) mmhg				
Systolic PA	157.32+/-29.7	160.74+/-28.73	148.43+/-30.84	0.05
Diastolic BP	92.5+/-16.8	94+/-16.1	87.73+/-17.9	0.06
Territory reached				
Sylvian artery	84 (70)	63 (75)	21 (25)	0.02
Anterior cerebral	20 (16.6)	12 (60)	8 (40)	0.16
Cerebral post	8 (6.7)	7 (87.5)	1 (12.5)	0.43
Subtentorial	8 (6.7)	7 (87.5)	1 (12.5)	0.43
Biological signs				
Urea (g/l)	0.41+/-0.35	0.35+/-0.21	0.55+/-0.53	0.02
Creatinine (mg/l)	18.65+/-8.48	14.37+/-7.46	28.73+/-7.57	0.008
Kaliemia (mmol/l)	4.09+/-0.81	3.97+/-0.79	4.37+/-0.79	0.02
Blood sugar (g/l)	1.56+/-0.95	1.55+/-0.90	1.57+/-1.14	0.96
Complications				
Escarrhes	38 (31.66)	25 (65.78)	13 (34.22)	0.33
Urinary tract infection	12 (10)	8 (66.66)	4 (33.34)	0.51
Pneumonia	27 (22.5%)	13 (48.14)	14 (51.86)	0.003
Length of hospitalization (days)	7.85+/-6.68	7.54+/-5.8	8.61+/-8.48	0.61

The associated cardiovascular risk factors were, in decreasing order, high blood pressure (72.5%), diabetes (31.6%), obesity (9.16%), dyslipidemia and smoking (each 5.83%). There was no statistically significant difference between cardiovascular risk factors and the occurrence of death (**Table 1**). In almost two

thirds of cases, there was a history of stroke or transient ischemic attack (TIA) (63.16%), with a statistical influence on the occurrence of death ($P = 0.013$). Neurological signs at admission were dominated by altered state of consciousness (69.16%), which had a significant impact on the occurrence of death ($P = 0.002$). Patients who died during hospitalization had a lower Glasgow score (10.09) at admission than survivors (12.09 ± 2) at the end of hospitalization. Regarding paraclinical data: Cerebral infarctions were found in almost all cases (92%), followed by lacunae (17%), 3% of patients had hemorrhagic remodeling and CT scan was normal in 1.66% of patients. Sylvian location of the stroke was associated with a poor prognosis ($P = 0.02$). Cardiovascular: Left ventricular hypertrophy was the most common abnormality (20%). Patients with carotid stenosis on Doppler had a higher risk of death than others. ($P = 0.0004$) The biological assessment identified an increase in creatinine urea associated with an increased risk of death respectively $P = 0.01$ and $P = 0.022$. The mean survival of hospitalized patients was 19.56 days with a 10-day survival of 70% and a 20-day survival of 30% (**Figure 3**).

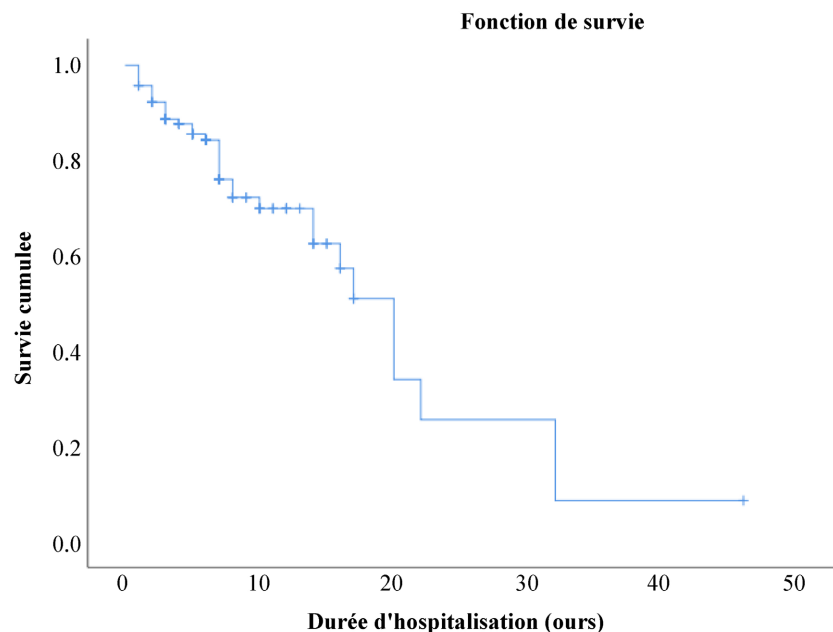


Figure 3. Mean survival curve of patients with strokes in hospitalization according to the Kaplan-Meier method.

The decubitus complications noted were, in order of frequency: bedsores (31.66%), urinary tract infection (10%), pneumonia (22.5%). The existence of inhalation pneumonia was significantly associated with the occurrence of death ($P = 0.004$) (**Table 1**).

After multivariate logistic regression analysis, a hospital stay of more than 20 days as well as a history of stroke or TIA were identified as independent factors of poor prognosis (**Table 2**).

Table 2. Identification of poor prognosis factors by logistic regression.

Term	Odds ratio	95% CI	Coefficient	SE	Z-statistics	P-value
Stroke (Yes/No)	<u>7.7701</u>	<u>1.6326</u> <u>36.9804</u>	2.0503	0.7960	2.5758	<u>0.0100</u>
Pressure sores (Yes/No)	1.6297	0.3107 8.5480	0.4884	0.8456	0.5776	0.5636
Glasgow < 13 (Yes/No)	3.9484	0.6658 23.4144	1.3733	0.9082	1.5121	0.1305
Hospi > 20 J (Yes/No)	<u>14.4362</u>	<u>1.1591</u> <u>19.8029</u>	2.6697	1.2868	2.0747	<u>0.0380</u>
Pneumopathy (Yes/No)	0.8903	0.1752 4.5246	-0.1162	0.8295	-0.1401	0.8885
Diabetes (Yes/No)	0.4558	0.0958 2.1677	-0.7858	0.7956	-0.9876	0.3234

4. Discussion

The burden of stroke remains heavy for sub-Saharan African countries. Indeed, the stroke mortality rate in this study was 24.11%, almost similar to previous data: 24.8% in Senegal according to TOURE in 2010 [3], although BARRY in GUINEA (14%) [4] and N'GORAN [5] in Ivory Coast had noted lower rates: 14% and 17% respectively. And yet mortality due to stroke is experiencing a considerable decline in developed countries due to the perpetual improvement of their care. Indeed, from 10.1% in 2007, mortality had been reduced to 7.7% in 2017 [6]. In our countries, stroke still remains lethal given the lack of early care, the absence of a neurovascular unit limiting access to better quality care. The socio-demographic characteristics remain similar: Average age around 60 years, male predominance, with a delayed delay in care. However, no statistical link was noted between these criteria and the occurrence of death in this study. In the work of TOURE [3] and OUEDRAOGO [7] age is unanimously recognized as a risk factor for death with Odds Ratios of 1.51 and 2.4 respectively. Similarly, BARRY [4] in Guinea found a significant correlation between age and the occurrence of death ($P = 0.01$). Regarding gender, our study corroborates the data in the literature [3] [5] [7] except for MOALLA [8] who identified male gender as a risk factor for death. ($P = 0.027$). Regarding the time of onset of symptoms before admission, only 9% of patients arrived less than 24 hours after the onset of symptoms, while the majority were present approximately 72 hours after the onset of symptoms. This could be explained by the fact that some patients had already received initial care in peripheral health centers or private establishments before being subsequently referred to the hospital in the event of complications. The same is true for patients residing outside Abidjan, evacuated by ambulance for long hours before reaching the city of Abidjan. However, the African data remain almost similar: very few patients arrive at the hospital before the first six hours [9]. OSSOU NGUIET [10] found an average admission time of 28 hours, while TOURE [3] noted an average time of eight days. The average admission time in the SENE DIOUF cohort [11] was 28.1 hours. Although the statistical link was not proven in our study, the admission time has an impact on the occurrence of death. Thus TOURE [3] and BARRY [4] found an OR of 2.24 and 1.57 respectively in patients who consulted 24 hours after the onset of symptoms. These data are consistent with those in the literature

because early management by thrombolysis improves vital prognosis and neurological recovery [12]. Regarding comorbidities, history of stroke was significantly associated with the occurrence of death ($P = 0.013$) in accordance with literature data [3] [4] [8] [9]. Despite its frequency (72.5%), high blood pressure and diabetes were not significantly associated with the occurrence of death. In the TOURE study [3], high blood pressure was a risk factor for death ($OR = 1.89$) but these were mainly cases of cerebral hematomas, generally associated with high blood pressure levels. The link between diabetes and cardiovascular mortality is also not unknown because TRAORE [13] found a high number of deaths in diabetic hypertensive patients. Moreover, according to the Multiple Risk Factor Intervention Trial (MRFIT), the absolute risk of death from cardiovascular diseases is 3 times higher in diabetics than in non-diabetics ($P < 0.0001$) [14]. On the other hand, the risk of stroke is proportional to the quantity and duration of tobacco consumption, the cessation of which reduces without completely eliminating the risk. In addition, 11% of deaths due to cerebrovascular accidents (CVA) before the age of 65 are attributable to smoking [15].

As for the clinical characteristics, the decrease in the Glasgow score was significantly associated with the occurrence of death ($P = 0.015$) in accordance with the data in the literature [3] [4] [8] [9] which had revealed that the existence of a Glasgow score lower than 10 during the first 24 hours was an independent parameter of poor vital prognosis. The absence of realization of the NIHSS score constitutes one of the weaknesses of this retrospective study. Thus in the TOAST trial [16], an additional point on the initial NIHSS score reduced the probability of survival at 7 days by 24% and at 3 months by 17%. OSSOU-NGUIET [10] had also found high systolic blood pressure figures (on average 234 mm Hg) as being associated with the occurrence of death ($P < 0.0001$), undoubtedly because his cohort included both patients with AVC and AVCH; the latter most often having very high blood pressure figures. However, HTA is beneficial in the event of a stroke, because it allows perfusion to be maintained in the ischemic penumbra zone around the infarction, thus avoiding definitive neuronal damage.

Concerning the paraclinical characteristics, there was a statistical link between the occurrence of death and the sylvian location of the stroke, which was also the territory frequently affected. This observation was also made by MOALLA [8] ($P < 0.001$). The size of the lesions also seems to be a factor to take into consideration; in a study carried out in Guinea [17] malignant sylvian infarction was lethal in 22 out of 33 cases with significant cerebral edema and there was a positive correlation between the occurrence of death and the existence of a stenosing atheroma ($P = 0.004$) and carotid thrombosis ($P = 0.007$) on Doppler ultrasound of the supra-aortic trunks. These data are in line with those in the literature; in fact, patients with carotid stenosis have a risk of death of 15 to 35% from the first stroke; This risk increases to 69% during subsequent strokes [18], requiring early carotid revascularization. Concerning the biological data, an increase in the values of urea and creatinine was associated with the occurrence of death; respectively $P = 0.02$

and $P = 0.014$. As was the case in MOALLA [8] ($P = 0.035$). SENE [11] had found in intensive care a renal failure in 10.5% of patients who died of stroke. The overall mortality during stroke in black African subjects is 26.6% at 3 months and it is higher in patients with renal damage ($P = 0.002$). Thus a decrease in the glomerular filtration rate and the presence of proteinuria double the risk of mortality [19].

About the evolution, a prolonged duration of hospitalization (more than 20 days) had been identified as a factor of poor prognosis ($P = 0.01$, $OR = 19.99$). observation also made by BARRY [4] ($OR = 1.908$, $P = 0.001$). The prognosis had however been more fatal in the series of OUEDRAOGO [7] with 86% of deaths occurring in the first 24 hours which was due to the fact that his cohort included both cases of AVC and AVCH generally with a worse prognosis. The duration of hospitalization is a determining fact in the prognosis of strokes. In Western countries, care in a neurovascular unit shortens the length of hospitalization, with the majority of patients having a length of hospitalization of less than 15 days, with possible deaths occurring on average 8.5 days after admission [20]. In our context, the insufficient number of centers equipped with a neurovascular unit did not guarantee optimal care of patients, which favored the appearance of complications of decubitus which in turn worsened the vital prognosis. Thus a positive correlation was found between the occurrence of inhalation pneumonia and the occurrence of death ($P = 0.004$, $OR = 3.62$). These data are in line with African data. BARRY [4] for example noted in addition to pneumonia ($OR = 4.824$), the existence of a urinary infection ($OR = 5.727$) and the presence of bedsores ($OR = 4.675$). ADAKONOU [9] identified infectious causes as being associated with the occurrence of intra-hospital deaths. It emerges after the multivariate study that the history of stroke as well as a prolonged duration of hospitalization were independent factors of poor prognosis. In the study of TOURE [3] it was mainly the existence of coma as well as the history of stroke. His analysis is however relevant the difference observed in our study comes from the fact that patients with a Glasgow score lower than 9 had not been taken into account in our study because they were kept in the medical emergency room or sent to an intensive care unit.

5. Conclusion

Ischemic stroke remains a condition with a poor prognosis in our regions due to the insufficient number of neurovascular units. Faced with this scourge, preventive treatment remains the most effective therapeutic option.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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