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Research Article

Spontaneous Intracerebral Hemorrhage: Clinical Profile And Natural History In A Sub-Saharan Africa Country: A Prospective And Multicentric Cohort Study.

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Abstract

Background: Stroke is a very common disease and well studied in high-income countries being predominantly ischemic and in elderly patients. In African low-income countries there is initial evidence of Youngers patients and hemorrhagic strokes with a worse neurological outcome. We aimed to analyze the clinical profile and natural history of patients with spontaneous intracerebral hemorrhage in 3 main tertiary Hospitals in Luanda – Angola.

Methods: Prospective multicentric cohort study, In the 3 main tertiary Hospitals in Luanda, capital of Angola. We prospectively included all patients with stroke from During a Year and analyzed only those with spontaneous intracerebral hemorrhage (SIH). The follow up time was 90 days with neurological outcome evaluation using modified Rankin scale on 30, 60 and 90 days of follow up, survival analysis was performed using Kaplan Meier curve, exclusion criteria were traumatic lesion, Subarachnoid hemorrhage, brain tumor and pediatric age.

Findings: On final analysis 150 patients were included, 54% were female, mean age 51 years old, main risk factor was arterial hypertension, main symptom was motor weakness, mean time of hospitalization was 14 days. On a 30 days analysis mortality rate was 29% on discharge, overall mortality was 55%, and functionally independent patients were only 29%. There are not surgical patients in this study because in public health system in Angola, surgical treatment for hemorrhagic stroke is not performed, so this is the natural history of this disease in Angola

Interpretation: SIH is an important cause of mortality in Angola (sub-Saharan Africa), with worse results because patients who would be candidates are not operated on. Adequate blood pressure control and implementation of surgery for selected cases could change the natural history.

Keywords : *Stroke; intracerebral Hemorrhage; Angola; Global Neurosurgery.*

INTRODUCTION

Stroke is a common cause of mortality and long-term disability, its prevalence is increasing. Stroke profile is not similar in high-income, middle and low – income countries. 1,2 Middle and low-income countries have more hemorrhagic strokes and 85% of death or disability sequels are in those countries.[1]

In low and middle income countries (LMIC) spontaneous intracerebral hemorrhage (ICH) is more frequent probably because of poor control of risk factors.[1,2]

In Africa we have scars data regarding SIH patients, but the tendency is a prevalence about 35% of strokes, average age under 60 years old and high rates of systemic arterial hypertension (AH) as the main risk factor.[3,4]

Angola is a country of twenty-eight million inhabitants, a little more than six thousand medical doctors and a very large shortage of specialists, despite the training efforts in the country and abroad.5 The risk factors for cerebrovascular disease in Angola constitute a previously studied problem, with very worrying data and no signs of improvement, namely the high prevalence of systemic arterial hypertension in young patients and arterial disease in addition to all other risk factors with less data published.[6-9]

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There is a high prevalence of risk factors, and there is a lack of published data on patients with ICH in sub-Saharan Africa, so the purpose of this work is to investigate the profile and outcome of these patients in the main tertiary hospitals in Angola, as well as what the natural history in patients who did not undergo surgery even when they would have been indicated due to the volume of the hematoma.

METHODS

Study Design

A cohort-prospective study with a quantitative approach was carried out on the "Clinical Profile and Outcomes of Patients with Hemorrhagic Stroke Attended at Tertiary Hospitals, in Luanda, Angola.

Place of study

The study was carried out in 3 of largest tertiaries hospitals in Luanda, all of then with Neurologists, Neurosurgeons and UCI beds:Hospital Josina Machel – Maria Pia, is the national hospital, the largest in the country, with more than five hundred beds; Hospital do Prenda, with more than hundred beds in center of Luanda City; Hospital Americo Boavida is the Universitary Hospital, with more than two hundred beds, located at the transition between central and periphery region of Luanda city.

Universe

Having logistical capacity and a not very high number of patients, all patients who met the inclusion criteria and with signed consent were included in the research, due to the lack of previous studies and a very irregular number of admissions, it was not possible to estimate the sample size, so the whole universe was studied instead of a sample.

Inclusion criteria

All patients with evidence of intracranial hemorrhage on Cranial Computed Tomography performed within the first 24 hours of hospital admission and followed up for at least 30 days, up to 90 days, were included. Outcomes were evaluated at discharge, 30, 60 and 90 days at this time the patients were evaluated by the same author only assessing the items present on modified Rankin scale, the complementary clinical evaluation was performed by the consultant doctor.

Exclusion criteria

All patients who, despite having ICH, had a history of trauma, aneurysm rupture, arteriovenous malformation and bleeding expansive lesions of tumor etiology, were excluded, as those who were unable to respond to the interview and who were not accompanied by a responsible person capable of answering for them at the time of data collection and those with less than 30 days of follow-up.

Study variables

Biological: Age group and sex.
Clinical: Risk factors, initial symptom, treatment, hematoma location, hematoma volume, and midline shift.
Outcome: Main Modified Rankin Scale and substitutes (Long stay in the ward and length of stay in the Intensive Care Unit).

Collection, processing and analysis of data

Data was collected and gathered in a database and introduced in Microsoft Excel 2016, with the aid of the Modified Rankin Scale (mRS) which allows assessing the patient's level of disability and their degree of functional dependence.
The database was formed in a spreadsheet with information on the case number, phone number, age, sex, risk factors, type of treatment, location of the hematoma, volume of the hematoma, midline shift, length of stay, mRS in the first 3 months after patient discharge.

Follow-up

Data were analyzed at 30, 60 and 90 days of follow-up using the total number of patients in each stage, admitting a loss of up to 25% of the universe. The analysis was performed using the intention-to-treat statistical method.The same researcher evaluated the patients on alternate days during hospitalization, assessing the evolution of their mRS.Data on risk factors prior to hospitalization were collected during the initial clinical history whenever possible directly from the patient or a family member capable of providing it.Follow-up was carried out by telephone, with data always provided by the patient or by the same family member who accompanied the hospitalization, where questions were asked about the ability to perform activities of daily living independently and thus classifying the patient's mRS at 30, 60 and 90 days

Data processing and analysis

Data were analyzed using the Statistical Package for the Social Science 20 (SPSS 20) software, using descriptive statistics, in frequency distribution (absolute and relative), mean and Pearson's coefficient, survival was analyzed using the Kaplan Meier curve. The outcome was analyzed as favorable or unfavorable using only mRS (≤3 favorable; ≥ 4 unfavorable) cutoff points

RESULTS

During the study period and after applying the exclusion criteria, 288 patients with stroke were identified, of which 150 (52%) were ICH, and 54% were Female. The loss of follow –up on the final 90 days was 16.6%.
Mean age was 51 years old and 79.2% of patients were less

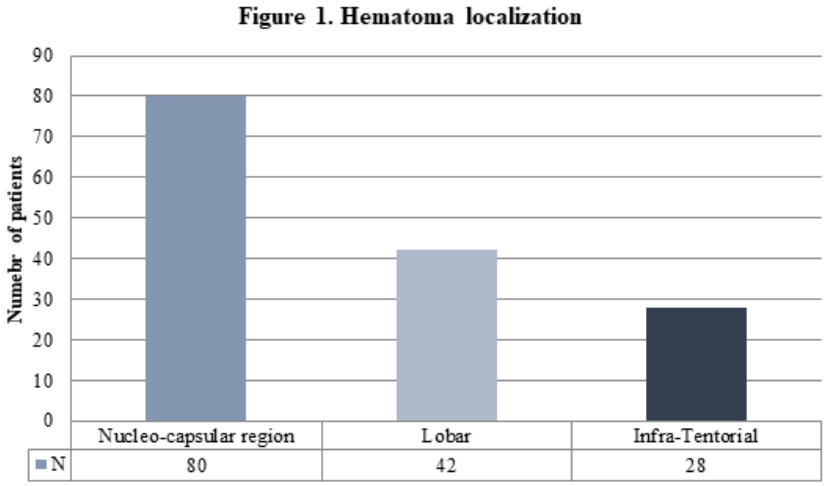
than 60 years old as in Table 1, nucleo-capsular region was the most frequently affected (**Figure 1**).

Table 1. Distribution of patients according to age and gender.

Age (years)	Gender				Total	
	Female		Male			
	n	%	n	%	n	%
20-25	2	1	--	--	2	1,3
26-30	---	---	---	---	----	----
31-35	4	3	2	1	6	4
36-40	8	5	10	7	18	12
41-45	18	12	12	8	30	20
46-50	14	9	15	10	29	19,3
51-55	7	5	7	5	14	9,3
56-60	10	7	10	7	20	13,3
61-65	6	4	8	5	14	9,3
≥65	12	8	5	3	17	11,3
Total	81	54	69	46	150	100

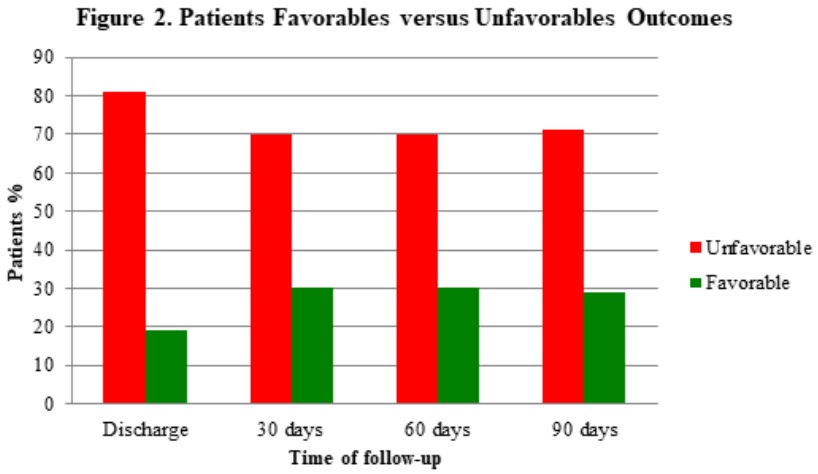
Legend: Patients according to age intervals showing only 15% of patients with more than 60 years old.

Figure 1:



The outcome classified as Favorable was 19% ate discharge, and 30% at 30 and 60 days, and 29% at 90 days of follow-up. Unfavorable outcome rates were 81% at discharge, 70 at 30 and 60 days, and 71% at 90 days of follow–up.

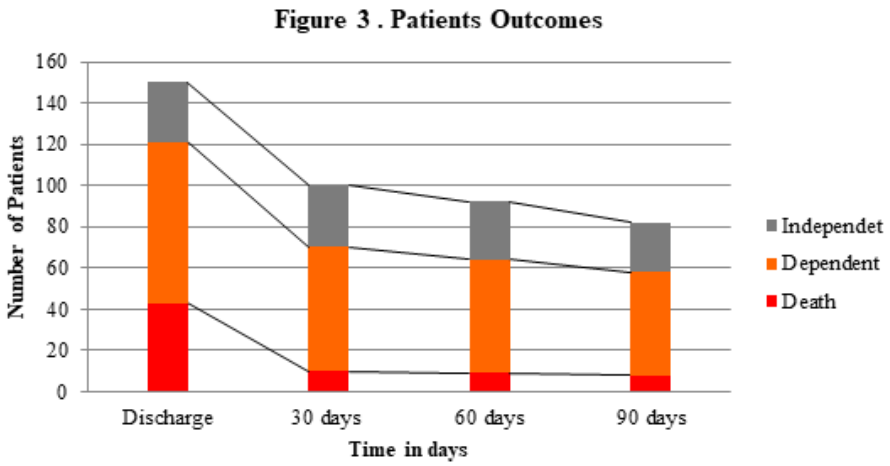
Figure 2:



Legend: Favorable outcome mRS ≤ 3; Unfavorable mRs ≥ 4

Hospitalar mortality rate was 28.6%. At the end of follow-up 82 patients were analyzed with 29.2% of them independent. A total of 70 patients died during the 90 days, considering 16% of loss of follow up (24 patients) remains 126 patients so global mortality rate is 55.5%. Figures 1 and 2 show detailed outcomes during follow –up.

Figure 3:



Arterial Hypertension was the main risk factor for ICH, having been identified as the only risk factor in 70% of the patients, the data on risk factors can be seen in **tables 2 and 3**.

Table 2. Risk factors

Risk factors	n	%
Diabetes	12	6
Dislipidemia	7	4
Arterial Hypertension	147	70
Familiar history of stroke	11	5
Previous Stroke	30	14
Eclampsia	2	1
Total	209	100

Table 3. Number of risk factors

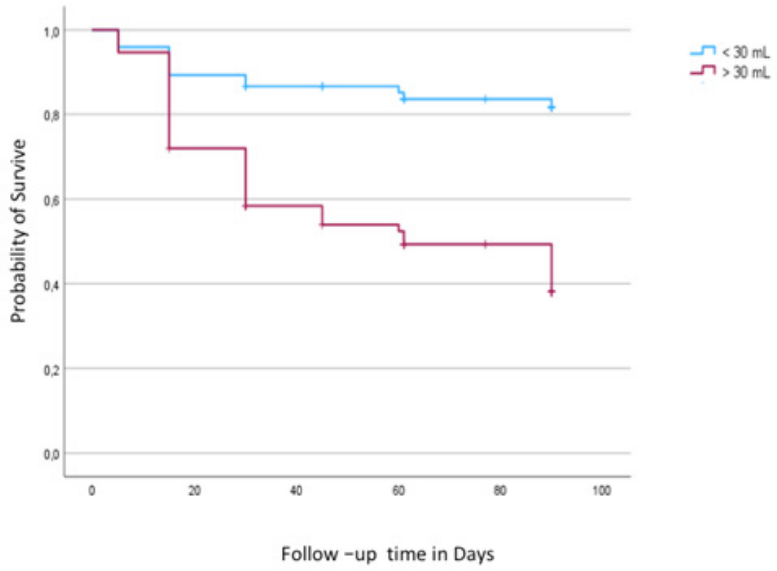
Number of risk factors	N	%
1	105	70
2	36	24
3 or more	9	6

Of the 150 patients, 26% had intraventricular hemorrhage and 45 (30%) had a hematoma volume calculated at 30 milliliters or more and of these 39 died during hospitalization, of the 105 patients with hematoma volume less than 30 milliliters, only 04 died during hospitalization, these data can be seen in Table 4 and Kaplan Mier survival analysis shows a statistically significative difference between more than 30ml group and less than 30 ml group after discharge in **figure 3**
The average length of stay was 14 days. The most frequent symptom was loss of muscle strength in 33% of patients.

Table 4. Hematoma volume and Hospitalar Mortality

Outcome	Volume (ml)		
	> 30 (%)	≤30 (%)	Total
Survived	06 (13%)	101(96%)	107
Died	39 (87%)	04 (4%)	43
Total	45 (100%)	105 (100%)	150

Figure 4. Kaplan Mier survival analysis



DISCUSSION

Socio-demographic profile

The profile of the patients was the opposite of what was expected since the male gender is the most frequent in previous studies, even constituting a risk factor.10 We already expected a young population but only one fifth of the patients are over 60 years old, it is very alarming. A previous small study in Angola had already shown an average age of 47 years in patients with stroke.5 It is urgent that we change the natural history of the disease in sub-Saharan African countries.The predominance of ICH in relation to ischemia confirms the higher prevalence in middle and low-income countries.3,4

Systemic arterial hypertension and ICH

Systemic arterial Hypertension is big problem in Angola with high incidence, underdiagnosis and the few patients diagnosed have poor disease control.11 The fact that the population is young (mean age 16 years) should be a protective factor, but unfortunately it is not because previous studies show that the onset of the disease in this population is very early and,6-10 as a consequence, patients with ICH are younger. 11,12A previous study in Angola, in patients with hypertensive emergencies, aged less than 46 years, 82% of them had ICH.12 These patients are probably hypertensive for 10 years, that is the average period until target organ lesions appear. There is yet another problem, which is the deficient pre-hospital care system, because of the leak of professional in primary health care system,13 which means that many patients do not even arrive at the hospital, and in most hospitals a CT scan is not available, so these alarming numbers are probably still under diagnosed.

Outcomes

The main outcomes (mortality and disability) were high but expected for a low-income country, 14, 2-4 with few patients functionally independents. As no patient was operated on in this work, we will discuss these results in more detail in the section below.

Natural history and role of Global Neurosurgery

In the universe studied, it is very noteworthy that we do not have operated patients, even with patients with a volume greater than 30 ml established as candidates for surgery with the purpose of at least altering substitute outcomes as in classic studies, 13-21 it is very clear that hematoma volumes between 30 - 60ml have an almost zero survival rate.18-21 As in this work, we can see that these patients (more than 30ml) have a survival rate of around 10%.

This is the largest work about this topic in Angola and ends up being an example of the natural history of the disease, because by choice of the services themselves, and some technical limitation, the patients were not operated on.

Global Neurosurgery, with its basic principle of bringing the best possible care to all places, could play a fundamental role in improving the outcome of this population where more than half died and only one fifth performed well.

In the country, neurological surgeries are performed, as can be seen in some small publications about other diseases such as traumatic brain injury.22-23 So, we can infer that the main limitation is not logistical but an outdated concept introduced in the 90's and tested in randomized studies since the beginning of the 2000's.15-19

The Global Neurosurgery committee could play an important role in updating the practices of Neurosurgeons in Angola as a priority and as a secondary action to contribute to better Neurosurgical equipment in the public system in the country.

The private system has hospitals with more adequate equipment and Neurosurgeons trained abroad who are up to date and operate on patients with ICH, but the majority of the population does not have access to these hospitals.

LIMITATIONS

Some risk factors such as Diabetes and Hypertension are only mentioned in the clinical history without confirmation.

CONCLUSION

ICH is an important cause of mortality in Angola (sub-Saharan Africa), with worse results because patients who would be candidates are not operated on. Adequate blood pressure control and implementation of surgery for selected cases could change the natural history.

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