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Malignant Sylvian Infarction: Epidemiological, Clinical and Prognostic Aspects at the Institute of Neurology of Simbaya, Conakry

Namory Camara[1*], Mohamed Tafsir Diallo[2], Malé Doré[2], Mohamed Lamine Condé[2], Karimka Diawara[2], Djènè Keita[1], Fodé Abass Cissé[1,2]

[1]Simbaya Institute of Neurology, Conakry, Guinea
[2]Department of Neurology, Conakry University Hospital, Conakry, Guinea
Email: *camaranamoryjb@gmail.com

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Abstract

Introduction: Malignant sylvian infarction (MSI) is a type of ischemic stroke (ICS) usually affecting the entire territory of the middle cerebral artery (MCA) associated with significant cerebral edema and a mass. It represents about 10% of all AICs, with a mortality of up to 80%. The objectives of our study were to describe the sociodemographic profile and the main clinical manifestations and identify the prognostic factors of ISM. **Material and Methods:** We conducted a retrospective descriptive study over a 2-year period. It included patients hospitalized for cerebral infarction involving 2/3 of the ACM territory with a NIHSS score ≥ 17 and/or a Glasgow score < 9. Epidemiological, clinical and prognostic variables were listed. Any p-value < 0.05 was considered statistically significant. **Results:** We collected 223 patients hospitalized for ischemic stroke, of whom 21 patients (9.4%) presented with ISM. The mean age was 57.43 ± 24.24 years with a male predominance (52.4%). The mean admission time was 47 ± 0.87 hours, and hemiplegia was the frequent neurological sign (85.7%). HBP was the common cardiovascular risk factor (76.2%). The mean NIHSS at admission was 18.38 ± 12.29. Respiratory distress (p-value = 0.00015), aspiration pneumonia (p-value = 0.015) and brain herniation (p-value = 0.014) were the main complications associated with mortality. **Conclusion:** ISM is associated with poor prognosis in the absence of surgical treatment. Respiratory distress, aspiration pneumonia and brain herniation are associated with high mortality.

Keywords

Malignant Sylvian Infarction, Respiratory Distress, Aspiration Pneumonia, Cerebral Herniation, INS

1. Introduction

The concept of malignant sylvian infarction (MSI) corresponds to a specific type of ischemic stroke (ISC), which usually affects the entire territory of the middle cerebral artery (MCA) or sylvian artery and may extend to other arterial territories due to complete or near complete occlusion complete ACM, associated with significant cerebral edema and mass effect [1] [2].

ISM is a serious condition in which significant ischemia of the territory of the ACM can cause a displacement of the medial structures responsible for rapid neurological deterioration due to a rapid increase in intracranial pressure by ischemic edema, thus producing coma and death [2]-[4].

Worldwide, the annual incidence varies from 10 to 100 cases per 100,000 inhabitants, with a mortality of 25% to 78% [2] [5].

In Canada, the annual incidence is estimated at 2% to 10% of all ischemic cerebrovascular accidents (CVAs), with a mortality of 80% [6].

In France, the hospital frequency is 10%, with a mortality rate of 78% if medical treatment alone versus 29% in the case of decompressive craniectomy [7]. In Spain, a Barcelona study reported a frequency of 2.3% of all MCA strokes and a death rate of 78% [5].

In Congo-Brazzaville, 34 cases of ISM with a mortality rate of 85.3% were recorded at the Brazzaville University Hospital between February 2011 and October 2012 [2].

In Guinea, Cissé *et al.* reported a frequency of 5.7% of all Ischemic strokes and 66.6% deaths with medical treatment at the CHU de Conakry [8].

The usual clinical presentation is massive hemiplegia, sensory deficit, severe body hemi, a combined deviation of the eyes and head, disorders vigilance, hemineglect, and mixed aphasia [9] [10].

The brain scan performed less than six hours after the objective evolution of the signs of early extensive ischemia greater than 50% of the ACM territory and brain magnetic resonance imaging (MRI), which is the examination of choice, shows on the broadcast sequence, an extensive Sylvian infarction whose volume is greater than 145 ml in the first 24 hours [11].

The etiology of malignant sylvian infarction is almost always embolic, source proximal cardiac or carotid disease (dissection, atheroembolic) [6].

Care requires hospitalization in a neuro-intensive care unit vascular, sedation, intubation and mechanical ventilation [2].

Moderate hypothermia of 33˚C to 34˚C using devices external and internal cooling and decompressive hemicraniectomy are the only two treatments that have proven their effectiveness in reducing mortality and long-term functional prognosis [2] [8].

ISM is associated with poor prognosis in the absence of surgical treatment [6].

Brain engagement, NIHSS (National Institute Health Stroke Scale) score high, low Glasgow score and ventricular collapse are associated with high mortality. With conservative treatment, the mortality rate is extremely high, reaching 80% and this

rate is reduced by craniectomy of approximately 34% [6] [8] [12].

The aim of our study was to determine the epidemiological, clinical and prognosis of ISM in a resource-limited sub-Saharan region where Decompressive hemicraniectomy is not feasible on the one hand due to the lack of suitable technical platform and, on the other hand, the delay in consultation by the patients.

2. Materials and Methods

This was a retrospective descriptive study over a 2-year period from December 1, 2021 to December 1, 2023 on patient records hospitalized at the Institute of Neurology of Simbaya-Conakry for heart attack sylvien malin. The diagnostic criteria were a Glasgow score less than 9; a NIHSS score greater than or equal to 17; hypodensity occupying 2/3 of the middle cerebral artery territory on computed tomography (CT) [13]. We noted for each patient the epidemiological and clinical data, the average consultation time, NIHSS scores; Glasgow and Rankin modified at the entrance and exit, the therapeutic means. The antecedents and the complications for each patient were investigated. We analyzed the brain scan results; cardiac and supra-thoracic trunk ultrasound aortic respectively looking for hypodensity and occupying 2/3 of the sylvian territory and an etiology. For ethical reasons, we have obtained consent from our patients and their families and we used data for strictly scientific purposes.

3. Results

We collected 223 patients hospitalized for ischemic stroke, including 21 patients, 9.4%, had malignant sylvian infarction. The average age of our patients was 57.43 (24.24) years old with a male predominance (11M/10F) and a sex ratio of 1.1. Table 1 shows the distribution of patients according to socio-demographic characteristics.

Table 1. Distribution of patients according to sociodemographic characteristics.

Sociodemographic characteristics	Staff	Percentages
Age group (year)		
1 - 21	2	9.5
22 - 42	2	9.5
43 - 63	5	23.8
64 - 86	12	57.1
Average age 57.43 ± 24.24 years	**Extremes**	**1 - 86 years**
Sex		
Men	11	52.4
Women	10	47.6
Sex ratio M/F = 1.1		
Total	21	100

The disturbance of vigilance was the frequent reason for consultation, *i.e.* 85.7%. Table 2 shows the distribution of patients according to the reasons for consultation.

Table 2. Distribution of patients according to the reasons for consultation.

Reason for consultation	Staff	Percentages
Low HCG	15	71.4
HCD weakness	6	28.6
Language disorder	17	81.0
Disturbance of vigilance	18	85.7
Headaches	13	61.9
Hustle	9	42.9
Mouth deviation	16	76.2
Vomiting	4	19.0

The mean admission time in our study was 47 hours. Table 3 represents the distribution of patients according to consultation time.

Table 3. Distribution of patients according to consultation time.

Consultation deadline	Staff	Percentages
< 24 h	6	28.6
24 – 48 h	5	23.8
> 48 h	10	47.6
Total	21	100.0

Extremes = 12 - 96 h; Average delay = 47 ± 0.872.

HBP was the most common cardiovascular risk factor and comorbidity, 76.2%. Table 4 shows the distribution of patients according to the factors of cardiovascular risk and comorbidities.

Table 4. Distribution of patients according to risk factors (FDR) cardiovascular and comorbidities.

FDR and comorbidities	Staff	Percentages
HTA	16	76.2
Diabetes mellitus	6	28.6
Dyslipidemia	5	23.8
Stroke	5	23.8
Tobacco	4	19.0
Alcohol	2	9.5
Ischemic heart disease	1	4.8
HIV infection	1	4.8

Hemiplegia was the dominant sign of the neurological examination, *i.e.* 85.7%. Table 5 shows the distribution of patients according to the examination data neurological.

Table 5. Distribution of patients according to the neurological examination data.

Exam data	Staff	Percentages
Hemiplegia	21	100.0
Hypertonia	17	81.0
Hyperreflexia	17	81.0
Facial paralysis	17	81.0
Babinski	14	66.7
Hypoaesthesia	13	61.9
Aphasia	17	80.9
Dysarthria	4	19.0

The majority of our patients had an undetermined etiology 57.1%. Table 6 represents the distribution of patients according to the presumed etiology of ISM.

Table 6. Distribution of patients according to the presumed etiology of ISM.

Etiology	Staff	Percentages
Atherosclerosis	3	14.3
Embolic heart disease	5	23.8
Indeterminate	12	57.1
Vasculitis	1	4.8
Total	21	100.0

The main complication developed by our patients was pneumonia or 47.6%. Table 7 shows the distribution of patients according to the complications.

Table 7. Distribution of patients according to the complications that occurred.

Complications	Staff	Percentages
Pneumonia	10	47.6
Septic shock	4	19.0
Respiratory distress	9	42.9
Buttock sores	4	19.0
Brain engagement	5	23.8

We recorded 10 deaths or 47.6%. Figure 1 shows the distribution of patients according to mortality.

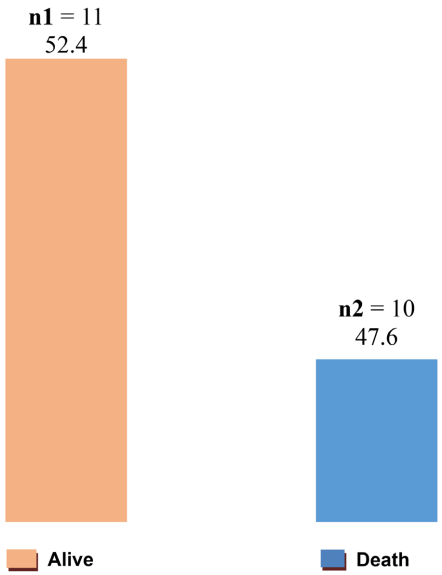

Figure 1. Distribution of patients according to mortality.

The mean NIHSS score of our patients at entry and discharge was respectively 18.3 ± 2.2 and 17.1 ± 4.5 (Table 8).

Table 8. Distribution of patients according to NIHSS score at entry and exit.

NIHSS	Staff (N = 21)	Percentages
At the entrance		
16 - 20	18	85.7
Sup 20	3	14.3
Average	**18.3 ± 2.2**	
At the exit		
11 - 15	6	28.6
16 - 20	7	33.3
5 - 10	2	9.5
Sup 20	6	28.6
Average	**17.1 ± 4.5**	

Factors associated with mortality in our study were distress respiratory followed by cerebral involvement and aspiration pneumonitis with respective p-values of 0.00015; 0.014 and 0.015. Table 9 represents the distribution of patients according to the association between mortality and sociodemographic, clinical and prognostic characteristics.

Table 9. Distribution of patients according to the association between mortality and sociodemographic, clinical and prognostic characteristics.

Causes of death	Death	X^2	p-value
Aspiration pneumonia	8	5838	0.015
Septic shock	4	4492	0.034
Respiratory distress	9	14,318	0.00015
Brain engagement	5	5966	0.014

4. Discussion

We collected 223 patients hospitalized for ischemic stroke, including 21 patients (9.4%) had malignant sylvian infarction. This frequency is lower than that found by Lompo *et al.* in Burkina Faso in 2018 where ISM accounted for 11.9% of all acute AICs [14]. However, Dharmasaroja *et al.* in Thailand in 2016 found ISM in 13% cases [15].

The difference in frequency could be explained by the difference in the duration of studies and also that of the sample size.

The mean age of our patients was 57.43 ± 24.24 years with extremes 1 to 86 years. Our result is close to that of Cissé *et al.* in Guinea in 2019 who found in their study of 33 cases of ISM a mean age of 60.48 ± 16.61 years with extremes from 7 to 78 years [8]. This result could be explained on the one hand by the fact that the risk of a stroke occurring is multiplied by 2 after 55 years old, and on the one hand by the risky hygiene and dietary habits in our context.

The urban population was the most affected in our study of 61.9% of cases. In fact, patients from rural areas used self-medication, traditional medicine and had a low level of education which could delay support and access to specialist services.

The reasons for consultation in our study were dominated by mental disorders. vigilance encountered in 18 patients (85.7%) followed by language disorders and weakness of the left hemibody whose respective frequencies were 81.0% and 71.4%. Our results are close to those reported by Mandon *et al.* in 2010 who found in their study a high frequency of disorders of the language and motility in 66.6% of cases [16]. This could be explained by the importance of perilesional edema responsible for a mass effect on the medial structures following alteration of capillary permeability [10].

The average admission time of our patients was 47 h ± 0.87 h with extremes of 12 to 96 hours reflecting the delay in consultation. This result is lower than that of Cissé *et al.* who found an average delay of consultation of 62.61 h ± 26.40 h. This delay could be explained on the one hand by the long patient pathways that pass through several health structures before joining the Simbaya Institute of Neurology and the unavailability of a service emergency medical assistance (SAMU) and non-medical transport on the other hand.

Hemiplegia was the dominant neurological sign in 85.7% of cases. Or Pallesen *et al.* (2019) found in their study series of 45 patients, a proportion hemiplegic by

53% [17]. This difference could be explained by the fact that According to the 2015 WHO report, stroke represents the leading cause of acquired neurological disabilities.

As reported in the study of Otiobanda *et al.* (2013) [2], all our patients have benefited from a brain scan. In fact, a brain scan is an examination of first line in the event of any suspicion of stroke in our context. In accordance with literature data [16]. HBP was the risk factor cardiovascular disease most commonly encountered in our patients, *i.e.* 76.2%, followed by sweetened diabetes or 28.6%. On the other hand, Li *et al.* in China in 2018 reported 50.1% of hypertension, 20.5% of diabetes and 22.5% of smoking [18] and Kamran *et al.* in 2017 found 46% of HTA and 34.3% of diabetes mellitus [19].

Smoking was encountered in 4 cases or 19% followed by alcoholism in 2 cases or 9.5%. This result is higher than that reported by Otiobanda *et al.* in 2013 which found smoking and alcoholism in 2 cases or 5.9% [2].

However, Li *et al.* [18] found 22.5% smoking. These data are confirmed by the literature, which stipulates the existence of eleven risk factors main factors explaining 90% of strokes including hypertension, smoking, diabetes, obesity, poor diet, physical inactivity, excessive alcohol consumption, dyslipidemia, cardiac causes, stress and mental depression [20].

All our patients received antiplatelet treatment, of analgesic and 90.5% benefited from mannitol 20% and oxygen therapy at the 5 liter per minute bezel. On the other hand, decompressive hemi craniectomy was not performed on any of our patients due to technical reasons and delayed consultation by patients. Otiobanda *et al.* in 2013 in their series, Antiplatelet and mannitol were used in all patients [2].

Li *et al.* in 2018 reported the use of antiedema treatment in 80.6% of their patients and decompressive hemi craniectomy in 9.4% of cases [18]. Raffiq *et al.* in Malaysia in 2014 [21] and Hofmeijer *et al.* in 2009 [22] reported in their series the practice of hemicraniectomy decompressive in 72% and 50% of cases respectively. Mannitol and Hypertonic saline solution are first-line medical treatment options. line for the management of cerebral edema in ISM [14], which may explain the high frequency of Mannitol use in this study on the one hand and the absence of the practice of decompressive hemicraniectomy in our context on the other hand.

As reported in the literature [21], the undetermined causes were the more frequent in our study 57.4% of cases followed by heart disease emboligenic 23.8% of cases.

Complications were dominated by pneumonia (inhalation or bronchial congestion) or 47.6% followed by respiratory distress 42.9%. This result is close to that of Li *et al.* in China 2018 who found 53.3% of broncho-pneumopathy [18]. On the other hand, Mapoure *et al.* in Cameroon in 2014, had reported 15% of bronchopneumopathy [20] and Lompo *et al.* found bronchopneumopathy in 31.8% of cases and fever in 13.9% of cases [14]. Our result could be explained by the diet of the patients in our context by parents despite the impaired vigilance before rallying the reference structures, responsible for food break-ins in the lungs.

The mean NIHSS score of our patients at admission was 18.381 ± 2.2, comparable to those of Kamran *et al.* in South Asia in 2017 and Albert *et al.* in England in 2017, which had reported NIHSS respectively mean at admission of 17.5 ± 14.8 and 15.1 ± 4.1 [19] [23]. This result could be explained by the fact that patients with ISM will generally have scores above 15 if the non-dominant hemisphere is affected and 20 points in involvement of the dominant hemisphere [17].

The mortality rate in our study was 47.6% (10 cases) and is higher than those of Raffiq *et al.* in Malaysia and Hofmeijer *et al.*, who reported mortality rates of 44.8% and 40.6% respectively [21] [22]. This difference could be explained by the practice of decompressive hemicraniectomy in their series, which constitutes an approach that considerably reduces the rate of mortality in ISM.

Eleven patients, or 52.4%, were discharged from the hospital, in whom the average score Rankin's score was 4.19 ± 1.03. The severity of the neurological deficit and the extent of brain damage during ISM may explain this finding.

5. Conclusions

Malignant sylvian infarction is a serious form of ischemic accident. Cerebral, the combination of clinical and neuroradiological criteria, allows us to make the diagnosis.

The frequency of this condition in our study is close to that in the literature, with a male predominance.

Decompressive hemicraniectomy remains the only treatment associated with better outcomes favorable during the ISM course.

Respiratory distress, aspiration pneumonia and brain involvement occurring during hospitalization were the factors associated with poor prognosis in our study.

Despite the absence of surgical treatment, survival in our study was high.

Conflicts of Interest

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

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