ORIGINAL RESEARCH PAPER

Medical Science

PREDICTIVE FACTORS OF MORTALITY OF HEMORRHAGIC STROKE OBSERVED IN THE INTENSIVE CARE UNIT OF THE TEACHING HOSPITAL TAMBOHOBE, FIANARANTSOA

KEY WORDS: predictors of mortality, hemorrhagic stroke, Fianarantsoa

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ABSTRACT

Objective: To determine predictive factors for mortality from hemorrhagic stroke in the Medical-Surgical Intensive Care Unit of the Teaching Hospital Tambohobe Fianarantsoa.

Materials and methods: This was a descriptive retrospective study of 33 months on patients with hemorrhagic stroke confirmed by a brain scan. The following parameters were studied: age, sex, Glasgow scale at entry, time to perform CT scan, topography of lesions, secondary intracranial lesions such as mass effect, hydrocephalus and ventricular flood, hyperthermia, hyponatremia, hyperglycemia, decrease of oxygen saturation (SpO_2 < 95%), pneumopathy, bedsore and hospital mortality.

Results: We selected 50 patients. The average age was 59.2 years (34 years to 80 years). The sex ratio was 1.3. Loss of consciousness was the main reason for consultation in 35 cases (70%). The mortality rate was 48% (n = 24). Fourteen patients (28%) had a Glasgow scale of ≤ 8 with a mortality rate of 71.4% (10 deaths out of 14 patients) (p = 0.039). Factors associated with mortality were hyperthermia and decrease in SpO_2. Ventricular flood was the secondary intracranial lesion that provided mortality (p = 0.001).

Conclusion: Predictors of hemorrhagic stroke mortality were Glasgow score ≤ 8, ventricular flood, hyperthermia, and decreased SpO_2. Staff training in the prevention of secondary cerebral injury of systemic origin could improve the prognosis of our patients.

Introduction

WHO defines stroke as a "fast" neurological deficit for more than 24 hours, related to a focal or global cerebral dysfunction, which can be fatal, whose apparent cause is vascular [1]. Worldwide, stroke is responsible for 5.6 million deaths each year [2]. In France, in 2014, the hospital lethality of hemorrhagic stroke was 28.9% [3]. In India, in 2002, the mortality rate in 30 days by hemorrhagic stroke was 56,6% [4]. In Madagascar, in 2008, a hospital study reported a mortality rate of the hemorrhagic stroke of 52,9% [5]. In Fianarantsoa, a recent study carried out showed a global mortality rate of stroke of 36.4% [6]. The objective of this study is to determine the predictive factors of mortality of hemorrhagic stroke in the Medical-Surgical intensive care unit of the Teaching Hospital Tambohobe Fianarantsoa.

Materials and Methods

This was a descriptive retrospective study performed in the intensive care unit of the Fianarantsoa Teaching Hospital for a period of 33 months, from January 2015 to September 2017. Patients with hemorrhagic stroke confirmed by a CT scan brain were included in this study. Hemorrhagic stroke was confirmed in the presence of a spontaneous hyperdensity in the cerebral parenchyma diffusing or not into the subarachnoid spaces. The criteria for non-inclusion were: hemorrhagic changes in ischemic stroke, hemorrhage and intracerebral hematoma of traumatic origin, CT scan results that did not conclude vascular lesions. For this purpose, the following parameters were studied: age, gender, Glasgow scale at entry, time to perform CT scan, topography of lesions, secondary intracranial lesions such as mass effect, hydrocephalus and ventricular inundation, hyperthermia above 38.3 ° C, hyponatremia defined by natremia less than 135 mmol/L, hyperglycemia greater than 10 mmol/L, decreased saturation in oxygen (SpO_2 <95%), pneumonitis, bedsore and hospital mortality. Data collection was done from the individual survey form. Data entry was made from the Excel software. The data was analyzed using the IBM SPSS Statistics 20.0 software. The Chi-square test was used to investigate the existence of association between two qualitative variables. A difference was considered significant for a value of p less than 0.05.

Results

During the study's period of 33 months, 50 cerebrovascular hemorrhagic strokes confirmed by a CT scan brain were hospitalized in the intensive care unit of the Teaching Hospital Tambohobe-Fianarantsoa. The characteristics of the patients are summarized in Table I. The average age was 59.2 years with extremes of 34 years and 80 years. Hemorrhagic stroke was predominantly male (n = 28, 56%). The sex ratio was 1.3. Loss of consciousness was the main reason for consultation in 35 cases (70%). The mortality rate was 48% (n = 28). Fourteen patients (28%) had a Glasgow scale of ≤ 8 with a mortality rate of 71.4% (10 deaths out of 14 patients) (p = 0.039). Hyperthermia and the decrease of SpO_2 were the main secondary cerebral injury of systemic origin of extra-cranial origin observed. Hyperthermia was found in 24 patients (48%) with a mortality rate of 75% (p = 0.009). The decrease in SpO_2 <95% was observed in 23 cases (46%) with a mortality rate of 69.6% (p = 0.005). Ventricular flood was the secondary intracranial lesion that provided mortality (p = 0.001). Predictors of mortality are summarized in Table II.

Table I: Patient characteristics (n=50)

Parameters		
Average age (year)	59,2	
	Number (n)	Frequency (%)
Gender n (%)		
Man	28	56
Woman	22	44
Cardiovascular Risk Factors n (%)		
HTA	44	88
Alcohol	25	50
Tobacco	18	36
Diabetes	9	18
Obesity	6	12
Hypercholesterolemia	5	10
Heart disease	1	2
Sedentary lifestyle	2	4
Contraception	3	6
Reasons for consultation n (%)		
Loss of consciousness	35	70
Deficit syndrome	15	30

Glasgow score at admission n (%)		
≤ 8	14	28
9-12	10	20
13-15	26	52
Scanner completion time n (%)		
< 24 hours	11	22
24 – 48 hours	21	42
≥ 48 hours	18	36
Secondary intracranial lesions n (%)		
Ventricular Flood	19	38
Mass Effect	14	28
Brain edema	5	10
Morbidity n (%)		
Hyperthermia	24	48
SPO2 < 95%	23	46
Hyperglycémie	10	20
Hyponatremia	9	18
Pneumonia	5	10
Bedsores	4	8
Mortality n (%)	24	48

Table II: Predictive factors of mortality

Parameters	Number of deaths	Number of patients	%	p-Value
Age over 50	19	50	38	0,848
Glasgow score at admission ≤ 8	14	50	28	0,039
Lesional complications				
Ventricular Flood	15	19	78,9	0,001
Mass effect	6	10	60	0,396
Brain edema	3	5	60	0,571
Morbidity				
Hyperthermia	18	24	75	0,009
SpO_2 < 95%	16	23	69,6	0,005
Hyperglycemia	7	10	70	0,119
Hyponatremia	5	9	55,5	0,616
Pneumonia	2	5	66,7	0,504
Bedsores	1	4	25	0,337
Average length of stay (day)	9,7	12,7	-	0,262

Discussion

This study allowed us to highlight a high case fatality rate during hemorrhagic stroke. Secondly, it was found that a Glasgow score at admission ≤ 8, ventricular flood, hyperthermia and a decrease in pulse oxygen saturation (SpO_2 <95%) were the predictors of hemorrhagic stroke mortality in the intensive care unit of the Teaching Hospital Tambohobe-Fianarantsoa. These are actually manifestations of secondary cerebral injury of systemic origin. In our study, the mortality rate was 48%. In Madagascar in 2008 and in DR Congo in 2011, studies reported mortality rates of hemorrhagic stroke of 53% and 35% respectively [5,7]. The mortality rate of hemorrhagic stroke remains high in developing countries. The high mortality rate of the hemorrhagic stroke in our study explains the severity of the primary lesion and the rapid onset of secondary cerebral injury of systemic origin. The fast appearance of secondary cerebral injury of systemic origin could be explained by the lack of pre-hospital care and delayed care. In addition, all our patients came to the hospital in non-medical transport. Staff training in the prevention of secondary cerebral injury of systemic origin is necessary to improve the prognosis of our patients. Studies pointed out that inadequate management of the acute phase [8, 9, 10, 11], low technical platform and lack of surgical management [12, 13] were responsible for the high mortality during this pathology. In addition, the very high cost of care in relation to the standard of living of the population and the lack of social security aggravate the situation [14]. In France, between 2008 and 2014, a drop in standardized hospital lethality (-5.4%) was observed [3]. This drop in hospital lethality could be linked to a significant improvement in the management of acute patients, with the development of neurovascular units (NVU) and particularly intensive care units within NVU in France [3]. This explains the decrease in the mortality rate in the developed countries contrasting with the increase in the mortality rate in the developing countries. In our context, the creation of a service dedicated exclusively to stroke with a staff specifically trained in the management of stroke would reduce the mortality of this pathology [6].

In our study, ventricular flooding was significantly associated with mortality. This finding was highlighted by several authors [15, 16]. In fact, ventricular flooding is associated with significant mortality, probably through hydrocephalus or the mass effect on paraventricular structures, which leads to global hypoperfusion of the cortex [16]. Moreover, the Glasgow score of less than or equal to 8 observed in our study could be the consequence of the violent nature of the affection and the characteristic of its lesional support [5]. As in the literature, the Glasgow score ≤ 8 was a predictor of mortality [15, 17]. Callixte KT and al found that deaths occurring before 96 hours were strongly correlated with an initial Glasgow score of less than 8 [17]. As a definition of hyperthermia, we have used any value of the central temperature strictly greater than 38.3 °C [18]. In neuro-resuscitation, the temperature threshold for the definition of hyperthermia varies between 37.5 C [19.20], 38 C [21], 38.3 C [18] or 38.5 C [22]. In our study, the fever affected all 24 patients (48%) and was a predictor of mortality. Our results are comparable to those of the literature. Hyperthermia is common during the first 48 hours after brain injury [23], occurring in more than 50% of patients admitted to neuro-resuscitation [24, 25]. In Europe, studies have demonstrated the association between hyperthermia and poor neurological prognosis of stroke [26, 27]. In Africa, authors have reported that hyperthermia is a predictor of hemorrhagic stroke mortality [17, 28]. Studies have reported that hyperthermia may worsen intracranial hypertension in the brain-injured patient [29, 30]. To improve the prognosis of our hemorrhagic stroke patients, the maintenance of controlled normothermia is recommended. Paracetamol is often ineffective in 50% of cases [31, 32]. Then, the use of surface cooling systems [33] or endovascular (femoral venous catheter or sub-keyboard) [34, 35] can be proposed. Then, the use of surface cooling systems [33] or endovascular (femoral venous catheter or sub-keyboard) [34, 35] can be proposed. In our study, the decrease in SpO_2 <95% was associated with mortality. Persistent hypoxemia (SaO_2 ≤ 90%) beyond 5 minutes is a secondary systemic stress factor [36].

Conclusion

This study allowed determining the predictive factors of mortality of hemorrhagic stroke such as Glasgow score ≤ 8, ventricular flood, hyperthermia and decrease in SpO_2. Staff training in the prevention of secondary cerebral injury of systemic origin could improve the prognosis of our patients. A prospective study is needed to look for other hemorrhagic stroke mortality factors.

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