

Contribution of Surgery in the Care of Intracranial Hematomas in Developing Countries: Case Series of 30 Patients in Abidjan

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Abstract

Intracranial hematomas, whatever its causes, represent an important disabling, and dreaded adult's lesion. This brain's condition has not well been studied in developing countries. The aim of our study is to overview the management of intracranial hematomas in Abidjan. It is a retrospective analytical and descriptive study, involving patients who had been admitted and monitored by neurosurgeons for intracranial hematomas, documented in brain CT scan and had been operated on from 1 January 2007 to December 31, 2009 in Abidjan. These 30 patients were 23 men and 7 women. The average age was 58.6 years old. 90% of the patients were admitted with wakefulness issues. Half had a Glasgow score of less than 8. The brain scanner allowed identification of an intraparenchymal hematoma associated or not with a cerebral ventricle contamination in 28 patients. There were 18 external ventricle derivations with or without decompressive craniectomy and 12 independent decompressive craniectomy. The evolution was marked by 20 deaths. 10 patients (33.3%) survived. Among the survivors, the first attack and arterial hypertension were the only illness before the attack. None had blood in the membranes and all had Glasgow scores greater than or equal to 9 at admission. Around 7 out of 10 patients were operated on during the first 48 hours. The operative indications of intracranial hematomas are still the subject of controversy. By basing itself on criteria and rigorous clinical and neuroimaging selection, surgery could eventually contribute to the management of this

pathology which has become very frequent in Africa.

Keywords

Spontaneous Intracranial Hematomas, Surgery, Developing Countries

1. Introduction

Intracranial hematomas (ICH), whatever its causes, represent an important disabling, and dreaded adult's lesion [1]. The role of surgery in the management of spontaneous intracerebral haemorrhage still remains a matter of debate, multitudes of studies were conducted and published dealing with the different concepts of management of spontaneous intracerebral haemorrhage demonstrating controversial results [1] [2]. This brain's condition has not well been studied in developing countries. Owing to the improvement of medical care technics including radiological and surgical managements, in Africa, these conditions have emerged as the serious public health's matter.

The aim of our study is to overview the management of ICH in Abidjan.

2. Patients and Methods

This retrospective study includes 30 adults with ICH diagnosed and treated 1st January 2007 and 31 December 2009 at ABIDJAN Intensive care unit. Stroke and others non-cerebral bleeding, such as pure sub arachnoid hemorrhage, were excluded.

The data were searched from the patients' files treated for ICH. All HIC were documented by a pre and post-operative CT scanner.

It is a retrospective analytical and descriptive study, involving patients who had been admitted and monitored by neurosurgeons for spontaneous cerebral subarachnoid hemorrhage, documented in brain CT scan and had been operated on from 1 January 2007 to December 31, 2009 in Abidjan ICUs.

3. Results

30 patients were selected, they represented 10.8% of patients admitted for stroke in intensive care. We found male predominance (23 men, for 07 women) sex ratio at 3.28. The average age was 58.6 years, ranging between 33 and 77 years. But 40% of patients were between 60 and 69 years. The ICU admission time after the initial event was on average 03 days. With a minimum of 1 hour and up to 8 days.

According to the disease history, our 23 patients (76.66%) were known hypertensive and 2 had already stroke. 90% of our patients were admitted with a vigilance disorder and half had a Glasgow score of less than 8. Of the 30 patients, 25 had the pupils in miosis against 3 who had anisocoria. 12 patients had a systolic blood pressure above 200 mmHg. 25 patients had motor deficit hémi-

corporels. The pre-operative CT scanner identified more or less associated lesions.

28 patients had intraparenchymal hematoma. The large diameter of the hematoma was more than 3 cm in 15 patients and less than 3 cm in 13 patients.

The average waiting period for intervention was three days post stroke. 46% of patients had been operated on before the 2nd day post stroke. A derivation of cerebrospinal fluid (15 cases). A decompressive craniotomy (12 cases). Decompressive craniotomy associated with the derivation of cerebrospinal fluid (3 cases).

Evolution, the average hospital stay was 20 days, with extremes ranging from 2 - 91 days. Of the 18 who had ventricular contamination at admission, 13 had died (72.22%) of which 8 had tétraventriculaires contamination (**Table 1**).

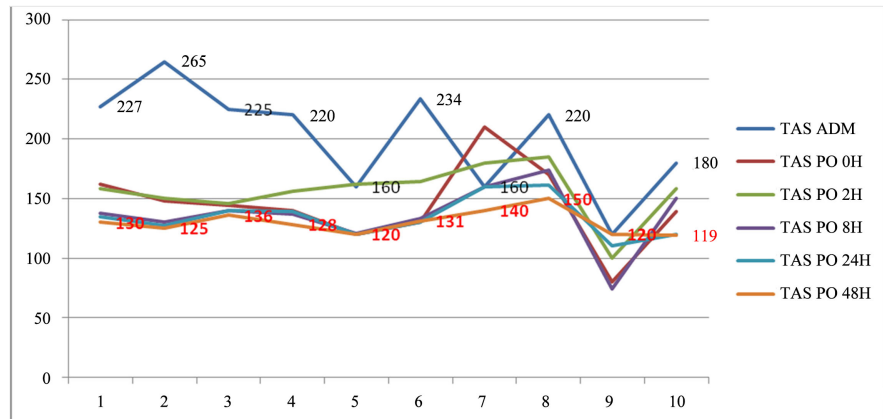
10 patients (33.3%) had survived in postoperative those 10 survivors, there were two women. The average age was 54 years, minimum 33 years and maximum 70 years. None of the survivors had no history other than hypertension and stroke was the first. Approximately, 7 patients underwent surgery before the first 48 hours. For patients who survived after surgery, the change in systolic blood pressure curves ranged from 0 mm Hg to 140 mm Hg, with an average of 71.2 mm Hg (**Figure 1**).

4. Discussion

Spontaneous intracerebral hematomas are relatively large affection [2]. For some authors, they represent 10% to 20% of cerebrovascular accidents (CVA), in general [3]. The frequency of stroke cases included in the study was 10, 8% of patients admitted to intensive care unit. It concerns more men than women in the age group between 50 and 70 years. In our study, men predominated with a sex ratio higher than 3. The average age was 58.6 years, with extremes ranging from 33 to 77 years old and 40% of patients were between 60 and 69 years. 76.66% of our patients were known hypertensive. High blood pressure is the most important risk factor for this disease. [4]. There were also 10% of our patients with a comorbid condition such as obesity and type 2 diabetes. Among the 7 women in our series, there was a pregnant woman.

Table 1. Distribution of patients by number of ventricles contaminated with blood and evolution. Of the 18 who had ventricular contamination at admission, 13 had died.

Number of ventricles contaminated by blood	Live	Dead	Total
1 Ventricle	0	1	1
2 Ventricles	2	3	5
3 Ventricles	1	1	2
4 Ventricles	2	8	10
TOTAL	5	13	18



Legend

TAS	ADM:	Systolicblood	pressure	at	admission
TAS	PO	0 H:	Systolicblood	pressure	0 hours postoperatively
TAS	PO	2 H:	Systolicblood	pressure	2 hours postoperatively
TAS	PO	8 H:	Systolicblood	pressure	8 hours postoperatively
TAS	PO	24 H:	Systolicblood	pressure	24 hours postoperatively
TAS	PO	48 H:	Systolicblood	pressure	48 hours postoperatively

Figure1. Comparative curves of the evolution of the systolic blood pressure of the admission and the first 48 hours postoperative of the survivors.

The ICU admission time after the initial incident was in average 72 hours. From 1 hour up to 8 days. 10% of our patients had arrived in the ICU in the first 2 hours after the stroke. Mayer-Reichenauer and all Reports that in the United States, 20.5% were admitted within two hours. [5] This rate which is the double of ours, reflects the awareness of the American people and the organization of rescue workers. In our series, 10% in developing countries can be considered relatively high. They are patients whose families were well informed about the patient’s history and who had directly transported the patients to the emergency room. The small size of our study population could also explain this. The mode of recruitment of patients admitted to intensive care leads to a bias in our selection. Therefore already 93.3% had a conscious trouble on admission. 43% had a Glasgow coma scale of less than 8 and 46% had a GCS between 8 and 12. 10% had a GCS between 12 and 15. For several authors, the disorders of the consciousness associated or not to focal deficits occupy the foreground of the strokes allowed in intensive care. A Glasgow score below 9 at admission would already be an element of poor prognosis [3]. It is also believed that pupil dilation is a poor prognosis factor especially if it becomes bilateral unreactive which explains the high rate (83%) of myosis in patients recruited for surgery. Myosis could either be linked to the medication started in emergencies or other center, before the transfer of the patient to intensive care in an equipped center or when transferring the USA. This is a bias in recruitment to hope for a better surgical

outcome. In the absence of monitoring of the ICP (Intra Cranial Pressure), we need to act in time to give a chance to the patient without making aggressive therapy. Therefore, all patients with GCS less than or equal to 4 and having an unreactive or bilateral mydriasis, were excluded unless a major element of good prognosis was associated. The main suspected cause is hypertension because 76.6% of patients were hypertensive and 40% were admitted with a systolic blood pressure above 180 mmHg. Soro in a similar study had found high blood pressure in all patients. The deep location of the hematoma was found in 90% as a causing element for hypertensive [6].

Several indirect criteria - in the absence of intracranial pressure monitoring- allows to estimate the degree of brain suffering. Thus include: the volume of the hematoma, a cerebral ventricle contamination, a cerebral herniation, and hydrocephalus. Thus, 83.3% of our patients had a cerebral herniation, especially falcine herniation, 50% had a filling of the basilar cisterns and 60% had ventricular contamination with dilated ventricles. 53.57% of intracerebral hematomas were considered important because they had large diameter more than 3 cm [7] [8] [9]. The concept of large diameter 3 cm, can be subdivided into two groups 90% deep bruises, and lay the surgical indications. All patients with large diameter greater than 3 cm had decompressive craniectomy and all those having a large diameter smaller than 3 cm with flood and ventricular dilatation, had received a ventricular shunt. In the recommendations of the French National Agency, the AESS, the indication for surgery in hemorrhagic stroke should be based on the patient's age, current treatment, particularly anticoagulant, the level of care (GCS), pupillary size scalability; the size and location of the hematoma, mass effect associated to subarachnoid hemorrhage, ventricular size. [10] From these recommendations, follow that the intracranial pressure monitoring is not necessarily crucial for deciding whether or not to operate a patient admitted for intracerebral hematoma.

The average time for action is 3 days after stroke and 46% of patients had been operated on before the 2nd day post stroke. This period relatively far from the recommended 24 hours, this could be put down to the ICU monitoring and especially the time to make the head CT scan, to have the opinion of Neurosurgery and the time required to prepare the intervention after the indication for surgery is chosen. However, 16% of patients were operated on within 24 hours post stroke. It's the best time to operate [11]. In the series of Soro L [6] 85.71% of patients were operated on within 24 hours post stroke. Decompressive craniectomy is the surgery of detaching a part of the calvaria creating a window on the cranial vault. This is a radical surgery in the treatment of increased intracranial pressure and allows expansion of the brain volume, then leading to an intracranial pressure decrease [12]. 50% of our patients had received decompressive craniectomy, 10% had an associated DVE. 50% had received only DVE.

All patients had received neuro-sedation whose depth was based on the initial depth of glasgow scale and lesions on the brain CTscan. A neuro-sedation was

introduced pre and post operatively. 90% of patients, associated in neuro-sedation midazolam 1 - 3 mg/h and fentanyl 50 - 100 micg/h.

The average length of stay is 20 days, with extremes ranging from 2 - 91 days.

20 patients, 66.6% had died. The average age of patients who died was 61 years, with extremes between 45 and 77 years old. All patients had associated history of hypertension and diabetes, had died. Comorbidity is a weakening factor. Stroke recurrence, diabetes, liver disease and thrombopathies may compromise the postoperative course of patients. [4]. 13 deceased patients had ventricular contamination in CT scans. This ventricular flooding was tetra-ventricular in 8 patients. Ventricular flooding is considered a poor prognostic factor when combined with an ICH [3] [4]. The massive flood of the ventricles would be responsible for acute hydrocephalus which consequence is the worsening of intracranial hypertension. Blood in contact with the cerebrospinal fluid degrades bilirubin and oxyhemoglobin (HbO₂). The HbO₂ is a potent aggressive vascular factor responsible for vasospasm, then, follows that a triple action related to ventricular flooding. A direct mechanical action by abrupt increase of the viscosity of the CSF slows its flow, a physico-chemical action in relation to the blood degradation products which causes an inflammatory phenomenon in subarachnoid space, this preventing the movement and the resorption CSF. The latest being the vasospasm vascular Action very deleterious to the brain that is already suffering. 95% of deaths occurred in the first month, as reported [3]. 5 patients operated on within 24 hours of their admission, two had died. This is the only day or the number of living patients (60%) was higher than the number of operated patients who died (40%). Thus, as stated [11], patients operated on the same day were more likely to develop favorably than other patients. Brain injuries, especially secondary, could be even reversible. While those who were operated late, had extensive and irreversible brain damage. Soro reports a much lower mortality rate of approximately 28% [6]. This low mortality can be understood if one takes into account that it was a short evaluation on 10 days for a much smaller population than ours. Our patients were followed for at least 90 days and our study population was more than double that of Soro [6].

The majority of the studies focused on the contribution of the surgery without having previously determined the influence of the medical management that precedes the surgery and which continues after the surgery. The neurosedation and neuro-resuscitation procedures that were used in the year 1997 cannot be compared to the procedures with the new molecules and the new monitoring monitors in 2017. Similarly for the surgical technique, the speed and accuracy of the surgical procedure by limiting the volume of damaged healthy brain tissue cannot be compared between 1997 and 2017.

Certainly, it is interesting to determine the place of surgery in the treatment of intracerebral hematomas, but it should be noted that surgery is an act that takes place at a precise moment in the entire chain of treatment. To assess its importance in this set, one must consider the interactions that other elements of the set

have with surgery. Several multicentric studies have been conducted around the world and most often retrospectively. These studies do not take into account the degree of variability related to the populations that have their local specificities that they depend on the environment, the climate, the soil.

Life expectancy is not the same in France and Ivory Coast. The French population is relatively aging while in the Ivory Coast, it is still mostly very young. Already this only perspective makes that the age of the populations concerned will not be the same. The proof in our study is that the average age was 58.6 years whereas for the majority of authors it will be necessary to add about ten years. Of the 10 survivors (33.33%), there were two women. The average age was 54 years, minimum 33 years and maximum 70 years. None of the survivors had history other than hypertension and stroke. Approximately 7 of 10 surviving patients were admitted before 48 hours and had a relatively low Glasgow score between 9 and 12 [4] [13]. Surgery should be performed before 26.7 h after stroke to reduce the toxic effect of blood components [1]. Mendelow report in 2013, in a randomized clinical trial that subgroup analyzes revealed a significant relative benefit of 51% of early surgery for patients with the initial Glasgow coma scale ranging between 9 and 12 [2]. To specify that patients with initial Glasgow score higher than 9 were more likely to have better postoperative outcome. Patients operated after the 7th day post stroke were all dead.

5. Conclusion

The operative indications of cerebrovascular accidents are still the subject of controversy [1]. From our study, it follows that ICH is pathology of about 50-year-old hypertensive males. Surgery does not yet allow the renewal of destroyed neurons. But surgery can mechanically reduce the compression of the brain and limit the hematoma increase. In the ICH, bleeding may continue after the first hour after bleeding, especially in patients with early clinical deterioration [14]. Surgery can also limit the toxic effects of blood components. Therefore, with good indications, surgery can effectively accompany drug therapy.

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Conflicts of Interest

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

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