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Nonsurgical Management of the Brain's Trauma in the University Hospital of Brazzaville

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Abstract

The aim of this study was to evaluate the medical management of traumatic brain injury. We performed a retrospective and descriptive study during the period from 1st January 2014 to 31st December 2015 (24 months), into the surgical department of the University Hospital of Brazzaville. 167 cases of non-operated traumatized brain have been identified. The average age was 29.84 years. The sex ratio was 8.82. Accidents on public roads were responsible for injury in 88.2% of the cases. 46.71% of patients had a moderate traumatic brain injury while 10.18% had a severe traumatic brain injury. Radiological evaluation was highlighted for the brain contusion in 52.09% of the cases. Tracheal intubation and ventilation were completed only in 6 out of the 17 cases of severe traumatic brain injury. Prevention of post-traumatic seizure was performed with the use of phenobarbital or sodium valproate. Mannitol was used for its osmotic properties. The outcome was favorable in 55.68% of the cases. The most common complications were pulmonary infections, persistent neurological disorders, urinary infection and hyponatremia. Mortality was recorded at 13.77%. Nonsurgical management of traumatic brain injury involves an expansion of the ventilatory assistance indication at all severe traumatic brain injuries, the fight against infectious complications and ionic monitoring.

Keywords

Nonsurgical Traumatic Brain Injury, Morbidity, Brazzaville

1. Introduction

Traumatic brain injuries are a major cause of morbidity and mortality in children and young adults, responsible for hospital stay and high cost of care [1]. The knowledge on

the pathophysiology allowed us to issue recommendations in the management of traumatic brain injury [2]. These recommendations are of surgical order among many therapeutic tools, with indications more or less codified in the order of less than 10%. Management of severe traumatic brain injury is involved by the progress of neuroradiology and reanimation. Association of primary and secondary lesions requires a multidisciplinary team made of urgentist, anesthesist, radiologist and neurosurgeons [3]. This study that the aims were to assess the management of head injuries apart from a surgical recommendation in Brazzaville (Congo), presented poor practice conditions in sub-Saharan countries.

2. Material and Methods

We performed a descriptive and retrospective study, during the period from 1st January 2014 to 31st December 2015 (24 months), into the surgical department of the University Hospital of Brazzaville which was the only tertiary center in the country with a frequency of 225 patients admitted per year. We included patients hospitalized for management of a traumatic brain injury. We have excluded the case in which the radiological data (scanner) were absent, cases of refusal of surgery, multiple trauma cases that were operated for an associated lesion other than head trauma. This study was performed in observance of conditions of local ethical committee. The parameters evaluated were clinical, diagnostic, treatment and outcome. Collection of data was performed from hospital register and treated in Excel 14.2.0 (120402).

3. Results

3.1. Studied Population

During the period from January 2014 to December 2015, 200 cases of traumatic brain injury were recorded. Of these patients, 175 cases (87.5%) were not operated; among non-operated patients, eight cases were excluded from our study (one case of epilepsy-related trauma dating back to 2012, five cases in which the scan was not performed, one case operated for cervical spine trauma and one refusal of surgery). Finally, 167 cases representing 83.5% of patients admitted for head injuries were recorded for this study.

3.2. Anthropometric Characteristics

The average age was 29.84 years, with extremes ranging from 2 to 84 years. We recorded 150 men against 17 women, a sex ratio of 8.82.

3.3. Clinical Aspects

Table 1 below indicates clinical variables of patients.

3.4. Radiological and Diagnostic Aspects

On admission to the emergency, X-ray of cervical spine was performed in 80 patients (47.90%), those of the thorax in 66 patients (39.52%), those of the basin in 4 patients (2.39%). The Cranioencephalic CT-scan was performed in 152 patients (91.01%), mag-

netic resonance imaging was performed in 15 patients (8.99%), following a breakdown of the scanner. Table 2 shows different lesions found in CT-scan and magnetic resonance imaging.

3.5. Therapeutic Aspects

Among 17 cases of severe traumatic brain injury, 11 were admitted to intensive care and the other 6 in the surgery department for lack of space available in the single intensive care unit in the hospital. Of the 11 patients admitted to intensive care, the orotracheal intubation and ventilatory, with sedation using midazolam and fentanyl support was performed in 6 patients. Benzodiazepines were used for sedation and midazolam was used for hemodynamic brain benefit. Morphine was used for analgesia. No tracheotomy was performed in the aftermath of the oro-tracheal intubation.

Anti-epileptic treatment was administered in 8 cases that convulsed; we used

Table 1. Clinical characteristics of patients in our series.

		n (%)
Antecedents	Substance addiction	33 (19.76)
	Diabetes	04 (02.39)
	Hypertension	06 (03.59)
Circumstances	Public road accident	147 (88.02)
	Assaults, falls	20 (11.98)
Neurological examination	Glasgow coma scale (GCS) Average = 11	
	3 - 8	17 (10.18)
	9 - 12	78 (46.71)
	13 - 15	72 (43.11)
	Seizures	08 (04.79)
	Neurological deficit	21 (12.57)
Related injuries	Thoracic	12 (07.18)
	Cervical spine	09 (05.38)
	Orthopedic	18 (10.77)
Delay admission—CT scan	Average = 4 days (45 minutes to 9 days)	

Table 2. Encephalic lesions in initial imaging.

	n (%)
Contusions	87 (52.09)
Subarachnoid hemorrhage	30 (17.96)
No lesion in CT-scan	28 (16.76)
Acute Subdural hematoma	16 (09.58)
Pneumocephalus	13 (07.78)
Epidural hematoma	08 (04.79)
Diffuse cerebral edema	04 (02.39)

phenobarbital. Immediate treatment of convulsion consisted of the administration of the bolus of diazepam. The prevention of post-traumatic seizure was used in 66 patients (39.52%), the indications were cortical brain contusion, diffuse cerebral edema, pneumocephalus, acute subdural hematoma, subarachnoid hemorrhage, epidural hematoma and lower GCS or equal to 10. This prevention was not systematic; we used phenobarbital and sodium valproate.

Mannitol 20% was administered in 9 patients with severe traumatic brain injury, including 3 patients in oro-tracheal intubation.

Heparin was administered to all patients in the series, at 0.4 ml per day by subcutaneous injection, from the 24th post-traumatic hour.

Proton-pomp inhibitor was systematic.

3.6. Evolution

Evolution was quickly favorable in 93 patients (55.68%), with a normal GCS, oral feeding, and absence of neurological deficit. The average hospital stay for these patients was 5 days.

Evolution was marked by complications in 51 patients (30.53%). Table 3 shows the patients in our series by types of complications.

The average hospital stay for these patients was 16 days.

23 patients of the series died (13.77%) during the study period. Death was due to a complicated respiratory infection as part of a disturbance of consciousness in 16 patients, 5 cases of neurological distress, 2 cases of severe hyponatremia.

4. Discussion

This was a retrospective study, limited in the collection of data from patients after hospitalization, in the difficulty to join them across the country. In addition, an analytical work could show the influence of GCS in clinical evolution of patients; a comparison between operated and non-operated patient could give us more information.

The management of severe brain trauma involves control of haematosis by tracheal intubation and ventilatory support, with continuous sedation [3] [4]. In our series, 6 patients in this case were not supported in the intensive care unit because of the lack of

Table 3. Hospital morbidity.

	n (%)
Pulmonary infection	24 (47.06)
Disorders of consciousness or persistent agitation	13 (25.50)
Urinary infection	06 (11.76)
Hyponatremia	06 (11.76)
Decompensated diabetes	01 (01.96)
Hypernatremia	01 (01. 96)
TOTAL	51 (100)

space; among the 11 patients admitted to intensive care, 6 underwent intubation and ventilation. Sedation goals for cerebral protection control of intracranial pressure and facilitation of care [5].

Preventive treatment of seizures was administered in 66 patients (39.52%); Van Haverbeke *et al.* [6] initiated this treatment in 35.3% of cases in patients treated for severe head trauma. Post-traumatic seizures are classified according to time of occurrence [7] in immediate (first 24 hours), early (within a week) and late (over a week). Their frequency is estimated between 5% and 7%; it increases with the severity of the trauma (11%), and more to trauma by penetrated objects (35% - 50%) [8]. Phenytoin is the recommended first-line molecule; carbamazepine is more effective in the early and late seizures [9]. In our series, the choice fell on phenobarbital and sodium valproate for reasons of commercial availability and affordability.

Mannitol [10] was used for its osmotic properties; the recommended dose is 0.5 - 1 g/kg in 20 minutes. It improves cerebral perfusion pressure and microcirculation. However, its use is preferable when the blood-brain barrier is intact. The hypertonic saline [11] has equivalent or superior effects to mannitol, especially when hemorrhagic shock is associated; but it was not used in our series by lack of availability.

In a global subsaharian's series (operated and non-operated), Fatigba *et al.* [12] found 755 cases of traumatic brain injury, a favorable change in 89.2% of cases, regardless of morbidity. The acquired pneumonia is common complications, especially in severe traumatic brain injury with mechanical ventilation [12]. The most frequent complications are hydroelectrolytic disturbs; hyponatremia was most frequent in our series (11.76%), and would be related to salt loss syndrome or inappropriate antidiuretic hormone secretion [13].

Hospital mortality in traumatic brain injury is variable depending on the series; they range from 8.5% to 38% [14] [15] [16] [17]. In our study, the mortality of 13.77% for deaths occurred during the study period. It is linked to neurological and infectious complications.

5. Conclusion

Nonsurgical brain injuries are the most common; cerebral contusions in intracranial lesions are predominant. Their care involves preventing secondary brain aggression of systemic origin which is dominated in our series by respiratory complications providers of infection and electrolyte disturbances. The management of severe head trauma involves an expansion of ventilatory assistance indications in all cases of severe traumatic brain injury. Prevention of post-traumatic seizures and the use of osmotic remain to be evaluated in context of our study.

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