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Original Research Article

Traumatic Brain Injuries: Clinical Profile and Therapeutic Aspects in a Rural Intensive Care Unit in Senegal

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Abstract: ***Objective:*** The aim of this study was to investigate the clinical profile and therapeutic aspects of traumatic brain injuries in the intensive care unit. ***Patients and Methods***: We conducted a retrospective and descriptive study over a period of January 2021 to December 2023 (24 months) in the multi-purpose intensive care unit of Thierno Birahim Ndao Hospital in Kaffrine, Senegal. The study involved analyzing the medical records of patients admitted for isolated or combined traumatic brain injury. The parameters studied were epidemiological and clinical data, treatments administered, and patient outcomes. ***Results***: During our study period, 38 patients presented with traumatic brain injury, representing a frequency of 5.20% of hospitalizations. The mean age of the patients was 27 years (range 4-65 years), with a male-to-female ratio of 8.5. Road traffic accidents were the major cause of the injuries (86.84%). Patient transport was medically supervised in 10.52% of cases. In our study, 12 patients (31.57%) had a Glasgow Coma Scale (GCS) score of 8 or lower. Traumatic brain injury was associated with chest trauma in 26.31% of cases. All patients underwent brain and cervical computed tomography (CT) scans. Mechanical ventilation and sedation were administered in 39.47% of cases. Eighteen patients (47.36%) received osmotic therapy with mannitol (20%). The mortality rate was 40.3%. ***Conclusion***: Traumatic brain injury is serious, especially when associated with deep coma and chest trauma. The prognosis can be improved with good organization and adequate facilities for patient care.

Keywords: Traumatic Brain Injury, Intensive Care.

INTRODUCTION

Traumatic brain injuries are frequent occurrences that can lead to respiratory and/or hemodynamic distress. The main causes are road traffic accidents, which primarily affect young people [1]. Management requires a thorough initial assessment of the injured patient to establish a comprehensive injury profile in order to implement appropriate therapeutic interventions. The main objective of this study was to determine the epidemiological profile, injury profile, and outcomes of patients admitted to intensive care in a rural area for isolated or associated traumatic brain injury.

MATERIALS AND METHODS

This was a retrospective study conducted from January 1, 2021, to December 31, 2023 (3 years) in the multidisciplinary intensive care unit of the Thierno Birahim Ndao Hospital Center in Kaffrine. We included all patients hospitalized in intensive care for traumatic brain injury, whether isolated or associated. We studied the epidemiological, clinical, therapeutic, and outcome parameters.

RESULTS

During our study period, 38 hospitalized patients presented with traumatic brain injury. The incidence represented 5.20% of hospitalizations. The mean age of the patients was 27 years (range 4-65 years). The male-to-female ratio was 8.5. Traffic accidents were the most frequent cause, accounting for 33 patients (86.84%). Other causes included falls from a height (3 cases) and unspecified falls (2 cases). No patient received medical care at the scene of the accident. Seventeen patients (44.73%) were treated at a healthcare facility before being transferred to our department. In 10.52% of cases, patient transport was by ambulance with the local emergency medical service (SAMU).

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Ambulances were provided by fire department ambulances in 26% of cases and by health centers in 31.21% of cases. Twenty-nine patients (71%) were admitted to the hospital's emergency department. In our study, 12 patients (31.57%) had a Glasgow Coma Scale (GCS) score of 8 or lower, of whom 7.89% were intubated and ventilated upon admission. Respiratory distress and shock were present in 24.6% and 8.6% of cases, respectively, and 23.66% had pupillary abnormalities. Traumatic brain injury was associated with trauma in 26.31% of cases of the thorax. The distribution of patients according to associated injuries is shown in Table I.

Table I: Distribution of patients according to injuries associated with traumatic brain injury:

Associated injuries	Number(n)	Percentage (%)
Abdominal injuries	01	2,63
Limb fractures	05	13,15
Spinal injuries	03	7,89
Thoracic trauma	10	26,31

A brain and cervical spine CT scan was performed on all patients, including 7% within 24 hours of the trauma. Table II shows the lesions identified by the brain CT scan.

Table II: Distribution of patients according to traumatic brain injuries on brain CT scan.

Cranioencephalic Injuries	Number(n)	Percentage (%)
Extradural Hematoma	08	21,05
Subdural Hematoma	04	10,52
Cerebral Contusion	05	13,15
Intraparenchymal Hematoma	04	10,52
Cranioencephalic Wound	03	7,89
Skull Base Fracture	01	2,63

In terms of treatment, fifteen patients (39.47%) received mechanical ventilation with sedation and analgesia. The mean duration of ventilation was 6 days (range 2-15). Six patients received blood transfusions, and four patients (10.52%) were given vasopressors. Osmotherapy with 20% mannitol was administered to 18 patients (47.36%). Twenty-five patients (65.78%) received empirical antibiotic therapy. The two patients scheduled for neurosurgery were transferred to a specialized center. The average length of stay in the intensive care unit was 13 days (range 1–35 days). Infectious complications, such as infectious pneumonia, were the most frequent, occurring in 18.6% of cases. The mortality rate in our series was 40.3%.

DISCUSSION

The incidence of traumatic brain injury was high in most African studies, demonstrating the need for organized and appropriate care and facilities [1, 2]. Barboza in Senegal found a higher frequency of 16.7% [1]. Hospitalization in intensive care for patients with traumatic brain injury may depend not only on the severity of the clinical presentation but also on the availability of care. Our intensive care unit was the only one in the area and had four beds. The average age of patients was 27 years, with a male-to-female ratio of 8.5, as found in most African series, with an average age around 30 years [1-3]. This is a condition affecting young men, who constitute the most active segment of our society and who also work in the transportation sector, thus being exposed to road traffic accidents. In our series, the main cause of death was identical to that found in developing countries: road traffic accidents (86.84%). Kessly in Chad and Agaly in Mali reported 83.57% and 47.1% of road traffic accidents, respectively [3, 4]. These results could be explained in our context by human factors, namely risky driving without wearing seat belts, which is not yet systematic in Africa, fatigue among drivers of transport vehicles, and the condition of the roads. In our area, we also observed an increase in the use of two-wheeled motorcycles, which are frequently used as a means of transport. Pre-hospital medical care, from the scene of the accident to the hospital, is a determining factor in the prognosis, especially in cases of life-threatening emergencies. It consists, on the one hand, of immobilizing the patient to prevent the worsening of unstable injuries, performing the initial assessment of potential or confirmed injuries, and stabilizing major organ failures, and, on the other hand, transferring the patient to the most appropriate healthcare facility [5]. This is very low in our study, and this is the case in most African studies where the majority of patients were transported by various means of transport, ranging from private vehicles and taxis to non-medical ambulances [2-6]. Upon admission to the intensive care unit, 31.57% of patients had a Glasgow Coma Scale (GCS) score of 8 or less, as found in Barboza's study in Senegal (29.31%) [1]. Belkadi reported a frequency of 46.8% of severe traumatic brain injuries (TBIs) in a study on the prognosis of TBIs in polytrauma in Morocco [7]. Brain CT scanning is the key examination in the initial assessment of a traumatic brain injury. It allows for the establishment of most of the usual diagnoses of observed cranioencephalic lesions. It is necessary to guide subsequent treatment, particularly hematoma evacuation

and/or decompressive craniotomy, depending on signs of cerebral herniation (midline displacement) and the patient's Glasgow Coma Scale score [8]. In our study, brain CT scans were performed on all patients, with some delay due to cost concerns or lack of health insurance. Respiratory distress and shock represented 24.6% and 8.6% of cases, respectively. Management of these conditions (neurological, respiratory, and hemodynamic) is essential to combat hypoxia and hypotension in order to improve patient prognosis. Thus, in our study, all patients with neurological and/or respiratory distress received mechanical ventilation combined with sedation. It is essential to control cerebral oxygenation and capnia levels and to prevent the occurrence of secondary systemic brain injury (SSBBI) in TBI patients to maintain adequate cerebral blood flow. Tracheal intubation and ventilation have demonstrated their prognostic impact [9]. Systemic hypotension associated with traumatic brain injury increases the risk of mortality and poorer long-term functional outcomes, as assessed using the Glasgow Outcome Scale. It increases the risk of secondary brain injury due to hypoperfusion and decreased oxygen supply to the injured brain [10]. According to the Brain Trauma Foundation (BTF) guidelines, systemic hypotension is defined as a systolic blood pressure below 90 mmHg; However, some studies recommend considering patients with moderate to severe isolated head trauma whose systolic blood pressure is below 110 mmHg as hypotensive [10-12]. In our study, the management of this hemodynamic instability consisted initially of fluid resuscitation with crystalloids, blood transfusion for hemorrhagic shock, and finally, administration of vasopressors. Mortality in our series was 40.3%. It was related to the severity of the injuries and the presence of multiple injuries in the context of polytrauma.

Although specific procedures are established for the management of traumatic brain injuries, our study shows that the availability of locally accessible healthcare significantly influences the management strategy for this condition.

CONCLUSION

Traumatic brain injury constitutes a serious injury in our practice setting. It can be life-threatening, either immediately or during its course. The development of hospital and pre-hospital emergency care structures could contribute to a considerable improvement in its management.

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