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Research Article

Head Trauma in the ICU for Surgical Emergencies

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Introduction

Traumatic brain injury (TBI) is a public health problem, by its frequency and its staggering cost to society [1]. Most patients with traumatic brain injury have moderate head injuries. Almost all persons with severe head injury, and up to 2/3 of those with moderate head injury will be permanently disabled in some fashion, and will not return to their premorbid level of function [2].

Young adult males are the most affected by head trauma, occurring mainly due to traffic accidents. In Morocco, there were 89375 traffic accidents in 2017, with 3726 casualties, and 10492 heavily injured subjects [3].

The goal of this study is to draw an overview of the epidemiologic, clinical, therapeutic and evolution data of head injury.

Materials and Methods

It is a retrospective descriptive study, led in the ICU for surgical emergencies of the Ibn Rochd University Hospital.

It spans over of a 6 year period, from 2015 to 2020, and concerns 302 patients, admitted to the ICU for head trauma.

Demographic, clinical, treatment and evolution data were analyzed in this study.

Were included in this study patients whose age was 15 years old or older, with head trauma, hospitalized in the ICU for surgical emergencies, in Ibn Rochd University Hospital, in the years 2015 to 2020.

Results

Demographics

The mean age of patients was 37 years [15-86], with a maximum incidence between 21 and 40 years (66%), and male predominance (83%). 76% had no comorbidity. 256 (85%) were in the labour force.

52% of admissions were made in a 4 month period, from June to September, 27% on a saturday.

Aetiology

The main cause of head trauma is traffic accidents (64%), followed by falls (13%). Motorcycle accidents were the cause of injury for 121 patients.

Clinical data

	N	%
Traffic accident	192	64
Fall	39	13
Aggression	30	10
Work accident	12	4
Other	29	9
Total	**302**	**100**

Table 1: *Causes of head trauma.*

The time from head trauma to hospitalization was less than 3 hours in 56% of cases, 3 to 6 hours for 34% of cases and exceeded 6 hours for 10% of cases.

Glasgow coma scale at admission was 9 to 13 for 66% of patients, 14 or 15 for 17% of patients and 8 or lower for 17% of patients.

205 patients (68%) experienced initial loss of consciousness right after the trauma.

Pupils were isocoric and with equal reaction to light in 80%, anisocoric in 10%, in mydriasis in 6% and in myosis in 4% of cases.

8 patients presented focal signs on admission.

Associated signs were as follows:

	N	%
Scalp wound	144	47
Scalp hematoma	96	31
Palpebral ecchymosis and edema	62	20
Headaches and emesis	51	17
Ear bleeding	25	8
Epistaxis	15	4

Table 2: *Associated signs.*

Associated lesions were found in 37% of cases.

	N	%
Isolated head trauma	190	63
Facial trauma	32	11
Limb fractures	28	9
Spinal injury	19	6
Thoracic injury	17	6
Abdominal injury	13	4
Pelvic injury	3	1

Table 3: *Associated lesions.*

Imaging

Cranial computed tomography was used for 266 patients on admission.

No lesions were found in 76 cases.

Cerebral contusion was the most frequent lesion (45%).

	N	%
Cerebral contusion	136	45
Acute subdural hematoma	112	37
Extradural hematoma	90	30
Subarochnoid hemorrhage	87	29
Cerebral edema	63	21
Pneumocephalus	47	15
Depressed skull fracture	25	8
Intraventricular hemorrhage	8	2
Normal	76	25

Table 4: *Distribution of radiologic lesions of head trauma.*

Treatment

183 patients (60%) were intubated on admission and sedated for 48h. The mean intubation duration was 10 +/- 4 days. Tracheotomy was performed for 55 patients, from the 8th to the 14th day of hospitalization.

Osmotherapy by mannitol 0.5 g/kg was used for 37 patients with cerebral edema.

Vasopressor drugs were used for 43 patients after fluid resuscitation failure.

Corticosteroids (methylprednisolone) were used for 115 patients.

105 patients received one or more blood transfusions.

Nutrition was started on day 1. Enteral nutrition was prescribed for 255 patients, whereas parenteral nutrition was prescribed for 35 patients.

Motor and respiratory physiotherapy was prescribed for all patients.

102 patients (34%) received surgical treatment. Subdural and extradural haematoma evacuation accounted for 67% of surgical motives.

Evolution

The mean hospital stay is 33 days [14-87 days].

48% were sent home, 32% were transferred to a non ICU ward.

The mortality rate was 20%. 36% of deceased patients were aged 60 years and more. Initial GCS of 8 or less is linked with a 73% mortality rate.

63 patients (21%) developed a hospital associated pneumonia, with a mortality rate of 51%.

Discussion

Traumatic brain injury is a non degenerative, non congenital insult to the brain from an external mechanical force, possibly leading to temporary or permanent impairment of cognitive, physical, and psychological functions, with an associated diminished or altered state of consciousness [4].

Head trauma often causes primary injuries. Primary injuries can manifest as focal injuries (eg. skull fractures, intracranial haematomas, lacerations, contusions, penetrating wounds), or they can be diffuse (as in diffuse axonal injury) [5]. Secondary injuries are caused by further cellular damage from the effect of primary injuries.

Traffic accidents are the primary cause of traumatic brain injury. In our study, 64% of cases were due to traffic accidents, especially motorcycle accidents (37%). This is similar to what is described in medical literature [2].

Male young adults are the most affected by head injuries, with a male predominance of 83%, and 66% of patients aged from 21 to 40 years.

90% of cases were hospitalized less than 6 hours after the injury, with a mean of 4 hours, which is longer than the time needed in more developed countries.

Clinical evaluation showed traumatic brain injuries were mostly mild (66%). 17% of TBI were severe and 17% light. Initial loss of consciousness was found in 68% of cases. Pupillar assessment mostly found isocoric pupils with equal reaction to light. Focal deficits were initially found in only 8 patients.

Cerebral contusion, acute subdural haematoma and extradural haematoma were the principal primary injuries found in brain CT, whereas cerebral edema was the principal secondary injury. Brain CT is the 1st intention radiologic exam and its indications are broad, as long as the patient is stable.

Clinical assessment and early brain CT were crucial in dealing with surgical emergencies, leading 115 patients to surgery. Most neurosurgeons consider any of the following to represent indications for surgery in patients with head injuries: extra-axial haematoma with midline shift greater than 5 mm, intra-axial haematoma with volume greater than 30 ml, an open skull fracture, or a depressed skull fracture with more than 1 cm of inward displacement.

A second brain CT may be indicated if there is no clinical improvement, if there is an increase of internal cranial pressure [6], or if the first CT was done less than 3 hours after the head injury.

Treatment of head injury may be divided into the treatment of closed head injury and penetrating head injury. Treatment of closed head injuries is further divided into treatment of mild head injury, and that of moderate or severe head injury.

Mild head injury may only require clinical observation, before a quick discharge.

The treatment of moderate and severe head injury begins with initial cardiopulmonary stabilization. In the Traumatic Coma Data Bank study, patients with head injury who presented to the hospital with hypotension had twice the mortality rate of patients who did not present with hypotension. he combination of hypoxia and hypotension resulted in a mortality rate 2.5 times greater than if neither of these factors was present.

Once the patient has been stabilized, assessment of GCS and a neurological exam should be made.

If no surgical lesion is present, or following surgery if one is present, general measures should be instituted. Furthermore, venous outflow from the brain is improved by a an elevation of 20 to 30° of the head of the bed. Sedation is often necessary in order to minimize agitation. No evidence exists that the use of anticonvulsants minimizes the risk of seizures. They may be stopped within 7 days of injury.

Monitoring of ICP can also be instated via invasive means.

Evolution was favourable in 48% of cases. It was mainly conditioned by avoiding secondary cerebral systemic aggression. The main complication was hospital induced infection which increased the death rate.

Most patients with traumatic brain injury have moderate head injuries. Almost all persons with severe head injury, and up to 2/3 of those with moderate head injury will be permanently disabled in some fashion, and will not return to their premorbid level of function [7].

The mortality rate was 20%, 73% for severe head trauma, 51% for persons who developed a hospital induced pneumonia. Prevention of infection is paramount to bettering the odds of survival.

Treatment of head trauma must essentially be preventive.

This study's results only represent a subset of Moroccan population: adults admitted to the ICU for surgical emergencies in the Ibn Rochd University Hospital. It does not take into consideration the multitude of patients with head trauma who are hospitalized in other hospitals. Moreover, data was only collected for the ICU stay and does not factor total hospital stay. These results can then not be extrapolated to the society.

Conclusion

Head trauma and traumatic brain injury constitute a serious health problem, with their staggering cost to society, on an economic or emotional standpoint. Almost all persons with severe brain injury, and two thirds of moderate brain injury are permanently disabled. The cost of this disability is even greater since most patients with head trauma are young adults. Prevention and swift care are the cornerstones of treatment.

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