

Epidemiological Profile of Traumatic
Brain Injuries in ChildrenRachid Khemakhem^{1*}, Kawther Aloui¹, Houda Rahay¹, Faouzi Nouira¹, Fouzia Chennoufi¹, H la Louati², Sofiane Ghorbel¹, Sonia Ben Khalifa³, Ibtisem Bellagha² and Said Jlidi¹¹Department of Pediatric Surgery, Children's Hospital of Tunis, Faculty of Medicine Tunis El Manar, Tunisia²Department of Pediatric radiology, Children's Hospital of Tunis, Faculty of Medicine Tunis El Manar, Tunisia³Department of Anesthesia and ICU, Children's Hospital of Tunis, Faculty of Medicine Tunis El Manar, Tunisia

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Abstract

The head injury is one of the most common traumatic pathology that may be the cause of serious sequelae; particularly since it mainly affects the young active population

Aim: The aim of this study is to evaluate the epidemiologic profile of victims of head trauma and the lesion characteristics.

Patients and methods: This is a retrospective descriptive study including all children (age 0 to 15 years) who have been hospitalized in the year 2010 for head injury in our department.

A total of 191 children (131 boys and 60 girls) with a mean age of 5, 94 years were managed.

The causes of head injury were: domestic accidents in 65, 9% of cases, accident of public roads in 32, 5% of cases and aggression in 3 cases. Head injuries were benign in 83, 4% of cases, moderate in 8, 9% of cases and severe in 3, 7% of cases.

188 patients were explored by CT scan that objectified an elementary lesion in 63, 3% of cases. In major cases, treatment consisted in saline infusion, oxygenation and neurological monitoring. Intubation and mechanical ventilation was necessary in only 11 cases (5, 76%).

Evolution was satisfactory in 96% of cases. Five patients died in our series and tow had major neurological sequelae.

Conclusion: Head trauma is common in children especially in males. Although most of them are benign, it may in some cases be responsible for major neurological sequelae.

Introduction

Traumatic head injury is a frequent reason for hospitalization in pediatric departments. It can lead to death and major neurological sequelae in young men. Prevention of traffic road and domestic accident is the only mean to reduce his incidence.

In this work we attempt to study the epidemiological profile of patients suffering from brain injury and the evolution of this accident.

Patients and Methods

This is a retrospective descriptive study conducted at the department of pediatric surgery "B" at the Children's Hospital of Tunis.

Were included in this study all children (age 0 to 15 years) who have been hospitalized in the year 2010 for head injury.

We conducted a univariate analysis of variables by a SPSS 14.0. Means with standard deviations were calculated for quantitative variables and relative frequencies for categorical variables.

A bivariate analysis was conducted for categorical variables using X², and the Student's test for quantitative variables.

Results

During the study period, 191 children were hospitalized for traumatic brain injury among 2721 children hospitalized for surgery "B", and head injury patients represent 7% of all patients admitted. Hospitalization was indicated in the presence of neurological signs (disturbance of consciousness, convulsions, vomiting), or to the severity of trauma, or younger age (often difficult examination).

The mean age was 5, 94 years ranging from 3 months to 15 years. The most affected Children are those between 2 and 3 years with a percentage of 18, 2%, and the least affected are infants whose age is less than 1 year with a percentage of 2%.

There are 131 boys and 60 girls with a sex-ratio of de 1, 58 and a male predominance for head injuries. We calculated the number of boys and girls according to age groups and found the boys are the main victims of head injuries especially in older children (6 to 15 years).

The most common causes of head injuries are: Domestic Accidents (DA) and Accidents of Public Roads (APR). The distribution in our population is as follows:

- DA (falls): 126 patients (65, 9%)
- APR: 62 patients (32, 5%)
- Aggression: 3 patients (1, 5%)

For a better assessment of trauma severity the domestic accidents were divided into falling under than 2 meters and falling over 2 meters, and we found the same proportions in the two groups for 63 patients or 33% of all traumatic brain injury.

Clinical presentations

- Three patients (1, 6%) had respiratory problems immediately with 1 case of severe dyspnea.
- Hemodynamic instability was found in 7 children brain injured patients (3.6%).
- The initial state of consciousness has been assessed by the Glasgow Coma Score (GCS).

The average GCS found in hospitalized patients was 14.1 +/- 2.11 with a range from 3 to 15. This Clinical study demonstrates that most head injuries are benign, in fact, head injury was considered as:

- Ø Benin (GCS between 13 and 15) in 167 cases (83, 4%).
- Ø Moderate (GCS between 9 and 12) in 17 cases (8, 9%).
- Ø Grave (GCS between 3 and 8) in 7 cases (3, 7%).

The head injury was associated to others lesions in 62 cases (32, 5 %).

CT scan (CT) is the best choice examination used in all patients in our series with the exception of 3 patients. It objectified lesions in 121 TBI (63, 3%), and it was normal in 67 traumatized (or 35, 1%). The main lesions observed on CT are skull fractures in 51.8%, subarachnoid hemorrhage in 14, 1% of cases, an extra-dural and subdural hematoma in 22% of cases.

The treatment was based essentially on neurological monitoring in surgery department in mild cases and in an intensive care unit in serious cases. Filling infusion of saline was introduced in 88.5% of cases, intubation and mechanical ventilation was instituted in 11 patients that is 5.76% of the cases due to breathing difficulties, hemodynamic and/or disturbance of consciousness. Phenobarbital was prescribed for 32 patients (16, 8%). Neurosurgical intervention has been indicated only in one patient is (0.52% of cases) for a depressed skull fracture.

The evolution was satisfactory in 96% of cases, worsening health status of patients occurred in 2 patients or 1.04%, of which presented pneumococcal meningitis and presented a status epilepticus.

Five patients died in our series is 2.62%, two due to trauma or 1.04% moderate and three severe traumas or 1.57% and tow had major neurological sequelae.

Discussion

Head injury is a nonspecific term which includes clinically evident external injuries to face, scalp, and calvarium such as contusions, abrasions and fractures. Traumatic Brain Injury (TBI) is more adapted term. It is defined by the American Association of Neurologic Surgeons, as a blow or jolt to the head or penetrating head injury that disrupts the normal function of the brain. Mild TBI may result in a brief change in mental state or consciousness; severe TBI may result in prolonged unconsciousness, coma, or death [1,2].

Injury is the main cause of death and disability in children worldwide. In 2002, Traumatic Brain Injury (TBI) caused 2% of all deaths in children aged 0-14 years, 6% of all deaths, and 30% of deaths due to external causes of injury in 1-14 years old in England and Wales [3]. In the United States, more than 1.5 million head injuries occur annually, resulting in approximately 300,000 pediatric hospitalizations. Overall, up to 90% of injury-related deaths among children are associated with head trauma [2].

The severity of brain injury is defined by the Glasgow Coma Scale (GCS). Severe TBI is defined by a GCS < 8; it carries a high risk of mortality and definitive neurologic impairment. It is the leading cause of death in children after 1 year of age in developed countries. About 70-80% of the accidental deaths result directly from central nervous system lesions [4].

In this study, the age distribution of THI was aggregated in the younger age children, with more than half of subjects in the 1-4 yr old bracket. The gender ratio of the study showed male predominance and an increasing likelihood of male predominance in each age bracket as age increased. These findings coincide with the results of preceding reports and are explained but the dangerous character of games and plays in male compared to female [1,5].

Regarding seasonal variation, pediatric injuries have been assumed to occur mainly in summer due to the increased extent of activity, especially outdoor activity; however, seasonal variation was not evaluated in our study [5].

Our data confirmed that the home was the most common location of pediatric THI (65.9%), as shown in previous studies. With increasing age, the rate of injury at home tended to decrease, whereas the frequency of injuries outside the home (roads and playground) increased. This finding is believed to be associated with increasing engagement in outdoor activities among older children [5].

The results from the study of hospitalized patients with traumatic head injury, conducted in the San Diego area, showed that the most common mechanism was motor MVC (37%), followed by falls (24%) and sports and leisure activities (21%). Previous two studies in Korea, which were based on hospitalized patients with traumatic head injury, demonstrated that pedestrian traffic accidents were the most common cause of injury. In our study, overall, falls predominate as a cause of injury in the children and elderly, regardless of race and gender.

Overall prevalence of TBI may be slightly higher. It is also difficult to compare these rates with other studies as inclusion criteria, age ranges, and definitions of TBI vary widely between studies. For example, Parslo et al describe hospitalization rates for severe TBI in Italy at approximately 17 per 100 000 for all ages between 1996 and 1999. In Sweden, only 1.5% of accident and emergency attendances (for all ages) had a loss of consciousness of greater than 30 minutes corresponding to about 8 per 100 000 [3].

The peak time of injury around mid-to-late afternoon reflects and means that a larger proportion of these children will be admitted to intensive care or for neurosurgery outside normal working hours, a fact that can be pejorative for the patient [3].

Conclusion

The traumatic brain injury is a common cause of pediatric hospitalization. The peak of incidence is seen between two and three years, the age when the child starts walking and a quiet to explore his surroundings. Traumatic brain injury is two thirds of the boy after the age of 6 years.

In 66% of cases the TBI is of a domestic accident and is benign in 83% of cases, but may be accompanied by associated lesions in 33% of cases and can cause death or major neurological sequelae.

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