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Mode of Management and Outcome in Paediatric Head Injury Patients

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ABSTRACT
Head trauma is one of the most challenging fields of traumatology and demands immediate attention and intervention by first-line clinicians. There are a limited number of research articles studying the management of Traumatic Brain Injury (TBI) in children. To know about approaches and outcome in paediatric head injury patients. This was Prospective study conducted on total 56 paediatric patients admitted to Trauma ward at Govt. TD medical college and hospital Alappuzha, tertiary care centre in Kerala, with head injuries after Ethical committee clearance and following inclusion and exclusion criteria, for the duration of one years. There were more male paediatric patients, from age group 1-5 years followed by more that $\geq$ 6 years. Majority of the patients were injured due to fall followed by road traffic accidents and only one patient was injured due to the assault. 94.3 % of the study population were managed medically, while only 3 patients were managed surgically, of these 2 had age group more than 6 years while one patient from 1-5 years of age. around 92.9% of the study population observed with good recovery. Early identification and stabilization of children with severe traumatic brain injury, is crucial for initial and effective management of focal injuries in order to prevent conditions from surgical interventions worse outcome.

INTRODUCTION

A head injury is any trauma that leads to injury of the scalp, skull or brain and it ranges from a minor bump on the skull to serious brain injury. Traumatic brain injury (TBI) occurs when the brain is traumatically injured by an expected or unexpected external force[1]. TBIs can be categorized by severity, mechanism or particular characteristics. A child's life could be seriously endangered by head trauma and according to international epidemiological surveys, TBI is the main cause of fatalities.

Approximately 30% of total head injury are the Paediatric Head injuries. There are various mechanisms that cause harm in children and each one's prognosis is unique. Mechanism of injury, the response of the skull and the cranial contents to injury and the long-term prognosis are quite different in the paediatric age group than compared to adults. Hence Paediatric head injury contributes a separate entity for the treating Neurosurgeons. Compared to adults the common mode of injuries in paediatric population are birth injuries, fall, road traffic accidents, assaults, fall of objects on head, beaten baby.

The more prevalent and tragic cause of morbidity and mortality in children is traumatic brain injury. The traumatized child should be treated quickly and stepwise, focusing first on life-threatening issues. Preventing secondary harm from physiologic extremes such as hypoxemia, hypotension, prolonged hyperventilation, temperature extremes and abrupt changes in cerebral blood flow is the main goal of management. Initial glasgow coma score, hyperglycaemia and imaging are often prognostic of outcome. In order to reduce mortaliy early management of air way, hypoxia is more important. The adult-focused approach is also followed in child deciding for surgery. Mannitol is recommended for treating brain oedema in adults but hypertonic saline may also be used. If necessary, anticonvulsants should be administered with caution to prevent seizures. Thus, present study we have undertaken to know about approaches and outcome in paediatric head injury patients.

MATERIALS AND METHODS

Prospective study conducted on total 56 paediatric patients admitted to Trauma ward at Govt. TD medical college and hospital Alappuzha, tertiary care centre in Kerala, with head injuries after Ethical committee clearance, for the duration of one years. Patients were included in the study after following inclusion and exclusion criteria given bellow

Inclusion criteria:

- Paediatric patients with head injury
- Age≤13 Years

Exclusion criteria:

- There is no specific exclusion criteria

Method: (Airway, breathing, circulation, disability) method and their vitals are monitored after making sure that the child is hemodynamically stable the child is shifted for radiological assessment if required any and the child is accompanied by the resident doctor. Based on clinical and radiological results, patients were either managed conservatively or surgically. At the moment of discharge, results were recorded. Patients were followed for varied amounts of time, from three months to a year. The above mentioned data was entered into the master chart and numerous criteria that affected the result and contributed to the severity of head injury in pediatric age groups were examined.

- Pediatric glassgow coma scale

Statistical analysis: Microsoft excel 2016 has used for data entry of collected data, for further statistical analysis. Analysis was presented in terms of descriptive statistics. Qualitative data were presented in terms of frequency and percentages.

RESULTS

In the present study we have included 56 patients, after following inclusion and exclusion criteria and descriptive statistics of the study population was shown bellow. In the study we have observed that, there were more male paediatric patients compared to the female patients in the study population, also majority of the study population were from age group 1-5 years followed by more that ≥6 years. We have observed that majority of the patients were injured due to fall followed by road traffic accidents and only one patient was injured due to the assault.

Among the study population vomiting was major clinical feature observed followed by loss of consciousness, seizures and ENT bleed shown in above pie chart. Above table showed, management of head injury with abnormal CT, it was observed that 94.3% of the study population were managed medically, while only 3 patients were managed surgically, of these 2 had age group more than 6 years while one patient from 1-5 years of age. Above table showed that, around 92.9% of the study population observed with good recovery, 3 patients encountered with moderate disability and only one was expired, having Glassgow coma scale between 9-12 and other 55 patients had Glasgow coma scale between 13-15 at the time presentation.

DISCUSSION

Head trauma leading to brain injury is an important cause of morbidity and mortality in

Table 1:

Eye opening			
<1 Year	>1 Year		Score
Spontaneously	Spontaneously		4
To shout	To verbal command		3
To pain	To pain		2
No response	No response		1
Motor response			
Spontaneous	Obeys		6
Localizes pain	Localizes pain		5
Flexion withdrawal	Flexion withdrawal		4
Decorticate	Decorticate		3
Decerebrate	Decerebrate		2
No response	No response		1
0-23 months	2-5 Year	>5 Year	
Verbal response			
Smiles/coos	Appropriate words	Oriented	5
Cries, consolable	Inappropriate words	Disoriented confused4	
Cries, inconsolable	Cries, inconsolable	Inappropriate words	3
Grunts, agitated	Grunts	Incomprehensible sounds	2
No response	No response	No response	1

Table 2: Demographic profile of study group

Parameters	Frequency	Percentage
Age		
<1 Years	4	7.1
1-5 Year	29	51.8
>6 Years	23	41.1
Gender		
Male	35	62.5
Female	21	37.5
Mode of injury		
Assault	1	1.8
Fall	30	53.6
Road traffic accident	25	44.6

Table 3: Distribution of clinical feature among the study population

Clinical features	Frequency	Percentage
Loss of consciousness	24	42.9
Vomiting	46	82.1
ENT Bleed	5	8.9
Seizures	10	17.9

Table 4: Age wise management of study population

Managements	Medical	Surgical	Total
<1 years	4 (7.1)	0 (0)	4 (7.1)
1-5 year	28 (50.0)	1 (1.8)	29 (51.8)
>6 years	21 (37.5)	2 (3.6)	23 (41.1)
Total	53 (94.6)	3 (5.4)	56 (100)

childhood. In this population, the mechanism of traumatic brain injury varies by age[2]. Among infants, non-accidental TBI is a major cause of TBI, often associated with repeated, severe, diffuse injury and a delay in treatment that may cause associated hypoxic-ischemic injury. These traits set it apart from other TBI causes and these individuals typically experience worse outcomes than those who suffer from other types of TBI[3]. Fall-related injuries are more common in toddlers, while motor vehicle accidents are the leading cause of moderate to severe TBI in older age groups, culminating in late adolescence and early adulthood. In the present study we have included total 56 paediatric patients after satisfying inclusion and exclusion criteria and it was found that males were the predominant among the study population compared to female, also majority of the patients were from the age group of 1-5 years and more than or equal to 6 years. It was also observed that, fall and road traffic accident were the major cause for this head injury among study population. Some studies form India, Kumar, Sharma, Kumar *et al.*[4] observed male more than females with paediatric head injury. As they become older, male children tend to be much more free than female children. According to Michael Dewan *et al.*[5] observed that, male children suffered in majority compared to females after age of 3 years. A bimodal age distribution is often described, with injuries occurring more frequently in 0-2 years of age and teenagers (15-18). Many studies have shown, male children are at higher risk of head injury than female children, also growing children more than one year are more prone to fall and road traffic accident while playing roadside, supported by study Kumar, Sharma, Kumar *et al*. Also it correlates with the results Malla *et al.*[6].

In the present study, only 3 patients were managed surgically due to the multiple injuries and remaining 53 patients were managed conservatively. Worse outcome was associated to children with skull fractures, as measured by the "Pediatric Cerebral Performance Category" (PCPC) score by the study of

Mahapatra *et al*.[7] in contrast to our study where fractures have good outcome. The presence of epidural hematoma and diffuse axonal injury were significant predictors of mortality, while the presence of subarachnoid haemorrhage was a significant predictor of a worse outcome, as measured by the Glasgow Outcome Scale (GOS) by The presence of epidural hematoma and diffuse axonal injury were significant predictors of mortality, while the presence of subarachnoid haemorrhage was a significant predictor of a worse outcome, as measured by the Glasgow Outcome Scale (GOS) by Sundaram *et al*.[8] similar to findings of our study. In our study we have observed only one death, that was also due to the multiple injuries and had Glasgow coma scale between 9-12, in contrast to 4% death with the study of Pitts and Dereck Bruce *et al*. only 3 patients observed with moderate disability but they have Glasgow coma scale 13-15 and remaining 52 patients observed with good recovery and had GCS was 13-15. Also in the same study, 2-3% of the patients are noticed in vegetative states which contrast to our study having no patients with vegetative state. Henrick *et al*. and Ramamoorthy *et al*. have also noticed absence of vegetative states in their studies. Study by Mahapatra *et al*. observed Lower GCS scores on admission were a significant predictor of a worse outcome, as measured by the PCPC score by Arora *et al*.[9] Lower GCS scores on admission were a significant predictor of a worse outcome, as measured by the Glasgow Outcome Scale (GOS) which were similar to our study.

CONCLUSION

From the overall observation and after discussion with other studies we can conclude that, the efficient initial management of focus injuries and the prevention of conditions from surgical intervention depend on the quick diagnosis and stabilization of children who have suffered severe TBI. An initial GCS score of $\leq$9 is considered severe TBI and any accompanying injuries worsen the situation. Study also conclude that most common cause of head injury in paediatric patients is falls, followed by road traffic accidents, commonly shown in males compared to females. Majority of the patients were managed conservatively with GCS 13-15 at presentation and comes to good outcome.

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