

The Clinico-Radiologic Profile and Outcome of Traumatic Brain Injury in Paediatric Patients

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Abstract: Aim of this study was to evaluate the clinico-radiologic profile and outcome of Traumatic Brain injury (TBI) in Pediatric patients. In this prospective study 54 paediatric patients (age < 13 years) from January 2015 to December 2015 with TBI were studied. Clinico-radiological, treatment and outcome data were recorded. In our study, TBI predominant in male with age group of 1-3 years. Loss of consciousness and vomiting (42.60%) were the leading symptoms. At the time of admission 55.55% patients presented without any focal deficit or seizures and 44.45% patients presented with focal deficit in which hemiparesis (11.11%) most common followed by quadriplegia (7.40%). Patient (50%) with mild TBI stage and Glasgow coma scale (GCS) 13-15 having less hospital stay and mostly discharge without any deficit (P=0.002). Remaining moderate (27.77%) and severe (22.23%) TBI stage patients were discharged with deficit. Patient with abnormal CT head (61.11%) needed significantly more hospital stay (P=0.0029) and had low GCS (P=0.001) compared to patient with normal CT head (38.89%). Most patients (31.89%) treated symptomatically, 12.96% with anticonvulsants and those with GCS ≤ 8 shifted to ICU and supported with mechanical ventilation (7.40%). At the time of discharge 74.07% patient had no deficit. Patient with GCS 9-12 having maximum number of hospital stay and half of patients were discharged with some form of deficit. Above results indicates that patients with abnormal CT scan and focal deficit at the time of admission need more hospital stay. Patients with low GCS and severe TBI stage are mostly discharge with focal deficit or seizures. There was no significant correlation between time to start physiotherapy and outcome on discharge and hospital stay.

Keywords: Traumatic Brain injury, paediatric, Glasgow coma scale

1. Introduction

Traumatic Brain Injury (TBI) is a leading cause of death and disability following injury in children, adolescents and young adults around the world (WHO, 2009). Nonetheless, most of our understanding including clinical management of pediatric traumatic brain injury (TBI) is extrapolated from adults. Children are not just "little adults", and there are many important distinctions between the developing and mature brain, particularly with regards to normal function, patho-physiological response to injury, recovery and plasticity.^[1] Level of consciousness is the most common and reliable clinical parameter used for evaluating brain injury severity. The most widely used measure of level of consciousness is the Glasgow Coma Scale.^[2] TBI is one of the most common indications for hospitalization among children and is often associated with important morbidity and mortality.^[3] CT is the reference standard for emergently diagnosing TBI although some brain injuries are not seen on CT.^[4] Children who sustain TBI are at high risk for problems in behaviour, adaptive functioning and educational performance.^[5] Many studies have reported the clinico-radiologic profile of TBI in the Western (Developed) world and appropriate management guidelines are in place.

In India, apart from road traffic accidents, children are very vulnerable to accidents at home, farms, playground, school, etc due to lack of safety measures and effective legal regulations at all these places. There is in general non-availability of on the spot resuscitation facility, poorly organized, equipped transport of patient and emergency services; lack of team approach in the developing world like India.

It is very obvious that the clinical and radiologic picture reported by the western literature does not provide appropriate and adequate information regarding TBI due to

these accident/ trauma situations, so very exclusive to India and other developing countries. The current study was therefore conducted to find out the clinico-radiologic profile and outcome of Traumatic Brain injury in children presenting to the Emergency room/ Trauma Centre attached to a tertiary Paediatric Hospital.

2. Material and Methods

A Prospective study on "the clinico-radiologic profile and outcome of Traumatic Brain injury in Pediatric patients" was conducted on patients admitted in neurosurgery/paediatric units of Dr S N Medical College, Jodhpur from January 2015 to December 2015. Details of patient like mode of injury, clinical examination, radiological findings, treatment given etc. noted. CT scan of brain was done. Based on GCS, TBI cases were graded as mild (13-15), moderate (9-12) and severe (≤ 8).

Selection criteria of patient

- Patients of both sexes having head injury surviving for more than 24 hours of admission.
- Children upto ages of 13 were included in this study.
- Patients who come under the following modes of traumatic injury: fall from height, road traffic accidents, animal horn injury and injuries due to fall of heavy object over head.

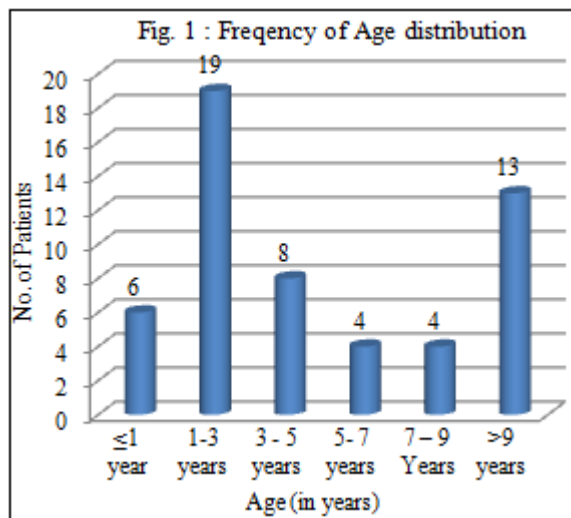
3. Observation and Discussion

Fifty four patients who fulfilled the inclusion criteria were analysed in this study.

Table I : Gender wise distribution of cases

Gender	Number of patients	Percentages
Male	30	55.56
Female	24	44.44
Total	54	100%

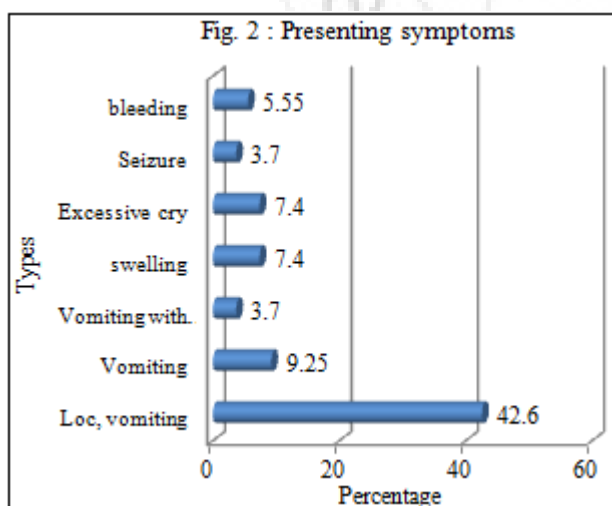
$[x^2=0.667; d.f.=1; p=0.414]$



According to this study TBI predominantly affect males and children of age group 1 - 3 years.

Table II: Mode of Injury

Type	Number of patients	Percentages
Animal horn	03	5.55
Fall from height	29	53.70
Fall from bed	04	7.40
Fall of heavy object over head	02	3.70
Fall from stairs	01	1.85
RTA	15	27.77
Total	54	100%



Fall from height (53.70%) was the most common mode of injury followed by RTA (27.77%).

Mostly patients presented with loss of consciousness and vomiting 42.60% followed by vomiting alone and then scalp swelling and excessive cry.

Table III: TBI Stage

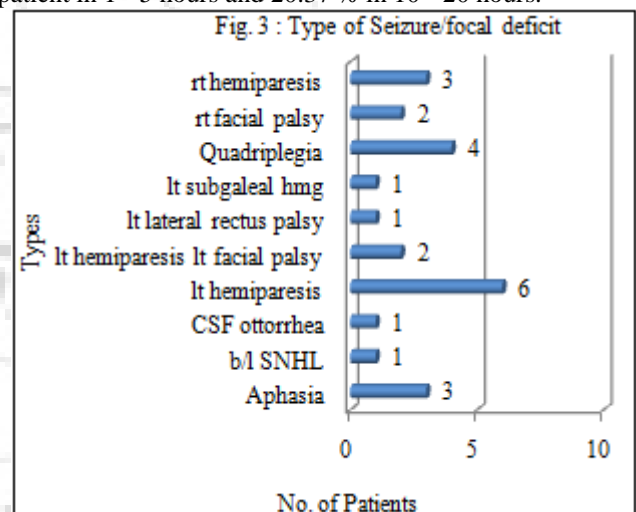
Stage	Number of patients	Percentages
Mild	27	50.0
Moderate	15	27.77
Severe	12	22.23
Total	54	100%

Table IV: Correlation between TBI Stage with Outcome

TBI Stage	Outcome		P value
	No deficit (N=36)	Deficit (N=17)	
Mild (N=27)	24	03	0.002
Moderate (N=15)	08	07	0.269
Severe (N=12)	04	08	0.01

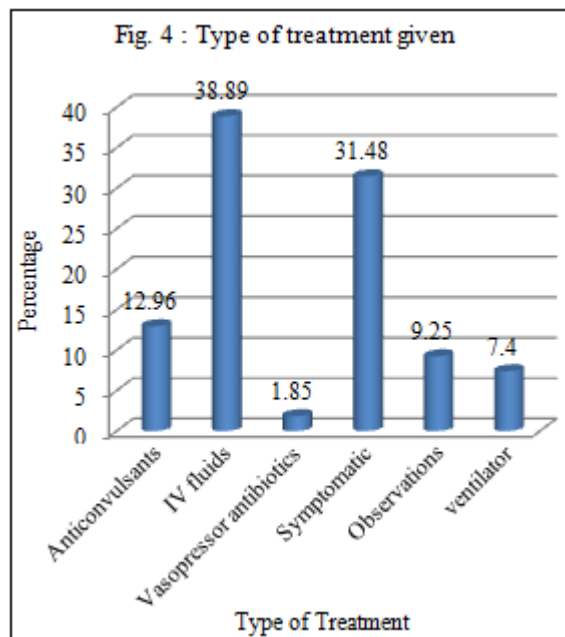
Out of 54 patients 50% having mild TBI stage and 27.77% in moderate and 22.23% in mild TBI stage. Significant number of patient (24 out of 27) with mild TBI stage with hospital stay (6.22 ± 4.44) discharged without any deficit ($P=0.002$) and mild TBI stage patients (8 out of 12) with hospital stay (6.15 ± 13.47) present with deficit on discharge ($p=0.01$). Moderate TBI stage patients were having maximum hospital stay (9.00 ± 4.76).

Only 5.55% patient got scanned within one hour of injury and mostly scanned after 24 hours (33.33%), 22.22% patient in 1 - 5 hours and 20.37% in 10 - 20 hours.



At the time of admission or in hospital stay 55.55% patients presented without any focal deficit or seizures and 44.45% patients presented with focal deficit in which mostly with hemiparesis (11.11%) followed by quadriplegia (7.40%) and aphasia (5.55%).

In this study around 61.11% patients present with abnormal CT head and they needed more hospital stay (7.95 ± 4.13) and had significantly low GCS score (6.78 ± 2.78) compare to patient with normal CT head (38.89%).



Most of the patients treated symptomatically and with iv fluid and 12.96 % patient needed anticonvulsants and only 7.40 % patient needed ventilator support. NO significant correlation found in this study between the time to start physiotherapy and outcome on discharge and hospital stay.

At the time of discharge 57.40% patient had no deficit and 1 patient expired during hospital stay and remaining patients 40.74% discharged with any deficit.

Patient with $GCS \leq 8$ (5.41 ± 1.24) mostly shifted to ICU and supported with mechanical ventilation. Out of 12 patients 1 patient expired and significant number of patients were discharged with deficit and had significantly longer hospital stay. Patient with GCS score 9-12 (10.73 ± 0.88) having maximum number of hospital stay and half of patients discharged with some form of deficit. Patient with GCS score 13 to 15 (13.51 ± 0.51) having significantly less hospital stay, not required any physiotherapy (31.48 %) and significant number of patient discharge without any deficit ($P=0.002$).

Physiotherapy started 1 to 5 days after injury in most patients (31.48 %). Maximum patients (35.18 %) stayed in hospital for 4 to 7 days followed by 20.37 % patients for 1 to 3 days. Only 5.56 % patients stayed in hospital for more than 15 days.

4. Conclusion

Fall from height was the most common mode of injury followed by RTA. GCS score, TBI stage and Radio imaging (CTscan) for traumatic brain injury have a significant impact on the clinical presentation, management and outcome of injury. Early intervention, aggressive medical and surgical management is advised, when needed particularly for moderate and severe cases of traumatic brain injury in children to reduce morbidity and mortality.

References

- [1] Gizza CC. Lasting effects of pediatric traumatic brain injury; Indian journal of neurotrauma, 2006;3(1):19-26.
- [2] Murgio A. Epidemiology of traumatic brain injury in children. Revista Espanola de Neuropsicologia 5, (2003);2:137-161.
- [3] Ghizoni E, Ade FM, Baracat EC, Joaquim AF, Fraga GP, Rizoli S, et al. Indications for head computed tomography in children with mild traumatic brain injury. Rev Col Bras Cir 2013;Nov-Dec;40(6):515-9.
- [4] Kuppermann N, Holmes JF, Dayan PS, Hoyle JD, Atabaki SM, Holubkov R, et al. Identification of children at very low risk of clinically important brain injuries after head trauma: a prospective cohort study. Lancet. 2009 Oct 3;374(9696):1160-70. doi: 10.1016/S0140-6736(09)61558-0. Epub 2009 Sep 14.
- [5] Taylor HG, Yeates KO, Wade SL, Drotar D, Stancin T, Minich N. A prospective study of short- and long-term outcomes after traumatic brain injury in children: behavior and achievement. Neuropsychology. 2002 Jan;16(1):15-27.