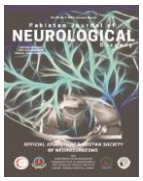

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Original Article (BRAIN)

Outcome of Severe Traumatic Head Injury in Children

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ABSTRACT

Objective: To determine the frequency of outcome of severe head injury in children.

Material and Methods: This study was a descriptive case series carried out in the neurosurgery department from 05-01-2018 to 04-07-2018. The study includes 89 child age group patients with severe head trauma within the last 8 hours. CT scan non-contrast done in all patients. Designed Performa was filled. Required surgical intervention was done after completing pre-operative care if indicated. CT scan was done after performing the surgical intervention. Glasgow outcome scale was calculated at 2 months to follow up.

Results: 11.27 ± 4.38 years was the average age. It includes 70 (78.65%) males and 19 (21.35%) females. 18 (20.22%) was the frequency of mortality, those who survived were 36 (40.45%) with a good outcome, moderately disabled 19 (21.35%), severely disabled were 7 (7.87%), and vegetative was 9 (10.11%). The relationship of outcome with gender and age was found insignificant (p-value > 0.05) while with a mode of injury it was significant (p-value < 0.05).

Conclusion: Low mortality in children with a severe head injury was reported in this study. The commonest mode of injury was a road traffic accident. The clinical criteria for admission, findings on CT scans, and standardized neurological examination may yield data that can be used to predict outcomes accurately in children.

Keywords: Traumatic head injury, Road traffic accident, Outcome, GCS, Children.

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INTRODUCTION

Injury to the scalp, skull, and brain is a highly common occurrence in childhood.[1] The most common cause of mortality in children is traumatic brain injury (TBI).[2] The frequency of head trauma in children ranges between 180 and 300 per 100,000.[3,4] It is possible to measure the state of consciousness following a traumatic brain injury using the Glasgow Coma Scale (GCS), with lower values indicating greater disability and more severe traumatic brain injury.[5] Leading causes of death in children in 1 – 19 years is severe traumatic head injury.[6] The GCS score of 8 or lower indicates serious traumatic brain injury, which is the major cause of morbidity and accounts for half of all fatalities.[7,8] Lower GCS indicates intracranial injury and poor outcome.[9,10] Universal with severe traumatic brain injury is acute subdural hematoma which results in neurologic deficits which results in lifelong morbidity, persistent coma, and death.[11] CT scan is the most common investigation performed in traumatic head injury.[12,13]

38% mortality is reported in one of the published studies which included children under 12 years, among those who survived were 45% with a good outcome with GOS of 4 or 5, severely disabled were 13% with GOS of 3 and with GOS 2 were vegetative 19%.[14]

Outcome measurement after a severe head injury is an area of intense interest. Resources allocation and abilities which measures outcome have gained increased attention which reflects the curiosity of neurosurgeons.

MATERIAL AND METHODS

Study Design & Setting

A case series study was conducted and included patients presenting in Emergency at Neurosurgery department, Jinnah Postgraduate Medical Centre, Karachi. The study was conducted for 06 months from 05-01-2018 to 04-07-2018. Approval was taken from the institutional review board.

Sample Size and Technique

The previously documented outcome in literature used severe head injury among children was 13% severe disability.[14] Using d = 7% with a 95% confidence interval for our study the sample size was calculated as 89. A non-probability, consecutive sampling was considered.

Inclusion Criteria

Head trauma patients both male and female, age < 18 years, with GCS < 8 after who gave consent were included in the study.

Exclusion Criteria

Patients with known neurosurgical disease, intervention, and polytrauma were excluded.

Data Analysis Procedure

SPSS version 21 is used for data analysis. We used frequencies and percentages for gender, mode of trauma, and outcome while mean and standard deviation for age, GCS at presentation, and after two months were calculated. Age, gender, and mode of trauma were effect modifiers and marked through stratification. We used the chi-square test for the assessment of correlation and used P-value ≤ 0.05 as significant.

RESULTS

This study includes 89 pediatric patients with severe head trauma within the last 8 hours.

Age and Gender Distribution

Patients below 10 years were 39 (43.82%) and between 11 – 18 years were 50 (56.18%). 11.27 ± 4.38 years was the average age of patients and 70

(78.65%) were male while 19 (21.35%) were female.

Mode of Injury

Regarding mode of head injury, 46 (51.69%) were injured by road traffic accident (RTA), 38 (42.7%) fall from height, and 5 (5.62%) were assaulted.

Outcome

The frequency of outcomes in our studied patients with a severe head injury is presented in Table-1. Mortality was 18 (20.22%), those who survived were 36 (40.45%) with a good outcome, moderately disabled 19 (21.35%), severely disabled were 7 (7.87%), and vegetative was 9 (10.11%).

The outcome of severe head injury was observed with respect to age group, gender, and mode of injury. The outcome was not significant with respect to age and gender while it was significant with respect to the mode of injury as presented inTable-2.

Table 1: The demographic data of patients.

S. No.	Characteristics		Number of Patients (n)	Percentage (%)
1.	Gender	Male	70	78.7
		Female	19	21.3
2.	Age	≤ 10 years	39	43.8
		> 10 years	50	56.2
3.	Mode of Injury	RTA	46	51.7
		Fall	38	42.7
		Assault	5	5.6
4.	Outcome	Good	36	40.5
		Moderately disabled	19	21.3
		Severely disabled	7	7.9
		Vegetative	9	10.1
		Mortality	18	20.2

Table-2: Comparison between Outcome and demographic characteristics of patients.

S. No.	Characteristics		Outcome					P value*
			Good	Moderately Disabled	Severely Disabled	Vegetative	Mortality	
1.	Gender	Male	31	14	6	4	15	0.181
		Female	5	5	1	5	3	
2.	Age	≤ 10 years	21	5	3	4	6	0.085
		> 10 years	15	14	4	5	12	
3.	Mode of Injury	RTA	14	16	5	3	8	0.046*
		Fall	20	2	2	6	8	
		Assault	2	1	0	0	2	

*Significant < 0.05

DISCUSSION

Trauma to the head is called head injury where the brain may or may not be damaged in the process. It is the most important cause of morbidity and also mortality worldwide may result from close or open injury.[15] A large number

of children with severe head injuries visit the emergency room and admit to the hospital each year which is a major cause of death and disability in children over 1 year of age. Motor-vehicle–related accidents followed by falls from height are a common mode of injury.[16] Abuse of children under the age of two is a leading reason for brain injury in these children. To determine the frequency of outcome of severe head injury in children, those less than 18 years from both genders, presenting in an emergency with GCS <8 were recruited. Head injuries involve thousands of people especially young males each year.[17] This study found that children in the age range between 11 and 18 years were most commonly affected and 11.27 ± 4.38 years was the average age. Among them, 78.65% were males. Numerous other writers have documented a tendency for young males aged 11 – 18 years to have a head injury, as demonstrated in our study.[18,19] A significant tendency for accidents exists among this busy and adventurous age group, which is frequently involved in accidents.[17] Falling from a height, which is a significant cause of head injury in youngsters, is becoming more prevalent by the day.[20] In our survey, the most common mode of injury was a road traffic collision (51.69%), which was followed by a fall from a height (which accounted for 42.7% of all injuries) and an assault (which accounted for 5.62%). According to the World Health Organization (WHO), RTAs will soon become the third leading source of disease incidence and disabilities worldwide.[21] RTA was the major cause of morbidity & mortality reported in an Indian study where it caused 78% head injuries and 11% deaths in patients less than 45 years.[22] Our study includes a total of 89 patients with a male/female ratio of 3.6:1,70 (78.65%) male and 19 (21.35%) female. Ghebrehiwet M et al reported identical results in their publication, where the male to female ratio was 3.5:1 and 75.5% of patients were male while 24.5% were female.[23] Other studies reported male patients more commonly involved in 67% and females in 33% of cases.[24]

Our study reports the outcome of severe head injury in children as 20.22% mortality, while 79.78% survived. Moreover among survived, 40.45% have a good outcome, 21.35% were moderately disabled, 7.87% were severely disabled and 10.11% were vegetative which is again similar to another study. Becker et al. found that 34% of children had a poor outcome (that includes mortality, persistent vegetative state, and severe disability), compared to a satisfactory recovery in 66%.[25] Jennett and colleagues found that 49% of patients were in a chronic vegetative state and 51% were severely disabled.[26] Another study included patients within a few hours after injury in a hospital in the Netherlands and reported 52% mortality, 39% good recovery, and 42% moderate disability.[27] Cedermark and Akerlund support that children after severe head injury recover better than adults.[28,29] In his study, Hendrick found a 44% mortality rate in children following a serious head injury, whereas Pazzaglia and colleagues found a 35% mortality rate in patients below ten and a 42% mortality rate in children between the ages of eleven and twenty years.[30,31]

CONCLUSION

Our study reported low mortality in children who presented severe head injury. A road traffic accident is the most prevalent mode of injury in children followed by falls. The mode of injury mainly determines outcome rather than age & gender. The clinical criteria for admission, findings on CT scans, and standardized neurological examination may provide significant data which can be used to reliably predict outcomes in children.

We believe that with multidisciplinary team children with severe head injury have a better prognosis for survival.

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Additional Information

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Human Subjects: Consent was obtained by all patients/participants in this study.
Conflicts of Interest:
In compliance with the ICMJE uniform disclosure form, all authors declare the following:
Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.
Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.
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AUTHORS CONTRIBUTIONS

Sr.#	Author's Full Name	Intellectual Contribution to Paper in Terms of:
1.	Mumtaz Ali Narejo	1. Study design and methodology
2.	Ali Akbar	2. Data calculations
3.	Farrukh Javeed	3. Data collection and calculations
4.	Lal Rehman	4. Interpretation of results
5.	Muhammad Munwar Ali	5. Literature review and referencing
6.	Khair-un-Nisa Shaikh	6. Analysis of data