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ORIGINAL ARTICLE

Pediatric Traumatic Brain Injury; Experience in Tertiary Care Hospitals of KPK, A Multi-Center Study

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ABSTRACT

Objective: The present study examined the epidemiology, clinical features, and outcome of pediatrictraumatic brain injuries (TBI) in tertiary care hospitals in Khyber Pakhtunkhwa (KPK) .

Duration and Place of the Study: Duration of study was From February 2020 to February 2022.It was conducted in Neurosurgery Department, Khyber teaching hospital MTI, and Hayatabad medical complex Peshawar.

Material and Methods: A total of Six hundred and forty-three pediatric patients, ages 01 to 11years, who had suffered traumatic brain injury were included in the study. All children were first seen at an emergency room, where theyhad a series of diagnostic tests and a physical examination. All necessary radiological studies were carried out under the watchful eye of the senior consultant neurosurgeon. In addition to demographic information, the pattern, treatment, and outcome of children with head injury were also recorded.

Results: Among the 643 kids examined, 411 (or 65%) were boys, and 232 (or 35%) were girls.At presentation, the average age was 4.062 years. Among the children surveyed, 525 (82%) lived in an urban setting, while the remaining 117 (18%) lived in a rural region. Three hundred and seventy-eight (60%) of the children suffered a head injury secondary to fall, whereas just 207 (33%) had been involved in automobile accidents. 58% (374) had mild head injury and 185 29% had moderate head injuries, 84 (13%) had severe head injury. 12% (74) of patients underwent craniotomy for extra-dural hematoma. 46 (7.1%) of the children had depressed skull fracture which was surgically treated. 23 (3.5%) patient had acute sub-dural hematoma for which craniotomy was done. Rest of the 27(4.1%) children had traumatic sub-arachnoid hemorrhage and intracerebral bleed which were treated. Out of the total 76(11.6%) children did not recover and died, most of them presented with severe head injuries

Conclusion: Most common cause for head injury in our setup was fall from height which was followed by motor vehicle accidents. Over half of the children presented mild to moderate head injuries. Over half were treated conservatively with good outcome. We had mortality of 11.6% with most having severe head injuries.

Keywords: Mortality, Brain Injury, fall, Car Accidents, depressed skull fracture, extra-dural hematoma, acute sub-dural hematoma.

INTRODUCTION

Children's mortality and hospitalization rates are statistically higher due to head traumas[1]. There is no national register detailing the precise burden of brain injuries among children in Pakistan, even though half of the country's population is under the age of 20[2]. According to statistics fromindustrialized nations, concussions are the leading cause of child death and long-term impairment[3]. Even though severe head injuries are the most common cause of bad outcomes, moderate or mild head injuries can also hurt a patient's health[4] in the form of prolonged hospital stay and disability. There is a lot of evidence from studies 4,5 that falls arethe leading cause of head injuries in children who visit emergency rooms, and that falls account for roughly 6% of all pediatric age group mortality. 6-8 When considering all causes of trauma-related fatalities that are automobile accidents, fires, and drowning, falls rank fourth[5,6]Of the kids treated, 71% fully recovered, while 11% died[7]. There is a lack of information on the presentation, treatment, and outcomes of pediatrics head injury patients presenting to the Neurosurgery department of KTH and HMC from different rural and urban areas in KPK. Our primary goal in doing this research was to learn more about the demographics, presentation, and outcomes of pediatric head injury at emergency rooms[8]. The resultsof this two-year study will identify the most common mechanism of head injury, which might help allocate the necessary resources and modalities to design mechanisms to prevent such incidents leading to head injuries in pediatrics population and also this study will help in providing awareness to parents in keeping their children safe from head injuries. Thus help in reducing the burden in emergency room services.

MATERIAL AND METHODS

The Department of Neurosurgery at KTH and the HMC Hospital collaborated on a multi-center study from February 2020 to February 2022. As this was a multi-center study, permission from each institution's ethical review boards was taken. There were 643 boys and girls between the ages of 07 and 11 who had suffered traumatic brain injury. All individuals who had suffered multiple or extremely complicated fractures were ruled out. Also omitted were kids who suffered abdominal injuries that required surgery. All children with only head injuries were referred from general emergency room to neurosurgery emergency room, where they were examined in detail and classified on basis of GCS into mild moderate and severe. According to the Glasgow Coma Scale (GCS), a score of [14–15] indicates a mild head injury, [09– 12] a moderate one, and [03–08] a severe one. Ct brain was done for all children who met the required criteria. Data from the study were recorded using a custom- made proforma.

The data was analyzed using SPSS 24.0 (Statistical Package for the Social Sciences). Quantitative information was presented as frequencies and percentages, while statistical information was depictedas means and standard deviations (SD).

RESULTS

Among the 643 kids examined, 411 (or 65%) were boys, and 232 (or 35%) were girls. At presentation, the average age was 4.062 years. Among the children surveyed, 525 (82%) lived in an urban setting, while the remaining 117 (18%) lived in a rural region. Three hundred and seventy-eight (60%) of the children suffered a head injury secondary to fall, whereas just 207(33%) had been involved in automobile accidents. 58% (374) had mild head injury and 185 29% had moderate head injuries, 84 (13%) had severe head injury. 12% (74) of patients underwent craniotomy for extra-dural hematoma. 46 (7.1%) of the children had depressed skull fracture which was surgically treated. 23 (3.5%) patient had acute sub-dural hematoma for which craniotomy was done. Rest of the 27(4.1%) children had traumatic sub-arachnoid hemorrhage and intracerebral bleed which were treated. Out of the total 76(11.6%) children did not recover and died, most of them presented with

severe head injuries

Table 1: Pediatric Patients Presenting With Head Injuries: Emergency medicine Characteristics(n=643)

[Baseline Characteristics]		[Number] (%)
[Gender]	Male	411 (65%)
	Female	231 (35%)
[Age Groups (years)]	<1	38 (06%)
	1-5	370 (58%)
	6-10	226 (34%)
	11-12	06 (01%)
[Residential Status]	Rural	117 (18%)
	Urban	525 (85%)
[Mode of Injury]	Fall	378 (60%)
	Road-Traffic Accidents	207 (31%)
	Sports Injuries	30 (04%)
	Blunt Injury	13 (02%)
	Violence or Abuse	08 (01%)
	Others	06 (01%)

Table 2: Injury Distribution in Children with Head Trauma (n=643)

[Diagnosis]	[Number] (%)
[Brain edema]	389 (61%)
[diffuse axonal injury]	74(11.5%)
[Depressed Fracture]	46 (7.1%)
[Contusions+SAH)	27 (4.1%)
[Extra Dural Hematoma]	84 (12.7%)
[Subdural Hematoma]	23(3.5%)

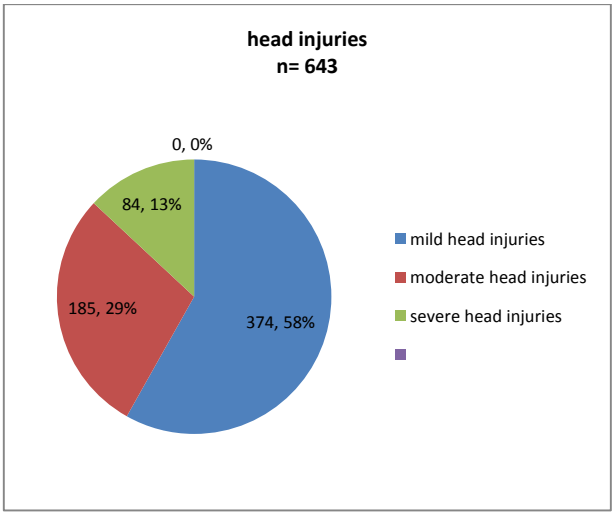

Chart 1: More than half of the patient had mild head injuries

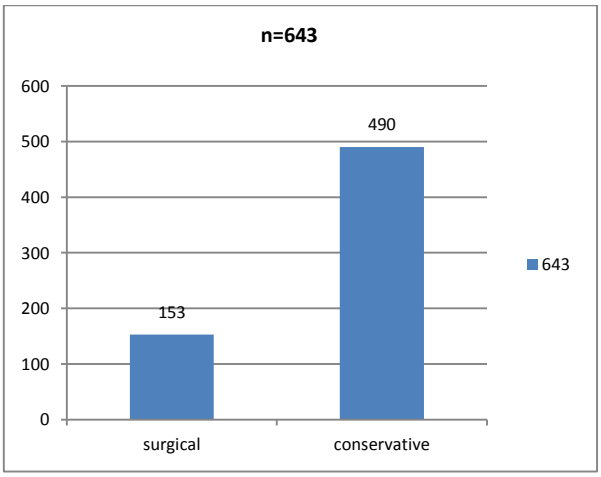

Chart 2: treatment given to patients

Table 3: surgical treatments N=643

Procedure	Number of patient	Percentage
Craniotomy for extra dural hematoma	84	12.7%
Craniotomy for acute sub-dural hematoma	23	3.5%
Surgery for depressed skull fracture	46	7.1%

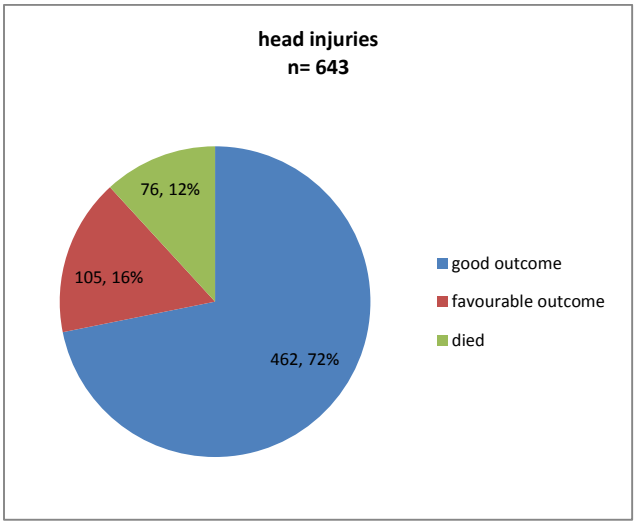

Chart 3: Outcome of head injury N=643

DISCUSSION

Any physical force to the head resulting in entire or partial functional disability and causing altered state of consciousness is define as traumatic brain injury[10]. A head injury is a recognized contributor to a wide range of emotional, physical and mental abnormalities and thus can also effect the victim's behavior. Aside from the physical and mental toll, a child's brain injury might cost their family a lot of money. According to statistics gathered in the United States, brain injuries account for around three-quarters of all child fatalities caused by trauma. Approximately 98% of all child deaths due to accidents occur in developing nations, according to a global analysis of injury statistics[11]. This analysis of 643 pediatric head injuries in kpk Pakistan is the most extensive study of its kind. The majority of the kids (65%) were boys. These results are consistent with local research conducted in Sahiwal, which found that 61% of the children with head injuries were male[12]. A majority of the youngsters who suffered head injuries were boys (61%), according to a kpk research. Another Egyptian study indicated that boys comprise 60% of the pediatric head injury population. Possible explanations for the overwhelming male participation in this study include boys' natural tendency toward risk-taking and the stereotype that boys are naturally more aggressive than their female counterparts[13]. Most of the children (58%) in this research were between the ages of 01 and 06 upon presentation, with a mean age of 4.602 years. An Egyptian study found that two to six-year-olds made up 49% of the pediatric head injury population, indicating that the years after infancy are the most vulnerable for this injury type. However, Asif M et al. found that 57% of children with head injuries were between the ages of 06 and 14 years old[14]. Specifically, we observed that 85% of children live in metropolitan regions. It is possible that most of the children reported in this study came from urban areas because our setting is located in an urban area, where people from nearby locations approach more often immediately after the head injury.

In contrast, people from the periphery or rural areas might seek out healthcare in rural areas to get immediate healthcare attention. Sixty-eight percent of Egyptian children with brain injuries live in cities, according to recent research[15]. Head injuries in

children were most commonly sustained due to a fall (58.9%), followed by road traffic accidents (31%)[16]. Previous local and regional data have shown that falls are the leading cause of head injuries.

Contrary to what is depicted in international literature, approximately three-quarters of all pediatric brain injury cases do not result from a fall or a car accident; most patients (62%) with head trauma in Sahiwal were injured in falls[17]. The current study found that 12% of pediatric head injury cases resulted in death, indicating a low overall mortality rate and that most fatalities occurred in children with severe brain damage[18]. Our study's 12% fatality rate is similar to that seen in a local [Rawalpindi] study, including children with head injuries[19]. There were certain caveats to our study. The present study has several restrictions because it was a retrospective analysis. Unfortunately, we could only collect data on the immediate effects of brain injuries on children and report those. Unfortunately, we could not write on the children's radiological and laboratory parameters in this study[20].

CONCLUSION

Children's head injuries were most frequently caused by falls and motor vehicle accidents. Over two- thirds of those who had a head injury had mild to moderate head injuries. The vast majority of kids were treated conservatively, which shows that outcome of pediatric head injury patent is good if treatment is offered timely need not that be surgical. This conservative treatment can be offered in a low healthcare setup also.

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