

Uncommon Modes of Presentation of Head Injury

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Abstract: Uncommon mode of presentation of head injury [UPHI] in children needs to be highlighted to create awareness amongst the treating surgeons and parents to prevent injuries to the growing brain. Records of 21 children aged between 6 months and 7 years admitted with UPHI between 2001 and 2003 were analyzed. Out of 21 children, 5 were ejected from their cars following head on collision, 4 children were hit by falling television sets, 3 were injured while reversing cars, 3 were hit by running ceiling fans, 2 were hit by siblings out of jealousy, 2 fell from laps of their teenaged mothers, 1 fell from camel back and 1 was victim of abuse. Nine children (42.8%) sustained severe head injury [SHI] presenting as diffuse brain injury, brain edema, acute subdural hematomas, or multiple contusions. Five (23.8%) children had moderate head injury [HI] presenting with depressed fractures with associated contusions (2 cases) epidural hematomas, calvarial fractures, seizures and patient of child abuse had depressed with small epidural hematoma with subdural effusion. Seven children (33.3%) with mild HI showed depressed fractures associated with small epidural hematomas. Five out of 9 SHI patients died (55.6%) and four had moderate outcome (44.4%). Of the five patients with moderate HI two had moderate outcome (40%) and the remaining 60% had good outcome. Patients with minor injury became normal. If care is taken against above highlighted factors then mortality and morbidity can be reduced.

Keywords: head injury, uncommon mode of head injury, motor vehicle accidents, pediatric head injury .

INTRODUCTION

Head injuries (HI) occurs at all ages, children and young adults being more prone because of increased outdoor activities, the motive being intentional or unintentional¹. The former includes assaults and child abuse and the latter includes motor vehicle accidents (MVA), falls or sport related injuries. Incidence of HI is on the rise because of mechanization and increasing motor vehicles density, and consequently, MVA, the latter accounting for most of the cases of HI. MVA causing HI is uncommon in infants and children upto 3 years of life. In the present communication the uncommon presentation of HI (UPHI) seen during the first three years of life is discussed.

MATERIAL AND METHODS

We analyzed records of children admitted to our hospital between 2001 and 2003 (three years). Out of 482 children admitted with HI, 21 were admitted with UPHI. All patients underwent CT scan of head in addition to base-line hematological and biochemical investigations. Patients with low coma scale, or seizures, were ventilated in the intensive care unit (ICU). Severe Head Injury (SHI) or moderate HI patients requiring surgical intervention were operated upon and the remaining were treated with decongestive therapy

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and/or ventilation in ICU along with intracranial pressure (ICP) monitoring as and when indicated.

RESULTS

A total of 21 patients (4.82%) presented with UPHI with age ranging from 6 months to 7 years (mean 1.33 ± SD years) and almost an equal sex ratio (11 males, 10 females). The mild, moderate and severe HI constituted 33%, 24% and 43% of the patients respectively (Fig.2). Twenty patients (95.1%) were the victims of unintentional HI and only one patient (4.5%) was victim of child abuse. Majority (80.9%) were victims of MVA. Causes of unintentional head injuries were motor vehicle collision in 5 (25%), car reversing injuries in 3 (15%), falling of television sets in 4 (20%), hit by ceiling fan in 3 (15%), fall from lap of teenager mothers in 3 (15%). Associated chest, abdominal or limb injuries were seen mostly in victims of MVA most of these had SHI. The other unusual causes of unintentional injuries were hit by sibling in 2 (10%) and fall from camel back in one child (5%). CT scan in mild injuries revealed small extradural hematomas in three children, contusion and depressed fractures in two children and scalp hematomas in one child, all requiring conservative treatment. In patients with moderate HI, CT scan revealed depressed fracture in three patients, extradural hematoma in two, traumatic subarachnoid hemorrhage (t-SAH) in one, contusion and associated subdural effusion in one child who was abused.

CT in SHI patients revealed diffuse brain injury (DBI) in six, t-SAH in three patients acute sub dural hematoma requiring surgical evacuation in two patients thalamic contusion in one patient. All the eight patient of SHI had associated chest abdominal and limb injuries (Table-2).

OUTCOME

Five of the nine children who sustained SHI died (55.6%) and four(44.4%) had moderate outcome with Glasgow outcome score of two and three. Of the five patients of moderate HI two had moderate outcome (40%) and the remaining 60% had good outcome. All patients with minor injury made good recovery.

DISCUSSION

Causes of head trauma vary with age and geographical distribution. Trauma is the leading cause of death in children over 1 year of age with accidents accounting for 81% and abuse for 19% of cases². In our study accidents accounted for 17/21 (81%) cases and child abuse for 5%. Sex ratio was almost equal (11 males to 10 females); this is because we had been considering very young children. Brown and Malone¹ and Peclat et al³ found the mean age for accident group as 2.5 years which was 1.33 years in our study. Mean age for child abuse group was 0.7 to 2 years³⁻⁵ and it was 2 years in our study. As per de Villers et al⁵, falls account for about 70% of all HI in infants and are a majors factor in children upto 3 years⁵⁻⁷. Though household falls are neurologically benign, while different fall heights were associated with different age groups viz. fall from small height is common in 0-3 months of age, 6-8 months infants fall from furniture, later fall from stairs (9-11 months), and in 24-26 months children falling from building is commonly seen¹⁰.

Keeping in mind different causes of head injury in children, different authors have divided head injured children into three or four groups. Causes of HI in children vary in different age groups, falls being the commonest in younger children followed by child abuse, MVA, sport injuries. Assaults are seen in grown up children. Berney et al⁸ divided into three group and subdivided group I into Ia (0-1 year) and Ib (1-3 years). deVillers et al⁶ divided their patient population into three groups: I (0-1 years), II (1-5 years) and III (6-14 years). We have, like Berney et al⁸ divided children with HI into four groups: Group I (0-1 year) group II (1-3 years), group III 3-6 years and group IV (7-14 years). The difference in nomenclature between Barney et al and us is that while Berney et al⁸ divided them into four group but prefer to call it I a and I b, we labeled these as I and II. Though falls are common in younger children (70% cases) upto 3 years⁶⁻⁸ but the present study attributed falls for less than 10% cases which were neurologically

benign occurring commonly from the laps of teenaged mothers. Berney et al⁸ reported that the incidence of head injury in girls and boys was 15% and 17% respectively in group I and it trebled in the next group (45% for girls and 50% for boys). Our findings are in agreement with these findings. There were two infants and six children were in age group 1-4 years who sustained head injuries because of MVA. Uncommon finding in this study was ejection of children from the laps of mothers (who were front seat passengers) following head-on collisions and there no seat belts fasteners for children. It was a coincidence that all these children were males. In group III (4-9 year), the uncommon mode of injuries were due to car reversal injuries at home. In this group there was male preponderance MVA accounted for 23% cases in study by Reece and Sege² and 38% in present study where 23.8% cases were because of head-on vehicle collisions and 14.3 % because of car reversing injuries, a feature not commonly reported. MVAs result in SHI or moderately HI and are associated with chest, abdominal, limb injuries either alone or in combination resulting in high mortality and morbidity. Mortality was 23.8% in the present study. Berney et al⁸ report 85% mortality while Reece and Sege² reported only 2% mortality. In older children (1-5 and 6-14 years) motor vehicle accidents were more common and accounted for 63.1% and 64% cases respectively⁶. In the present study infants and young child were indirect victims of MVA with severe head injury with poly trauma as they are seated on laps of their parents and are thrown out of the vehicles following head-on collision at a very high speed, while other studies have pointed out that older children (over six years) are victim of MVAs and are mostly pedestrians⁶⁻⁸. It is not common to see assault by siblings out of jealousy, fall of television sets and other heavy objects in young child and accidental hit by running fans sustained by children when they were lofted by their parents or relations as seen in the present study and the sex ratio was equal. Young girl becoming mothers at teenage may not be able to handle infants effective as was seen in this study where two children fell from the laps of their mothers. Another interesting point was young children hitting their younger infant sibling out of jealousy because of their parents giving more time and care to the new born. Fall from camel back while camel-racing is also uncommon and is generally seen in regions where this form of sport is popular.

Association of SHI and moderate HI with multi system injury and outcome

It has been common observation that house-hold falls are benign and that mild head injuries usually do not have other associated injuries and have less morbidity and minimal mortality¹⁰. In the present study, household HI were benign. 91% of household HI had good outcome and only one had moderate outcome. Moderate HI resulted in

moderate outcome in all cases and there was multiple system involvement in both these cases. SHI had a high mortality 62.5% and moderate outcome in the remaining. Moderate HI and SHI, especially the latter, have higher morbidity and mortality as the latter is associated with multiple system injuries (Table 1,2 and Fig 2). Reece and Sege² reported 2%

Table -1 Age, mode of injury, CT scan findings, associated injuries and outcome in 21 patients.

	Age /sex	Mode of injury	GCS/GCS	CT Findings	Associated Injuries	outcome
1	2M	Ejected from car	2T	Fracture skull +Diffuse brain injury	#shaft femur	Died
2	1.5M	-do-	2T	Diffuse brain oedema+multiple contusions	chest+ abdominal injury	Died
3	0.5M	-do	2T	Diffuse brain oedema+Acute sub dural haema toma	Abdominal injury +bilateral #shaft femur	Moderate recovery
4	2M	-do-	2T	Diffuse brain oedema+Acute sub dural haema toma	#shaft femur	Moderate recovery
5	0.75M	-do-	2T	Diffuse brain oedema+Acute sub dural haema toma	Fracture shaft femur	Moderate recovery
6	3.5M	Car reverse	2T	Diffuse brain oedema	Chest and abdomen injury	Died
7	2.5F	-do-	2T	Diffuse brain oedema	Abdomen injury	Died
8	4M	-do-	2T	Diffuse brain oedema	Abdomen+ #shaft femur	Died
9	7M	Fall from camel back	2T	Thalamic contusion	Chest injury	Moderate recovery
10	2.5M	Ceiling fan injury	13/13	Depressed Fracture + contusion	Nil	Good
11	3F	-do-	13	Depressed Fracture+ Extra dural haematoma	Nil	Good
12	2.5M	-do-	12	Depressed Fracture+ Extra dural haematoma	Nil	Good
13	3.5F	TV fall	13	Depressed fracture + contusion	Nil	Good
14	3.5F	-do-	12	Depressed fracture + Diffuse brain oedema	Nil	Moderate recovery
15	5F	-do-	12	Depressed fracture +contusion	Fore arm injury	Good
16	6M	-do-	12	Depressed fracture + contusion	Nil	Good
17	2F	Battered baby	9	Sub dural effusion	Multiple limb injuries	Moderate recovery
18	1F	Hit by sibling	9	Depressed fracture	Nil	Good
19	1.5F	-do-	9	Depressed fracture	Nil	Good
20	0.75F	Fall from mothers lap	9	Calvarial fracture +small Extra dural haematoma	Fracture clavicle	Good recovery
21	0.5F	-do-	8	Calvarial fracture +surface contusion	Fracture clavicle	Good recovery

Table-2: showing associated injuries with SHI and moderate HI

Associated injuries	Car collision (5)SHI	Car reversing (3)SHI	Fall from Camel (1) Moderate HI
Limb injury	3		
Chest injury			1
Abdomen		1	
Chest + abdomen	1	1	
abdomen+ limb	1	1	

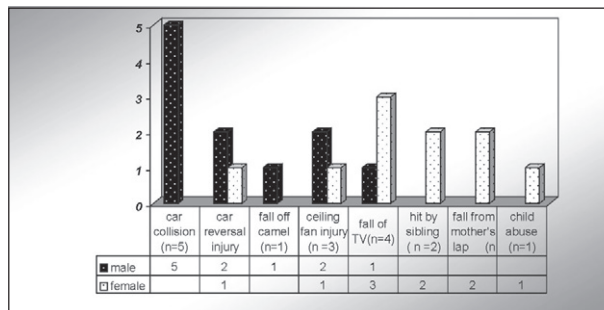


FIGURE 1. Distribution of Uncommon Head injuries in children.

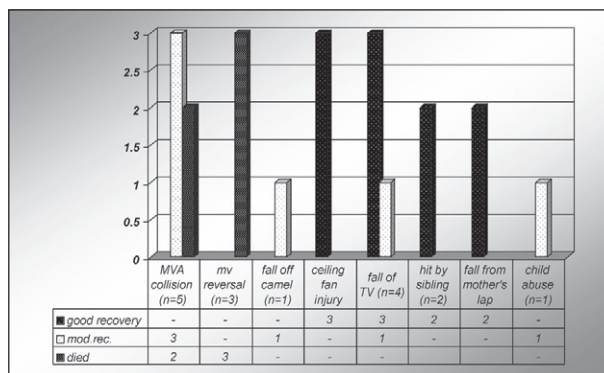


FIGURE 2. Outcome of Uncommon Head injuries in children.

mortality in accident group and 13% in definitive abuse group, and Bener et al¹¹ reported a mortality of 28.6% in children of 1-4 year age group. Berney et al⁸ reported 85% mortality in SHI patients.

CONCLUSION

Head injuries are always preventable. If adequate safety measures are provided in automobiles for these younger children, it will reduce the mortality and morbidity. Better designing of the houses and fixation of electronic gadgets can also substantially reduce the incidence of household head injuries. Dangerous spots e.g. camel ride for children, lofting children in houses with low ceilings and counseling of young mothers in child handling are also important preventive steps to avoid head injury.

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