ORIGINAL RESEARCH PAPER

Neurosurgery

KEY WORDS: Pseudomonas aeruginosa, drug resistance, AST pattern.

EPIDEMIOLOGICAL STUDY OF PAEDIATRIC HEAD INJURY IN A PERIPHERAL TERTIARY TRAUMA CARE CENTRE

Dr. Mathiyash Arthur Professor, Dept of Neurosurgery, Thanjavur medical college hospital, Thanjavur.

Dr. Hariharasudan R* Neurosurgery resident, Dept of Neurosurgery, Thanjavur medical college hospital, Thanjavur. *Corresponding Author

ABSTRACT

Aim/Objective:
To conduct a survey on paediatric Head injury in a peripheral tertiary health centre and to analyze the various epidemiological factors like incidence, age, sex, mechanism/type of injury, associate injuries, presentation, CT findings, management, period of stay, Outcome (Condition at discharge).

Methods:
Retrospective study

Inclusion criteria:
All chidren (0-12 years) admitted from March 1, 2017 – February 28, 2018. (one year)

Exclusion criteria:
Paediatric head injury cases treated outside for more than 24hrs
Total no of 108 patients have been admitted and treated; the entire above mentioned parameters were analyzed & studied.

Results:
- There was a striking male preponderance (71%)
- Most common presenting symptoms – vomiting followed by post traumatic Loss of consciousness
- mean duration of hospital stay – 4.8 days (with 84% staying less than 1 week).
- Most common mode of injury – RTA followed by Domestic injuries.
- Most common indication for surgical intervention– Depressed fracture followed by EDH
- Good outcome in mild head injury cases and early presentation

Conclusion:
Through the retrospective analysis made at Thanjavur medical college hospital trauma unit, we found that there is an alarming increase in pediatric head injuries in rural areas with cases of assault and battered baby on the rise. We emphasize the importance of pre hospital care, early referral and need to improve safety measures, road infrastructure,etc., and the need to sensitize the people regarding the same.

INTRODUCTION:

Head injury is a major health problem in developing countries like India. It is a leading cause of death and disability in pediatric population. This places a huge economic burden and makes considerable demands on health services in a country. In developing countries, the number of vehicles is increasing in rural and urban areas not concurrent with developing road infrastructures. This leads to increased RTA. Head injuries account for one quarter to one-third of all accidental deaths, and for two-thirds of trauma deaths in hospitals. Head injury accounts for the largest cause of acquired disability in childhood. There are no clear recommendations or steps in reducing such traumas and opinions are deviating. The proposed management regimes are not always optimal or easily applied in pediatric cases. The study focuses on understanding the etiology, clinical presentation, treatment options, and outcome of these patients and to strengthen these aspects of pediatric trauma care in a peripheral tertiary care centre with emphasis on preventive issues and imparting health education to the personal involved in handling such cases.

Materials and Methods

Place of study Thanjavur Medical college hospital, Thanjavur, Tamilnadu, India.

Study design Retrospective observational study.
Study duration March 1, 2017 – February 28, 2018.
Inclusion criteria Children (under 12 years of age) presenting with head trauma between March 1, 2017 and February 28, 2018.

All cases with positive imaging findings in CT/MRI.
Exclusion criteria Paediatric head injury cases treated outside for more than 24hrs.
Sample size 108.

OBSERVATION AND RESULTS:

AGE-SEX DISTRIBUTION

A total of 108 cases were analyzed and there was a significant male preponderance noted. 76(71%) male and 32(29%) female children at a ratio of 2.21: 1 (M:F). 48(63%) of the male children injured were between the age group of 5-8 yrs which was found to be statistically significant whereas female children with head injuries were uniformly distributed across all age groups as shown in table 1.

TABLE 1

AGE	MALE	FEMALE
0-4	**09**	**11**
5-8	**48**	**10**
09-12	**19**	**11**

MODE OF INJURY AND SEVERITY:

The most common and significant mode of injury was road traffic accident as seen in Table 2 with 50(47%) children involved in the same, followed by accidental fall 44(40%). 11 cases of assault was noted and 3 battered babies were also seen in our study. The severity of injury was assessed as per the Glasgow coma scoring system as shown in table 3. They were classified accordingly as Mild (GCS13-15), Moderate (8-12) and Severe (<8) head injury. 59(55%) children had mild head injury, 35(32%) had moderate and (13%) had severe head injury.

TABLE 2

Mode of Injury	
RTA	**50**
Accidental fall	**44**
Assault	**11**
Battered baby	**3**

TABLE 3

GCS		Total
Total		
Mild	13-15	59
Moderate	18-12	35
Severe	<8	14

TIME OF PRESENTATION:

83(76%) of the total 108 patients were brought to the ER within 6hrs of trauma. The rest presented after 6 hours and within 12 hrs. There was a significant improvement seen in outcome of patients who presented early.

TABLE 4

TIME OF PRESENTATION	
<6hrs	83
6-12 hrs	25

SYMPTOMS ON ADMISSION:

66 children presented with vomiting as the predominant symptom at the time of admission, followed by Loss of consciousness in 37, seizure in 33, ENT bleed was the presenting complaint in 30 and 12 presented with headache.

TABLE 5

SYMPTOMS	TOTAL
Vomiting	66
LOC	37
Seizures	33
ENT bleeds	30
Headache	12

IMAGING FINDINGS:

All the children included in the study were subjected to imaging, either CT or MRI and 53(49%) were found to have calvarial fractures, of which 25 were depressed fractures and 28 were linear fractures. The most common site of fracture was frontal bone followed by temporal. 20 were found to have diffuse injury. A total of 44 cases had intracranial hemorrhages. 17 cases were found to have EDH, 8 SDH, 2 ICH and 26 SAH. 1 child presented with crush injury to head and CT imaging revealed EDH/SDH and ICH along with calvarial fracture.

TABLE 6

IMAGING FINDINGS	TOTAL
EDH	17
SDH	08
ICH	02
SAH	16
CALCARIAL FRACTURE(Depressed -25,Linear -28)	53
CRUSH INJURY WITH ICH/EDH/SDH	01
DIFFUSE INJURY	20

MANAGEMENT/ OUTCOME:

61 patients of the total 108 were managed conservatively and 47 underwent surgery. There were 33 deaths (1 ICH, 1 SDH, 1 ICH/SDH/EDH). 97% had a favorable outcome as per the Glasgow outcome score. The morbidity in children was less compared to adults.

TABLE 7

DIAGNOSIS	TOTAL NO OF SURGERY
Depressed Fracture	25
EDH	13
SDH	07
ICH	02

PERIOD OF STAY:

The mean duration of hospital stay was 4.8 days and 84% of children were staying less than a week in hospital.

Discussion:

India is a youth nation with population between the 12 year age group comprising of around 28-30%. Head Injury in infancy and childhood has been documented as the single most common cause of death. There is a significant difference between the modes of injury, the mechanisms of damage, and the management of specific problems between the adult and pediatric populations. Most of the studies on pediatric head injury have confirmed a male preponderance (71% of cases). Road traffic accidents and fall from height has been cited by most studies as the most common cause of pediatric head injury, followed by sports injuries, and various other mechanisms like ballistic injuries. None of the studies mention about assaults and battered baby. Our study showed significant number of RTAs as the cause of pediatric head injury followed closely by accidental falls, there was a significant number of assaults and battered baby (13%) in the rural areas our hospital caters to.

This study was carried out in a peripheral tertiary health care centre to analyze the clinical profile of paediatric head injury in relation to age distribution, sex, mode of injury, types of injuries, image findings, duration of hospital stay and outcomes. Our results are in accordance showing RTA as the most common cause of pediatric head injury as shown by Osmond et al. from Canada. The most common lesion seen on CT scan was an extradural hematoma (EDH) and Fractures. There was a significant number of fractures noted especially involving the frontal bone followed by the temporal bone. Mahapatra reports contusion as the most common CT finding. Vomiting was seen in 62% of our children; a similar incidence has been reported by others also .This study found that in rural areas head injury mostly affects young boys, due to RTA and accidental falls. But assaults and battered baby incidences were also in significant number. Low Glasgow coma score at admission and delay in presentation was significantly associated with increased mortality and morbidity.

This increase in number of RTA in rural India was mostly due to increase in vehicular population but no significant improvement in road infrastructures. Though most vehicle ownership is in the urban areas, a vast number of highways pass through rural and remote areas with extensive use of heavy motor vehicles travelling at high speed. Residential areas and highways are not segregated, and safety laws are not universally applied in our country.

Many interventions (e.g., road lighting, traffic signals, guard railing, seatbelts, helmets, airbags, and antilock brakes) have also demonstrated success in more industrialized setting and are likely to be valuable in resource-constrained setting such as India. There is total disregard for personal safety like use of helmets and seatbelts, people need to be imparted education on the importance of same, especially in rural areas. For example, in the United States, the rate of motor vehicle-related TBI fatalities decreased substantially from 11.4/100,000 in 1979–6.6/100,000 in 1992 due to the strict implementation of such safety mechanisms.

This decrease was largely attributed to an increase in seat belt and child safety seat use, standardized implementation of air bags, infrastructure investments, and improved safety engineering. In India, vehicles, especially those designed locally need to improve on build quality and increasing the safety features to European/ American standards.

There is a need to improve pre hospital care to reduce morbidity and mortality. Apart from safety laws, prompt transport to a hospital after an accident is another important measure to reduce mortality as shown in our study. This was due to the governments 108 initiative (rapid response centralized system) in the state of Tamilnadu. The majority of patients in rural India are still brought to the emergency department by relatives or bystanders in private vehicles, and prehospital emergency medical services remain

under-organized. Field triage often relies on bystanders who transport injured victims to the nearest clinic, which is often unable to provide appropriate treatment.

Major urban areas also have a loosely networked trauma system, untrained emergency medical services personnel, and unequipped ambulances. Our observation of family and bystander transport supports the notion that prehospital care in rural India requires much improvement. The incidence of RTAs is more during holidays and weekends. Increased vigilance by the traffic personnel and rapid response ambulance services during these periods will reduce the burden of such cases. Children play in the streets, have less supervision of the parents and above all there is lack of safety measures in place where they play. Males predominate was also seen in our study also. The male:female ratio being 2:1. Most of the USA reports show an incidence ratio of 2.0 or more for males compared to females. One of the series of 672 patients had 533 male and 139 female patients. Our observation corresponds with the observations made by other authors. The reason is that male child move out more frequently than female child. Our study also showed increase in incidences of assault even in pediatric populations and the need to protect such vulnerable groups.

Our results are in accordance showing age group 5-8 had most cases n = 58 (54%) cases, followed by 9-12 age group (n = 30) (28%). This is consistent with data reported from other studies, where the highest incidence of head trauma was found in the 6–10 age groups.

Conclusion:

Our study showed that there is a male preponderance to pediatric head injury and RTA followed by accidental fall is the most common cause, this in accordance with many national and international studies. The most common age group is 5-10 yrs.

The most common lesion seen on CT scan was fracture and EDH, and frontal bone being the most common site. Vomiting and LOC are the most common presenting symptoms followed by seizures. The importance of improving road infrastructure and safety measures, along with supervision of children during play is emphasized.

Good outcome was noted in patients whose admission GCS was good and in patients who presented within 6hrs of primary insult. The need to improve pre hospital care and early response system is recognized by this result.

The increasing trend of assaults and battered baby in rural population needs to be addressed. A centralized state or national level urban/rural data of chain of events leading to the accidents in pediatric head injury, with factors relating to favorable outcome will be extremely helpful in policy making and health management at the national level in India.

References

1. Jennett B. Epidemiology of head injury. J Neurol Neurosurg Psychiatry 1996;60:362-9.
2. Jennett B. Epidemiology of head injury. Arch Dis Child 1998;78:403-6.
3. Luerssen TG, Klauber MR, Marshall LF. Outcome from head injury related to patient's age. A longitudinal prospective study of adult and pediatric head injury. J Neurosurg 1988;68:409-16.
4. Crankson SJ. Motor vehicle injuries in childhood: A hospital-based study in Saudi Arabia. Pediatr Surg Int 2006;22:641-5.
5. Osmond MH, Brennan-Barnes M, Shephard AL. A 4-year review of severe pediatric trauma in Eastern Ontario: A descriptive analysis. J Trauma 2002;52:8-12.
6. Lalloo R, van As AB. Profile of children with head injuries treated at the trauma unit of red cross war memorial children's hospital, 1991–2001. S Afr Med J 2004;94:544-6.
7. Mahapatra AK. Head injury in children. In: Mahapatra AK, Kamal R, editors. A Text Book of Head Injury. Delhi: Modern Publication; 2004. p. 156-70.
8. Sambasivan M. Epidemeology-Pediatric head injuries. Neurol India 1995;43:57-8.
9. Bajracharya A, Agrawal A, Yam B, Agrawal C, Lewis O. Spectrum of surgical trauma and associated head injuries at a university hospital in Eastern Nepal. J Neurosci Rural Pract 2010;1:2-8.
10. Gururaj G. Burden of Disease in India: Equitable Development – Healthy Future. New Delhi: National Commission on Macroeconomics and Health, Ministry of Health and Family Welfare, Government of India, Injuries in India, A National Perspective; 2005. p. 325-47.
11. Sosin DM, Sniezek JE, Waxweiler RJ. Trends in death associated with traumatic brain injury, 1979 through 1992. Success and failure. JAMA 1995;273:1778-80.
12. Nantulya VM, Sleet DA, Reich MR, Rosenberg M, Peden M, Waxweiler R, et al. Introduction: The global challenge of road traffic injuries: Can we achieve equity in safety? Inj Control Saf Promot 2003;10:3-7.
13. Bhatoe HS. Brain Injury and prehospital care: Reachable goals in India. Indian J Neurotrauma 2009;6:5-10.
14. Knudson P, Frecceri CA, DeLateur SA. Improving the field triage of major trauma victims. J Trauma 1988;28:602-6.
15. Bhole AM, Potode R, Agrawal A, Joharapurkar SR. Demographic profile, clinical presentation, management options in cranio-cerebral trauma: An experience of a rural hospital in Central India. Pak J Med Sci 2007;23:724-7.
16. Mamelak AN, Pitts LH, Damron S. Predicting survival from head trauma 24 hours after injury: A practical method with therapeutic implications. J Trauma 1996;41:91-9.