PATTERN OF CHILDHOOD TRAUMA INDIAN PERSPECTIVE

A.K. Sharma
Y.K. Sarin
S. Manocha
L.D. Agarwal
A.K. Shukla
M. Zaffar
J. Singh

ABSTRACT

Although infectious diseases are still the chief cause of death in children in a developing country like ours, but a definite increase in incident and related mortality due to trauma has been noted in the last decade. The problems relating to pediatric trauma are peculiar to our setup and differ considerably to the severe multiple organ trauma met with in the high velocity vehicular accidents, seen in developed Western countries. The present study identifies patterns of childhood trauma from our region. It comprises 2100 patients admitted over a 3 years period to Pediatric Surgical Unit. Cranial injuries were the most commonly encountered injuries followed by the abdominal and skeletal injuries. Fall from the houseroofs is the commonest mode of injury, although road traffic accidents are also recognized to be on the increase. The overall mortality was 7.7%; its chief determinant being the presence of severe head injury. A few important epidemiological factors involved were identified.

Key words: *Pediatric trauma, Head injury, Epidemiology.*

The study of injury and injury prevention is emerging, finally, from a long period of obscurity to become a legitimate area of research and practice in Pediatrics and Pediatric Surgery. Even in a developed country like the U.S.A., the first National Conference on Pediatric Trauma was held as late as in 1985. One can imagine the situation in a developing country like India, where Pediatric Surgery has just started to come up as a distinct superspeciality. Moreover, problems in our country are very different from that of West and whatever research has been done there in the last decade is inadequate to give proper guidelines for the prevention of Pediatric trauma here.

According to a recent annual report of the National Safety Council of the U.S.A., trauma constituted 52% of the total mortality in children thus making it the number one killer in pediatric age-group(1). Approximately 15,000 children died from trauma in 1981, 2 million were temporarily disabled and 100,000 were permanently disabled. Although similar statistics are not available in our country, the magnitude of the problem may be judged by the facts that in the year 1990 there were 10,456 accidents in Rajasthan alone(2). Obviously many accidents go unreported and this figure may represent only the tip of the iceberg. Keeping all this in mind, a retrospective study was conducted on childhood

From the Department of Pediatric Surgery, S.M.S. Medical College and Attached Sir P.M. Child Health Institute,Jaipur, Rajasthan.

Reprints requests: Dr. A.K. Sharma, D-1, Doctors' Enclave, Gangwal Park, Jaipur, Rajasthan.

Received for publication: January 16, 1992;
Accepted: September 10, 1992

trauma to recognize the common patterns of injury. This data will help to design effective programmes to safeguard children from the many dangers common to their home, school and play environment.

Subjects and Methods

The study sample comprised 21,00 children aged 13 years or younger between July 1988 and June 1991 admitted to the Department of Pediatric Surgery, S.M.S. Medical College and attached S.P.M. Child Health Institute, Jaipur, with injury. The records of these patients were analyzed to identify children with head injury alone, head and extracranial injury and with extracranial injury only. Each group was then analyzed separately by comparing the patient profile, mechanisms of injury, management and outcome. Patients of burns, poisoning, foreign bodies in gastrointestinal and respiratory tracts were not included in this study.

Results

Trauma accounted for 23.6% of all admissions to the Pediatric Surgical Ward over 36 months. The mean age of the children in the sample was 4.8 years, with boys accounting for 67.2% of admissions; 49% patients were 4 years or less and 47.6% were between 4 and 10 years. The maximum number of patients had cranial injuries (84.3%), of these 5.4% had associated extracranial injuries. Isolated extracranial injuries accounted for 15.7% cases (*Tables I & II*). The most common mechanisms of injury were falls (81.7%) and road accidents (16.3%). The mechanisms of injury in both the cranial and extracranial injuries

TABLE I–*Patient Profile.*

		Infant (0-1 yr)		Toddler (1-4 yr)		School-aged (4-10 yr)		Preadolescent (>10 yr)	
	Total (%)	Male	Female	Male	Female	Male	Female	Male	Female
Cranial	1657 (78.9)	82	32	479	260	532	252	15	5
Cranial with extracranial	113 (5.4)	5	2	34	10	32	12	10	8
Extracranial	330 (15.7)	10	14	67	34	116	56	29	4
Total	2100	97	48	580	304	680	320	54	17

TABLE II–*Site of Injury Related to Mechanism of Injury*

Site	Fall	Road traffic accident	Penetrating injury	Misc
Cranial	1396	261	0	0
Cranial with extracranial	85	28	0	0
Extracranial	235	53	32	10
Total	1716	342	32	10

was practically the same in contrast to the experience of various reported series(3). Gunshot and stab-wounds were responsible for a very small number of extracranial injuries (1.52%). The overall mortality in the series was 7.7%.

Four per cent of the patients required immediate resuscitative measures including endotracheal intubation. The mean hospital stay was 3.96 days; extracranial injuries alone or in association with head injuries had a longer stay (5.9 days) than the head injury alone (3.47 days).

Head injuries were by far the commonest injury encountered in the present series (84.3%). Males predominated in the ratio of 2 : 1. Nearly 91% of the patients were toddlers and school aged children. The mechanisms of injury were mainly fall (81.7%) and road accidents (16.3%). A total of 5.4% of these had associated extracranial injuries the commonest being abdominal (2.0%) and skeletal (1.9%). Linear fracture of skull was found in 40% and depressed fracture in 4.2% cases. Only half of these needed elevation. The incidence of extradural and subdural hematoma requiring surgical intervention was low in the present series (0.5%) and only 6 cases required duraplasty.

Isolated extracranial injuries were seen in 15.7% of the patients, the commonest being abdominal (45.5%) and skeletal (22.2%). Other injuries included perineal (11%), palate (7.3%) and thoracic (2.43%). The maximum number of patients affected were between 4 and 10 years of age (52%) with a similar male predominance of 2:1. Fall was the commonest mode of injury in these patients (71%). One tenth of the patients had major surgical abdominal procedures. The overall mortality rate in this group was 2.2%. Four patients developed post-traumatic hydrocephalus requiring ventriculo-peritoneal shunt. A total of 161 cases (7.7%) sucumbed to their injuries. This included head injury in 145 cases (8.8%), cranial with extracranial injuries 11 cases (9.7%) and extracranial injuries alone in 5 cases (2.2%).

Discussion

The usual pediatric victim is a boy aged 4-10 years (*Table I*). The cranial injuries top the list as far as the incidence and number of related deaths are concerned. Head injuries constituted about 84.3% of pediatric trauma cases studied over 3 years at our institute. This is in accordance with the other series(4). This high incidence could be due to the fact that the head constitutes a larger portion of the body than in older subjects. Fortunately, most of these injuries were minor. In our series the incidence of subdural hematomas has been as low as 2%. This could be attributed to the fact that CT scan is not done routinely in every head injury patient and many of the sub-clinical subdural hematomas go unnoticed. Many victims of major accidents probably succumb to the injuries before reaching the hospital due to poor triage or are probably taken straight to the Neurosurgical Centres. Surgical intervention is seldom required. Surgical procedures include evacuation of subdural or extradural hematomas, elevation of depressed fracture and duraplasty.

One heartening thing to add here is that the pediatric patients have significantly greater physiological reserve in regard to potential for recovery from injuries to the brain and hence have a better overall survival rate than adults(5).

Abdominal injuries head the list of extracranial injuries. Gastrointestinal injuries were commonest, followed in decreasing

frequency by the hepatic, splenic, renal and other organ injuries. While splenic injury is reportedly the commonest injury in the Western literature(6), there were only 11 cases in our series of 2100 patients. This may be related to the mode of injury and its severity. Fractures of femur, clavicle and humerus are the common skeletal injuries encountered in pediatric practice.

Falls accounted for most of the cranial as well as extracranial injuries (*Table II*). This may not be consistent with other series where road accident was the commonest mode of injury, which in our series was the second commonest cause.

Falls were responsible for 83.7% of cranial and 71.2% of extracranial injuries. Most of the falls were from the first storey of houses on to the hard surfaces like metalled roads. The small parapets in most of the houses of Jaipur and around makes the children susceptible to fall while playing on the roofs unattended by the elders. Kites also play a notorious role in making them vulnerable to falls. The families tend to sleep on unguarded roof tops in the summer months and children often fall down in the dark. Some of the injuries were encountered within the home with toddlers falling off the bed. Probably, these falls cannot be avoided, but their effect can be reduced if the fall takes place on to a relatively soft surface.

Road accidents were responsible for about 16.3% of both cranial as well as extracranial injuries. These injuries tend to be more severe and associated with a higher mortality. Road accidents are increasing as a cause of major injuries in children and will probably top the list of agents of injury in the near future.

It is time to start to identify the ideal pediatric traumatologist–a pediatric surgeon in active practice with genuine training and experience in transport, critical care and surgical repair of traumatic injury. Teaching the special techniques of pediatric trauma care should be incorporated in the training programme in pediatric surgery. The Government and Private Organisations should be motivated in endorsing these activities as a legitimate academic interest. Injury counselling and registry of the cases and international coding will further help in research on the subject.

REFERENCES

1. Accident facts, Chicago, National Safety Council, 1982.
2. Accident facts, Jaipur, Road Traffic Records, 1991.
3. Peclet MH, Newman KD, Eichelberger MR, *et al*. Patterns of injury in children. J Pediatr Surg 1990, 85: 85-91.
4. Eichelberg MR, Randolph HG. Abdominal Trauma. *In* : Pediatric Surgery, 4th edn. Eds Welch KJ, Randolph JG, Ravitch MM, O'Neill JA, Rowe MI. Chicago, Year Book Medical Publishers, 1986, pp 154-174.
5. Kraus JF, Fife D, Cox P. Incidence, Severity and external causes of pediatric brain injury. Am J Dis Child 1986, 140: 687-692.
6. Mayer T, Matlak ME, Johnson DG, Walker MI. The modified injury severity scale in pediatric multiple trauma patients. J Pediatr Surg 1980, 15: 719-724.