Epidemiology and management of paediatric head injury in eastern Nepal

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ABSTRACT

Background: In children, majority of the head injuries are minor and management of critically ill children depend on a team approach using well-rehearsed, systematic management protocols that can be implemented within hours after injury. This study was carried out to ascertain the epidemiology and management of know the demographic profile and etiology of paediatric head injury in our setting, to know the clinical and radiological characteristics of head injury patients and to know the treatment options and outcome in paediatric head injuries. **Patients and Methods:** Details of all children (age <16 years) with head injury seen in 1 year from 01.04.2005 to 31.03.2006 were retrospectively reviewed. Demographic profile, clinical details, investigations, treatment offered, and outcome were noted in a proforma. All data were analyzed by appropriate SPSS 11.0 statistical software tools. **Results:** There were total 43 patients. Young male children were more commonly affected in present series with a mean age of 7.67 years (median - 5.010 years), range 6 months-16 year. Fall (65.11%) was the most common mode of injury followed by road traffic accidents (RTAs) (25.6%). Mild head injuries (65.11%) were most common. Most common complaint was loss of consciousness and all the patients with severe head injury presented loss of consciousness. All patients with mild head showed good recovery; with moderate head injury, nine patients showed good recovery and three patients recovered with moderate disability. Patients with severe head injury (three patients) had 100% mortality. **Conclusions:** In urban areas of Nepal, RTAs like vehicular crashes, motor cycle accidents, and pedestrian hit by moving vehicle are more common and in rural areas fall from height are commoner. We need to develop child safety legislations and risk-specific intervention programs in Nepal.

Key words: Children, head injury, morbidity, mortality, paediatric, paediatric head injury

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INTRODUCTION

Head injury or trauma is any injury that involves the cranium, meninges, and brain.[1] Head injury is the cause of death in more than 50% of trauma patients[2] and it accounts for 500,000 emergency visits, 95,000 hospital admission, and 7,000 deaths per year in United States.[3,4] Majority of the head injuries are minor.[5] Success of critically ill children is dependent on a team approach using well rehearsed, systematic management protocols that can be implemented within hours after injury.[6] There is a need to identify the pattern and exact figures of paediatric head injuries Nepal to formulate the preventive strategies and to plan the management protocols.

In this study, we wanted to know the demographic profile and etiology of paediatric head injury, their clinical and radiological characteristics, and the treatment options and outcome in paediatric head injuries.

PATIENTS AND METHODS

Details of all children (age <16 years) with head injury from April 2005 to March 2006 (01.04.2005 to 31.03.2006) were retrospectively reviewed. Demographic profile, clinical details, investigations, treatment offered, and outcome was noted in a proforma. All data were analyzed by appropriate SPSS 11.0 statistical software tools.

RESULTS

There were total 43 patients, 26 (60.5%) were males and 17 (39.5%) were females (M:F = 1.56:1). Their ages ranged between 6 months and 16 years (5.010 years).

Fall was the most common cause of injury in 28 (65.11%) patients, followed by road traffic accidents (RTAs) in 11 (25.6%).

Twenty-eight (65%) had mild head injuries (Glasgow Coma Scale [GCS]: 13-15), 11 (27.9%) had moderate head injuries (GCS: 9-12), and 3 (6.9%) had severe head



Figure 1: Computed tomography (CT) scan showing extensive subarachnoid hemorrhage in right Sylvian fissure, thin right frontal extradural hematoma, right sphenoid bone fracture, and specks of pneumocephalus

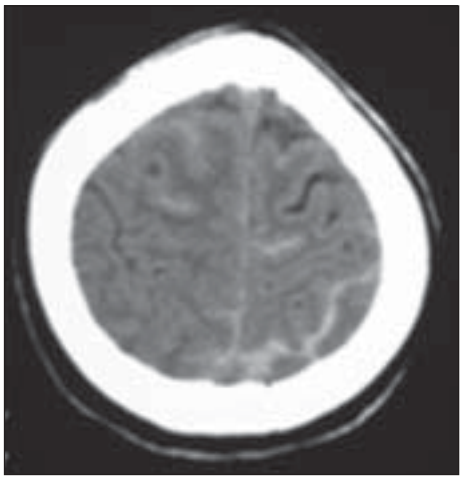


Figure 2: CT scan showing left parietal subarachnoid hemorrhage

Table 1: Age distribution (n = 43)

Age	No.
0-4	12
4-8	14
9-12	8
13-16	9

Table 2: Sex distribution (n = 43)

Sex	No.
Male	26
Female	17

Table 3: Mode of injury

Mode	No.
Assault	2
Fall	28
RTA	11

Table 4: Severity of injury (n = 43)

Severity	No.
Mild (13-15)	28
Moderate (9-12)	12
Severe (3-8)	3

Table 5: Clinical features and severity (n = 43)

Clinical features	Mild	Moderate	Severe
Loss of consciousness (29)	14	12	3
Vomiting (26)	17	7	2
Seizures (2)	1	-	1
Ear bleed (4)	1	2	1
Nasal bleed (7)	5	2	-
Headache (8)	7	1	-

Table 6: X-ray findings and severity (n = 43)

Findings	Mild	Moderate	Severe
Normal (35)	21	11	3
Fracture (6)	5	1	0

injuries (GCS: >8). The most common complaint was loss of consciousness (in all 43 patients with severe head injury), followed by vomiting 26 patients (more frequent in patients with mild head injury) [Table 1].

Skull X-ray performed in 41 cases showed fracture in six cases only (five mild head injury and one moderate head injury), and was normal in all cases with severe head injury (three patients) [Table 2]. Computed tomography (CT) scan was performed in 25 cases, it showed positive results in 23 cases; most common findings were contusion (11 cases), linear fracture (7 cases), and extradural hematoma (4 cases) [Table 3].

Majority (81.4%) of the patients were treated nonoperatively (close observation, antibiotics, anti-edema measures, and anti-eplileptics) and surgery (craniotomy and evacuation of hematoma) was performed mainly for extradural hematoma [Table 4]. All patients with mild head showed good recovery and were able to go to school. Nine patients with moderate head injury showed good recovery and were able to go to school, and three patients recovered with moderate disability (able to perform daily activities with parents support). Patients with severe head injury (three patients) had 100% mortality [Table 5]. The major cause of mortality was severe head injury and associated diffuse cerebral edema and in addition one child had associated abdominal injury with hemoperitoneum.

DISCUSSION

RTAs tend to involve children between the ages of 7 and 10 years; and pedestrians account for majority of the fatal casualties.[7,8] Accidental falls are the next common causes of head injuries in those aged between 4 and 6 years.[7] Motor vehicular accident causes head injury in

Table 7: Computed tomography scan findings and severity

Findings	Mild	Moderate	Severe
Contusion (11)	5	5	1
EDH (6)	4	1	1
Acute SDH (2)	2	-	-
SAH (2)	-	-	2
Pneumocephalus (3)	2	1	-
Cerebral edema (3)	1	1	1
Depressed fracture (5)	3	2	-
Linear fracture (7)	6	1	-
Normal (2)	2	-	-

Table 8: Management (n = 43)

Management option	No.
Conservative	35
Operative	6

Table 9: Outcome (n = 43)

Outcome	Mild (28)	Moderate (12)	Severe (3)
Good recovery (37)	28	9	-
Mild disability	-	-	-
Moderate disability (3)	-	3	-
Severe disability	-	-	-
Dead (3)	-	-	3

about 35-60% of cases in diverse series, and is usually a leading cause of serious injuries with head trauma and a common cause of morbidity and mortality related to trauma [Table 6].[7,9]

Children, with their relatively large heads, plastic bones, and limited ability to protect themselves during a fall, frequently sustain fractures and minor head injuries.[10] Mild head injury (MHI) is usually taken as a GCS of 13-15.[11,12] Within this group, there is a heterogeneous pathophysiology ranging from a minimal intracranial pathology to an evolving intracranial bleed requiring neurosurgical intervention. Appropriate management of paediatric MHI in developing countries includes preparedness to recognize and to treat the neurological deterioration and potential complications.[13] Most patients have minor trauma, and while most of these injuries are significant, MHI paediatric patients can have underlying intracranial injuries.[4,14] Only a few paediatric patients with minor head trauma require surgical intervention [Table 7].[15,16]

Severe head injury remains a common cause of disability in children with some morbidity potentially preventable.[17,18] Cranial CT is the diagnostic test of choice for evaluating children with blunt head trauma in the emergency department (ED). Less than 10% of these CT scans, however, are diagnostic of traumatic brain injury (TBI) [Figures 1 and 2].[19-21] A CT scan is probably recommended for all patients with mild head injury because one in five will have an acute lesion detectable by the scan [Tables 8 and 9].[22]

Limitations

These type of studies are meant to collect and analyze data relating to childhood injuries, with the aim of disseminating information to relevant authorities and agencies for appropriate actions, for example, public education programs and school education programs.[7] However, these have limitations in that not only are the study sample small, but also it is drawn from a single hospital.[7] A multicenter survey to cover all health centers in particular area at regular intervals is needed to give the big picture of paediatric trauma.[7]

Future perspective

Population-based regionalization of paediatric neurosurgical and neurointensive care services are necessary because of the numbers of patients needed for a viable and sustainable clinical practice.[23,24] Provision of an emergency practice has to contend with the problem of patient access, particularly if timeliness - within 4 h - is a key requirement.[25] The timings of assessment and subsequent transfer to the regional center suggest that current surgical guidelines are unworkable in regions covering areas with road distance times in excess of 45 min.[11,25]

Road traffic councils in rural area of that respective town or state may need to concentrate on village roads where accidents occur. Young adolescent children need specific education both in schools and colleges to prevent motorcycle accidents. Teachers and road traffic authorities play a big role to educate young adolescents in the right attitude of not riding motorcycles unless they have passed their license. Control of RTAs in both urban and rural towns are different, and it is thus the responsibility of all governmental and nongovernmental organizations to prevent further accidents from occurring. Specific measures to educate the public at large and relevant institutions must be made a priority so as to decrease the rates of MHI associated with motorcycle accidents.[11] Public education designed to discourage dangerous behavior by children on double-decker bunkbeds, and improved adult supervision of children at night, would be helpful in reducing the frequency of these preventable accidents.[7,8]

In urban areas of Nepal, RTAs like vehicular crashes, motor cycle accidents and pedestrian hit by moving vehicle are more common and in rural areas fall from height are commoner. We need to develop child safety legislations and risk-specific intervention programs

in Nepal. The purpose of this analysis is to document the trend of head injuries in paediatric age group in the tertiary hospital in eastern Nepal. To prevent head injuries in children, there is a need to identify causes, and to implement strategies to reduce their occurrence. These type of studies are meant to collect and analyze data relating to childhood injuries, with the aim of disseminating information to relevant authorities and agencies for appropriate actions, for example, public education programs and school education programs.[7] However, these have limitations in that not only are the study sample small, but also it is drawn from a single hospital.[7] A multicenter survey to cover all health centers in particular area at regular intervals is needed to give the big picture of paediatric trauma.[7]

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