Head Injury at a Tertiary Referral Centre in the Eastern Region of Nepal.

A. Agrawal , C.S.Agrawal, A. Kumar, O. Lewis, G. Malla, P. Chalise

[1]Consultant Neurosurgeon, Department of Surgery, B.P. Koirala Institute of Health Sciences,
[2]Professor and Acting Rector, Department of Surgery, B.P. Koirala Institute of Health Sciences,
[3]Professor in Surgery, Department of Surgery, B.P. Koirala Institute of Health Sciences,
[4]Professor in Family Medicine, B.P. Koirala Institute of Health Sciences, Dharan, Nepal
[5]Associate Professor in Family Medicine, B.P. Koirala Institute of Health Sciences,
[6]Junior Resident, Department of Surgery, B.P Koirala Institute of Health Sciences,
Dharan, Nepal.
Correspondence to: Amit Agrawal, e-mail-dramitagrawal@gmail.com

Background: The purpose of this epidemiologic study was to determine the pattern and characteristics of head injuries and to establish an epidemiologic data bank for designing preventive strategies for head injuries in the eastern region of Nepal.
Patients and Methods: This retrospective review was done at B.P.Koirala institute of Health Sciences, Dharan, Nepal. All the patients with head injury admitted to the Department of Surgery between the periods January 2005 to December 2005 were included in the study.
Results: The study population consisted of 334 patients who sustained head injuries. Their ages ranged from 1 to 88 with a mean age of 28.53 years. The majority (66.3%), were young adults in the 2nd to 5th decades The male to female sex ratio was 2.6:1. Road traffic crushes were the most common cause (43.4%) followed by fall from heights (30.8%). X-ray of skull showed lesions in 114 cases (49.8%) such as depressed fracture (11.4%) and linear fracture (24.0%). Common lesions on CT scan included cerebral contusion (21.6%), extradural haematoma (20.9%), linear fracture (23.8%), subarachnoid haemorrhage (18.5%) and pnemocephalus (11.2%). Forty patients (12.0%) sustained moderate head injury. There were 15 deaths. One patient had associated intra-abdominal injury (splenic rupture) and two patient sustained pulmonary trauma and succumbed to haemothorax and aspiration.
Conclusion: A clearer understanding of the patterns of head injuries will assist health care providers to plan and manage the treatment of traumatic facial injuries. Such epidemiological information can also be used to guide the future funding of public health programs geared toward prevention.

Introduction

Head injuries are one of the leading causes of death and disability worldwide[1,2,3]. Although many head injuries are minor, because of the devastating effects of moderate and severe head injuries, they constitute an important public health problem. In order to prevent head injuries there is a need to identify causes, especially with regard to motor-vehicle crashes, and to implement strategies to reduce their occurrence. The purpose of this epidemiologic study was to find out the pattern and characteristics of head injuries and to establish an epidemiologic data bank for designing preventive strategies for head injuries in the eastern region of Nepal.

Materials and Methods

This retrospective review was performed at B.P.Koirala institute of Health Sciences, Dharan, Nepal. All of the patients with head injury admitted to the Department of Surgery between the periods January 2005 to December 2005 were reviewed. All clinical records, investigations and treatment charts were reviewed. Age, gender, etiology and pattern of injuries, anatomic site of cranial lesions, associated systemic injuries, treatment details, complications and outcome were

noted and analyzed. The Ommaya classification of head injury was used and patients with head injuries were categorized into three grades; mild, moderate, or severe categories (based on the period of loss of consciousness and amnesia)[4]. Neurological injuries ranged from loss of consciousness to depressed skull fracture requiring neurosurgical intervention. Systemic injuries were grouped into following categories:

• Integument	Lacerations and abrasions
• Abdomen	Injuries to liver, kidney, bladder and bowels
• Pulmonary	Haemothorax, pneumothorax
• Ophthalmologic	loss of vision, fractures
• Orthopedic	Long bone fractures
• Spine	Fracture, spinal cord injury

Results

There were total 334 patients in present study who sustained head injuries. In present study majority of the patients were young adults 2nd to 5th decade (66.3%). Also in the present study there was high incidence of head injuries in the 1st decade of life (18.9%). Patients after 50 years (15%) were less commonly affected (Table 1). Mean age was 28.53 years (range 1 to 88 years). There was predominance of males **(**71.9 %) in our study. The male to female sex ratio was 2.56:1. Road traffic crushes were the commonest causes of head injuries in present study (43.4%) followed by fall from height (30.8%), assault (19.2%) and firearm injuries (4.2%). Falling object (1.8%) and occupational injuries (0.6%) were less common causes of head injuries (Table 2).

X-rays were performed in all the cases and findings are shown in Table 3. It was normal in 98 (29.3%) cases and showed scalp haematoma in 100 (29.9%) cases. X-ray skull showed lesions in 114 cases (49.8%), depressed fracture (11.4%), comminuted fracture (5.4%), linear fracture (24.0%), mandible fracture (0.5%) and orbit fracture in 2 (0.5%) cases respectively. CT scan was performed in 227 cases and it showed single lesion in 150 cases, two lesions in 57 cases and multiple lesions in 29 cases (Figures 1). CT scan was normal in 50 (18.0%), and showed one lesion in 150 (54.2%), two in 57 (20.6%) and three lesions in 20 (7.2%) of the cases. Common lesions on CT scan (Table 4) were cerebral contusion (21.6%), extradural haematoma (20.9%), linear fracture (23.8%), subarachnoid haemorrhage (18.5%), depressed fracture (10.8%) and pnemocephalus (11.2%). Comminuted fracture (2.9%), diffuse cerebral oedema (3.2%), acute subdural haematoma (2.1%) and chronic subural haematoma were less common lesions. There was presence of metallic foreign body in 7 cases (3.2%). Most of the patients (71.6%) sustained mild head injury, 40 (12.0%) sustained moderate head injury and 16.55% had severe head injury. Majority of the patients (79.0%) did not have any neurological deficits, only seventy patients (21.0%) had neurological deficits. Nasal or ear bleed was observed in 11.7% of the cases.

A total of 59 patients (34.7%) had associated injuries (Table 5). Long bone fractures were seen in 9.9%, dental injuries in 7.8% and chest injuries in 4.5%. Only three patients (0.9%) sustained abdominal injuries. Out of 334 patients 39 patients (11.7%) required some form of surgical intervention. The majority (88.3%) of the patients was managed conservatively. Majority of

patients had mild head injury and treated conservatively in present series. In thirty three patients suturing of lacerated scalp wound was performed. 16 patients underwent surgery for the evacuation of extradural haematoma, 11 patients underwent evacuation of chronic subdural haematoma, 6 patients underwent evacuation of acute subdural haematoma and in one patient evacuation of contusion was performed (Table 6).

Majority of the patients (87.7%) made good recovery. Six patient developed wound infection and were treated conservatively. Fifteen (4.5%) of patients died in this series. One patient had associated intra-abdominal injury (splenic rupture) and two patient sustained pulmonary trauma and succumbed to haemothorax and aspiration (Table 7).

Figure-1

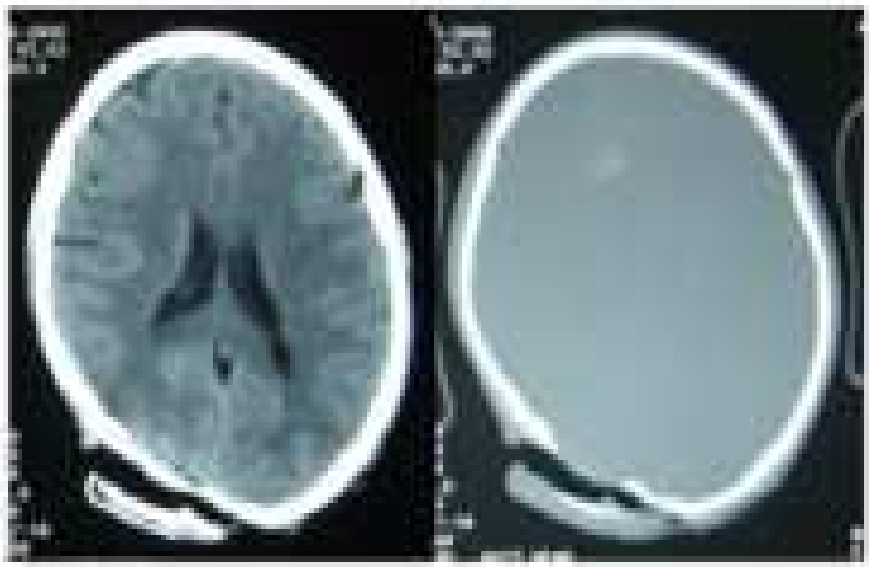

Figure 1. CT scan of a patient with history of assault by sharp weapon showing chip fracture of occipital bone managed conservatively

Table-1 Age distribution (n=334)

Age group	Frequency	Percent
0-10	63	18.9
10-20	59	17.7
20-30	70	21.0
30-40	55	16.5
40-50	37	11.1
50-60	23	6.9
60-70	13	3.9
> 70	14	4.2

Table 2. Mechanism of injuries

Type of injury	Frequency	Percent
Assault	64	19.2
Fall	103	30.8
Occupational	2	0.6
RTA	145	43.4
Firearm injury	14	4.2
Hit by falling object	6	1.8

Table 3. X-ray findings

	Frequency	Percent
Normal	98	29.3
Depressed fracture	38	11.4
Comminuted fracture	18	5.4
Scalp haematoma	100	29.9
Linear fracture	80	24.0
Mandible fracture	2	0.5
Orbit fracture	2	0.5

Table 4. Pattern of injuries on CT scan (n=277)

Facial injuries	Frequency	Percent
Normal	50	18.0
Scalp haematoma	28	10.1
Comminuted fracture	8	2.9
Linear fracture	66	23.8
Depressed fracture	30	10.8
Extradural haematoma	58	20.9
Chronic subdural haematoma	17	6.1
Acute subdural haematoma	6	2.1
Cerebral contusion	60	21.6
Subarachnoid hemorrhage	15	18.5
Pneumocephalus	31	11.2
Diffuse cerebral oedema	9	3.2
Metallic foreign body	7	2.5

Table 5. Associated injuries

System	Frequency	Percent
Abdominal injuries	3	0.9
ENT	39	11.7
Long bone fractures	33	9.9
Chest	15	4.5
Dental	26	7.8
None	218	65.3

Table 6. Details of operative management (n=69)

Treatment	Head injury
Evacuation of acute SDH	6
Evacuation of chronic SDH	11
Craniotomy+ Decompression of contusion	1
Evacuation of EDH	16
Suturing of lacerated area	30
Elevation of depressed fracture	5

Table 7. Outcome of Head Injury (n=334)

	Number	Percent
Good recovery	293	87.7
Discharge at request	15	4.5
Left against medical advice	9	2.7
Referred	2	0.6
Died	15	4.5

Discussion

There were total 334 patients in present study who sustained head injuries. In present study young adult males were commonly sustained head injuries. In literature also the vast majority of head injuries are experienced by males and young adults. [5, 6, 7,8,9,10,11] 71.9 % of patients in our study were male and incidence of head injuries in female was 28.1 percent (male to female ratio-2.56:1). These findings are consistent with previous studies also overall ratios of males to females have ranged from 3:1 to as high as 11.1:1 in literature. [5,8,10,11] High risk of head injuries in male gender may be due because males younger than 3 years have less freedom and mobility to engage in risk-taking activities or are less likely to have risk-taking behavior. They are also more vulnerable to bite and fall injuries. [12]

Road traffic crushes were the commonest cause of head injuries in most of the series as supported by the present study. [5, 12, 13, 14] This may be attributed to recklessness and negligence of the driver, poor maintenance of vehicles, often driving under the influence of alcohol or drugs and complete disregard of traffic laws. [8] Fall as a common cause of head injuries may be due location of the hospital in Himalayan foothills. Fall is an uncommon cause of head injuries in the literature. [8, 15] Assault was also a common cause of head injuries in the present series and it may be due to the high incidence of interpersonal violence in this area. Interpersonal violence, especially the use of fists, is found to be the leading cause of trauma. However due to underreporting by patients, sometimes the correct incidence may not be possible. [5]

Incidence of associated injuries was low in comparison to the literature where a large proportion of patients (35%) had associated injuries, such as abdominal, chest, and limb fracture injuries. [12, 16] Head trauma can affect skull, brain, and its meninges. High velocity impacts result in ruptures of intracranial vessels, leading to hemorrhages in different compartments. These accompanying injuries can be more life-threatening than simple injuries.[17,18,19,20]

In present series almost 50% patients had normal X-rays and remaining patients had associated fractures. However X-rays can not demonstrate associated intracranial injuries. CT scan was more useful in demonstrating the intracranial lesions. As in the present series most of the injuries are minor in nature and can be treated conservative. Even majority of the lesions on CT scan do not require neurosurgical intervention[1,2,3,21,22,23]. Causes of surgical intervention for intracranial lesions in present series were compound depressed fractures, decompression of contusion, and evacuation of intracranial haematomas and suturing of scalp lacerations. [24] Six patient developed wound infection and these were treated conservatively. Fifteen patients were expired in this series. One patient had associated intra-abdominal injury (splenic rupture) and other patient sustained pulmonary trauma and succumbed to haemothorax and aspiration[15,25,26]. The major cause of mortality in this review was severe head injury. [27]

Because this was a retrospective review and the information was obtained by chart review, it relies on the accuracy of both the history provided and the history recorded. In some cases, the information was provided by witnesses to the events; however, in other cases it was provided by the patient. Additionally, the history was recorded by different health care providers in nonuniform fashion. The above data work on the assumption that the history is an accurate representation of the events that transpired. Ideally, the investigators would perform all history taken and use a standard methodology in history taking to better ensure accuracy regarding data.

Conclusions

Road traffic accidents were the commonest cause of head injuries, young patients were most commonly affected in present study with a male preponderance. This study will provide a clearer understanding of the patterns of head injuries and will assist health care providers to plan and manage the treatment of traumatic head injuries. This epidemiological information can also be used to guide the future funding of public health programs geared toward prevention. In this

study we analyze epidemiology, clinical characteristics and management options in patients with head injuries in a tertiary referral centre of Eastern Nepal.

References

1. Kuppermann N. Intracranial injury in minor head trauma. Arch. Dis. Child. 2004;89;593-594
2. Kay A, Teasdale G. Head injury in the United Kingdom. World J Surg 2001; 25: 1210-1220.
3. Sanchez JI, Paidas CN. Childhood trauma. Now and in the new millennium. Surg Clin North Am 1999; 79: 1503-1535.
4. Ommaya AK, Rockoff SD, Baldwin N. Experimental concussion. J Neurosurg. 1964; 21:249–65.
5. Zargar M, Khaji A, Karbakhsh M, Zarei MR. Epidemiology study of facial injuries during a 13 month of trauma registry in Tehran. Indian J Med Sci 2004;58:109-114
6. Ugboko VI, Odusanya SA, Fagade OO. Maxillofacial fractures in a semi-urban Nigerian teaching hospital .A review of 442 cases.Int J Oral Maxillofac Surg 1998;27:286-9.
7. Bataineh AB. Etiology and incidence of maxillofacial fractures in the north of Jordan. Oral Surg Oral Med Oral pathol Oral Rehabil Radiol Endod 1998;86:31-5.
8. Al Ahmed HE, Jaber MA, Abu Fanas SH, Karas M The pattern of maxillofacial fractures in Sharjah, United Arab Emirates: a review of 230 case. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2004; 98(2):166-70
9. Haug RH, Prather J, Indresano AT. An Epidemiologic survery of facial fractures and concomitant injuries. J Oral Maxillofac surg 1990;48:926-32.
10. Marker P, Nielsen A, Bastian HL. Factures of the mandibular condyle. Part 1: Patterns of distribution of types and causes of fractures in 348 patients. Br J Oral Maxillofac Surg 2000;38:417-21.
11. Ellis E III, Moos KF, El-Attar A, et al: Ten years of mandibular fractures: An analysis of 2137 cases. Oral Surg 59:120, 1985
12. HYL Lynne, Kumar M, MM Charrles. Head and neck trauma in hospitalized pediatric patients. Otolaryngol Head Neck Surg 2004; 130:255-61.
13. Down KE, Boot DA, Gorman DF. Maxillofacial and associated injuries in severely traumatized patients: implications of a regional survey. Int J Oral Maxillofac Surg 1995; 24(6):409-12.
14. Olson RA, Fonseca RJ, Zeitler DL: Fractures of the mandible: A review of 580 cases. J Oral Maxillofac Surg 1982;40:23
15. Motamedi MH. An assessment of maxillofacial fractures: a 5-year study of 237 patients. J Oral Maxillofac Surg. 2003; 61(1):61-4.
16. Haug RH, Wible RT, Likavec MJ, et al. Cervical spine fractures and maxillofacial trauma. J Oral Maxillofac Surg. 1991; 49: 725.
17. Egol R, Fromm KK, Guntupalli M, Kaufman FD, Nasraway S, Ryon D, Zimmerman J. Task Force of the American College of Critical Care Medicine, Society of Critical Care Medicine. Guidelines for intensive care unit admission, discharge, and triage. Crit. Care Med. 1999;27: 633–638.
18. Keenan HT, Brundage SI, Thompson DC, Maier RV, Rivara FP. Does the face protect the brain? A case-control study of traumatic brain injury and facial fractures. Arch. Surg. 1999;134:14–17.
19. Yang WG, Chen CT, de Villa GH, Lai JP, Chen YR. Blunt internal carotid artery injury associated with facial fractures. Plast. Reconstr. Surg. 2003;111:789–796.
20. Derdyn C, Persing JA, Broaddus WC, Delashaw JB, Jane J, Levine PA, Torner J. Craniofacial trauma: an assessment of risk related to timing of surgery. Plast. Reconstr. Surg. 1990;86:238–245.

21. Davidoff G, Jakubowski M, Thomas D, et al. The spectrum of closed-head injuries in facial trauma victims: incidence and impact. Ann Emerg Med. 1998;17:6–9.
22. Alvarez M, Nava JM, Rue M, Quintana S. Mortality prediction in head trauma patients: performance of Glasgow Coma Score and general severity systems. Crit. Care Med. 1998;26:142–148.
23. Li HV, Heard A. A useful tool for predicting outcome for the pediatric head trauma patient. Crit. Care Med. 2002;30:1403–1404.
24. Hohlrieder M, Hinterhoelzl J, Ulmer H, Hackl W, Schmutzhard E, Gassner R. Maxillofacial fractures masking traumatic intracranial hemorrhages.Int. J. Oral Maxillofac. Surg. 2004; 33: 389–395
25. Ansari MH. Maxillofacial fractures in Hamedan province, Iran: a retrospective study (1987-2001). J Craniomaxillofac Surg. 2004; 32(1):28-34
26. Erol B, Tanrikulu R, Gorgun B. Maxillofacial fractures. Analysis of demographic distribution and treatment in 2901 patients (25-year experience). J Craniomaxillofac Surg. 2004 Oct; 32(5):308-13.
27. Plaisier BR, Punjabi AP, Super DM, Haug RH. The relationship between facial fractures and death from neurologic injury. J Oral Maxillofac Surg.2000; 58: 708- 12.