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Original Research Article

Comparative study of pattern of head injury in a rural community hospital and a tertiary care hospital

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ABSTRACT

Background: The objective of the study was to compare clinical patterns of head injuries in reference to the Glasgow coma scale including neurological examination and also to determine morbidity and mortality in head injury patients admitted to a nodal tertiary care hospital and a rural community hospital.
Methods: This prospective study was done at the emergency department of Kasturba Hospital attached to Mahatma Gandhi Institute of Medical Sciences and Sushrut Hospital, Maharashtra on a total of 1000 cases during one-year study duration. The severity of the head injury was analysed using a Glasgow coma scale and outcome in terms of management and death was assessed.
Results: Out of 1000 cases with head injuries, 900 cases were admitted in tertiary care hospital and 100 cases in a rural hospital. A significant difference was observed in terms of age group (p=0.01), mode of trauma (p=0.04) and symptoms (p=0.03) among the patients admitted with head injuries in both hospitals. The mortality rate was 1% and 3% in tertiary care and rural hospitals respectively.
Conclusions: Head injuries are predominantly affecting the male population and most of them are due to road traffic accidents. Early assistance of medical aid and emergency room care results in good outcomes with minimal deaths.

Keywords: Head injury, Tertiary care hospital, Rural community hospital, Glasgow coma scale, Outcome

INTRODUCTION

Head injury is one of the most common devastating types of injuries and is a leading cause of morbidity and mortality in India and other developing countries.[1] Globally, it is a major health problem in public and considered as a major cause of death and disability by the end of 2020. Majority of head injury cases are due to road traffic accidents (60%), followed by falls (20-25%) and violence (10%).[2,3]

The young male population is commonly affected by head injuries.[4] About 69% of the population with head injuries was reported between the age group of 15-35 years.[5] From the previous studies, it is identified that the most frequent cause of head injury in an adult is due to fall and in children younger than 15 years is due to fall and road traffic accidents and is considered to be the leading cause of mortality.[6]

The most common clinical presentations in patients with head injuries are headache and vomiting followed by skull fracture and loss of consciousness. Other suggestive clinical findings of skull fractures are nose and ear bleed, mastoid ecchymosis, and CSF rhinorrhea/otorrhoea.[7]

The severity of neurological assessment by head injury is commonly done by the Glasgow coma scale (GCS).[8] The

GCS score between 13-15 is considered as mild head injury, 9-12 as moderate and 3-8 as severe.[9] Radiological X-ray findings help in detecting skull fracture and can act as an indicator for severe internal brain injury and associated intracranial hematoma.[8] Despite many advances in radiology, computed tomography (CT) scan findings are considered to be the choice for investigating complete objective assessment of structural damage of the brain following head injury. Treatment plan and outcome can also be assessed easily with CT scan findings.[10]

Quality assistance of medical aid and emergency room care are extremely important contributing factors to determine the outcome in head injury patients. Trauma with a head injury and associated injuries demands rapid improvisation and interventions to save lives and permanent disabilities.[10]

Many factors determine the outcome in head injury patients namely age, sex, mode and severity of the injury, intracranial pathology and associated injuries.[11] The current study aims to compare the clinical assessment of head injury in reference to the Glasgow coma scale including neurological examination and to determine morbidity and mortality in head injury patients admitted to nodal tertiary care hospital and rural community hospital.

METHODS

This prospective study was conducted on 1000 cases of varied head injuries attending to the emergency department of Kasturba Hospital attached to Mahatma Gandhi Institute of Medical Sciences, Sevagram which is a tertiary care hospital and Sushrut Hospital, Nandurbar, Maharashtra, a rural community hospital from February 2007 to February 2008. Of 1000 cases, 900 cases of head injury were selected from Kasturba Hospital and 100 cases admitted at Sushrut Hospital, Shahada were included. After getting informed consent from the patient or the guardian (in case of unconsciousness) detailed demographic data of the patients were collected using a predesigned proforma.

Clinical information included age, gender, mode of trauma, interval between trauma and medical aid provided, duration of stay in the hospital, complaints like vomiting, convulsions, ENT bleeding, headache, level of consciousness, associated bony injuries, vital signs, pulse rate, body temperature, blood pressure, respiratory rate, pupillary reflexes, radiological examination findings, brain computerized tomography (CT) scan findings, interventions, and outcome. The severity of the head injury was quantified using GCS.

The data was analyzed using Microsoft Excel and Epi info. The variables were assessed and presented in mean and percentages. Differences between the two proportions were analyzed using a t-test and a p-value less than 0.05 was considered as statistically significant.

RESULTS

A total of 1000 patients examined with head injuries were included in the study during the period of February 2007 to February 2008. Out of these, 900 cases were selected from a tertiary care hospital and 100 cases from a rural community hospital. Table 1 shows the demographic and clinical characteristics of patients. In both the hospitals, the maximum number of cases was noted in 21-30 years of age group i.e., 360 cases (40%), and 28 cases (28%) respectively and the difference in the age groups were found to be significant ($p<0.05$). Male preponderance was seen in both hospital admissions but the difference among participants was not significant ($p>0.05$). In tertiary care hospital admissions, major cause of head injury was road traffic accident (RTA) in 423 cases (47%) followed by fall from height (185; 20.55%), fall from bus/train (69; 7.66%) and assault (66; 7.33%), etc. Similar order of admissions was also observed in rural community hospital i.e., RTA accounting for 43 cases (43%) followed by fall from height (22; 22%), fall from bus/bullock cart (11; 11%), and slipped on ground (13; 13%). A significant difference in the mode of trauma was observed among the patients admitted to the selected hospitals ($p<0.05$). Majority cases had duration of hospital stay of 2-3 days. Total of 67% cases from tertiary care hospital and 88% of cases from rural community hospital were in full conscious at the time of admission. The difference in the level of consciousness among patients admitted in both hospitals was not significant ($p>0.05$). Headache was a common symptom noticed in both cases (Table 2).

Table 1: Demographic and clinical characteristics of study participants.

Variable	Tertiary care hospital (n=900)	Rural community hospital (n=100)	P value
	N (%)	N (%)	
Age (in years)			
0-10	90 (9)	8 (8)	0.01*
11-20	108 (12)	16 (16)	
21-30	360 (40)	28 (28)	
31-40	180 (20)	22 (22)	
41-50	108 (12)	12 (12)	
51-60	36 (4)	7 (7)	
>60	18 (2)	7 (7)	

Continued.

Variable	Tertiary care hospital (n=900)	Rural community hospital (n=100)	P value
	N (%)	N (%)	
Gender			
Male	630 (70)	78 (78)	0.07
Female	270 (30)	22 (22)	
Mode of trauma			
RTA	435 (48.3)	43 (43)	0.04*
Fall from height	185 (20.5)	22 (22)	
Fall from bus/train	69 (7.66)	11 (11)	
Slipped from ground	64 (7.11)	13 (13)	
Assault	66 (7.33)	9 (9)	
Unknown	11 (1.22)	2 (2)	
Level of consciousness			
Fully conscious	603 (67)	88 (88)	0.08
Semiconscious	238 (26.44)	7 (7)	
Unconscious	59 (6.55)	5 (5)	

Data was given in number and percentages; *p value is significant.

Table 2: Symptoms observed in the study participants in both admissions.

Symptoms	Tertiary care hospital (n=900)	Rural community hospital (n=100)	P value
	N (%)	N (%)	
Vomiting	230 (25)	28 (28)	0.03
Convulsion	19 (2.1)	1 (1)	
ENT bleed	277 (30.7)	13 (13)	
Pain/headache	531 (59%)	92 (92)	

Data was given in number and percentages.

Table 3: Distribution of cases in relation to the scalp and associated bony injuries among study participants.

Type of injury	Tertiary care hospital (n=900)	Rural community hospital (n=100)	P value
	N (%)	N (%)	
Scalp injury	845 (93.8)	89 (89)	0.12
Fracture of humerus	14 (1.5)	1 (1)	
Fracture of mandible	19 (2.1)	2 (2)	
Fracture of ribs	60 (6.6)	12 (12)	
Fracture of femur	19 (2.1)	1 (1)	
Fracture of radius and ulna	25 (2.7)	0 (0)	
Fracture of tibia fibula	16 (1.7)	0 (0)	
Fracture of maxilla zygoma	19 (2.1)	0 (0)	
Fracture of clavicle	57 (6.3)	4 (4)	

Data was given in number and percentages.

More than 50% of the patients from each hospital had mild head injuries (GCS: 13-15) (70.6% tertiary care hospital; 67% rural community hospital respectively) followed by moderate (GCS: 9-12), severe (GCS: 3-8) and the difference in severity of injuries were not significant (p=0.10) (Figure 1).

As given in Table 3, scalp injury was the more common type identified in both the cases (93.8% tertiary care hospital; and 89% rural community hospital respectively) and the difference among the type of injuries noted was not significant (p>0.05). In tertiary care hospital, CT scan report was normal in 606 (67.33%) cases. Out of abnormal CT findings, subarachnoid hemorrhage was

seen in 49 (16.16%) cases. In the rural hospital, there was no facility for a CT scan (Table 4).

In tertiary care hospital, 520 (57.7%) cases were reported to the hospital for medical aid within 0-6 hours of suffering from trauma, however, 312 (34.6%), cases reported within 7-12 hours. There were only 2 cases (0.24%), reported within 73-96 hours. In the rural community hospital, the time interval between trauma and medical aid was reported in 76 (76%) cases within 0-6 hours and 12% within 7-12 hours. The difference was not statistically significant (p=0.08).

Table 4: Distribution of cases according to CT scan findings.

Centre	Normal CT scan report	Abnormal CT scan report	Sub arachnoid haemorrhage	Subdural haemorrhage	Extradural haematoma	Contusion
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Tertiary care hospital (n=900)	606 (67.33)	294 (33.67)	49 (16.16)	134 (45.57)	27 (9.18)	84 (28.57)

Data was given in number and percentages.

Table 5: Distribution of cases according to the interval between trauma and reporting for medical aid.

Duration in hrs	0-6	7-12	13-18	19-24	25-36	37-48	49-72	73-96	8 days
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Tertiary care hospital (n=900)	520 (57.7)	312 (34.6)	35 (3.8)	12 (1.3)	2 (0.24)	10 (0.9)	6 (0.66)	2 (0.24)	1 (0.11)
Rural community hospital (n=100)	76 (76.0)	12 (12.0)	6 (6.0)	3 (3.0)	-	1 (1.0)	1 (1.0)	-	1 (1.0)

Data was given in number and percentages.

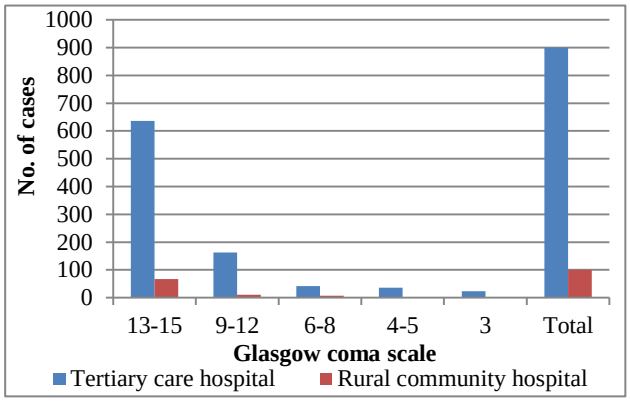

Figure 1: Distribution of cases in both admissions as per GCS.

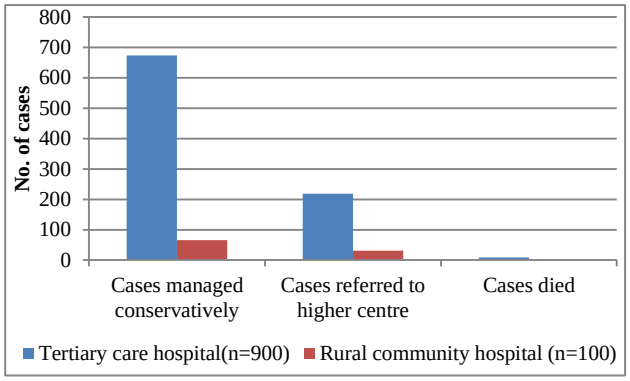

Figure 2: Outcome of cases in both the admissions.

In tertiary care hospital, out of 900 cases of head injury, 673 cases (74.77%) were managed conservatively, 218 cases (24.22%) were referred to higher center and 9 cases (1%) died while receiving treatment whereas in case of rural community hospital admissions, 66 cases (66%) managed conservatively, 31 cases (31%) referred to higher center and 3 cases (3%) were dead (Figure 2).

DISCUSSION

The incidence of head injuries by different modes of trauma was increasing exponentially in India and other developing countries. RTA was the most common mechanism of head injury reported in previous studies.[12,13] The need of implementation of safety protocols was emphasized by WHO in the year 1990 and estimated that trauma would be among the top 10 causes of disease burden globally by 2020.[14] Hence, implementation of safety protocols which were proven successful in developed countries is necessary to implement in developing countries to diminution the incidence rates of trauma.

This prospective study was planned on 1000 cases attending to the emergency departments of Kasturba Hospital attached to Mahatma Gandhi Institute of Medical Sciences (900 cases) and Sushrut Hospital, Maharashtra (100 cases) during one-year study period. In this study, the highest incidence of brain injuries was reported in the age group of 21-30 years (40%) followed by 31-40 years (20%) which was similar to other studies.[10,12] Study by Bhole et al, conducted on the

population of Central India reported that the mean age affected with a head injury was 32-64 years.[15]

The majority of the affected population in the present study was males. No significant difference was noted between the sex of the individuals admitted in both hospitals (p=0.07). This difference in sex ratio may be due to the reason that male population mobility was more compared to females as most of them were housewives. Similar observations of male preponderance were seen in the studies done by Bernat et al and Mamelak et al.[16,17]

A majority (48.3% and 43%) of the population admitted to both hospitals were due to RTA accidents. This could be due to inadequate knowledge of safety traffic rules, poor quality of roads and poor street lights.[12] Similar observations were also reported by Shekhar et al.[10]

In the present study, considering tertiary hospital 603 (67%) cases were fully conscious, 238 cases (26.44%) were semiconscious and 59 cases (6.55%) were unconscious at the time of admission whereas 88 cases (88%) were fully conscious, 7 cases (7%) were semiconscious and 5 cases (5%) were unconscious in case of rural hospital. In a retrospective study conducted by Rajendra et al, it was found that 38% of cases were conscious and 62% of cases were unconscious among 100 cases of craniofacial trauma at the time of admission.[18]

Considering both tertiary and rural hospitals, the headache was the most common complaint observed. This was in agreement with the findings of Shekhar et al.[10] This was contrary to the findings Adeleye et al.[13] In his study, loss of consciousness was the common symptom observed in majority cases (93%) followed by ENT effluxes (39%), vomiting (24%), seizures (13%) and headache (12%). In another study by Roka et al, vomiting was the major symptom observed in 57% of cases followed by headache in 31% cases.[19] It is because the previous studies included only serious cases of head injury who could not complain of headaches. Vomiting was seen in 25.55% of cases which is in concordance with studies of Rajendra et al.[17]

It was suggested that the Glasgow coma scale was used to assess the severity of head injury.[9] In our study, the majority of cases (about 90%) in both the hospitals were admitted with scalp injuries of mild to severe.

Emergency medical aid and pre-hospital care which includes airway protection, prevention of excess blood loss, plays a very important role in the stabilization of trauma cases before reaching the hospital.[10] The observations of Mock et al, concluded that the outcome would be good if a trauma victim received immediate medical aid and transportation to a nearby hospital within a few minutes of the injury.[20] In our study, majority cases in both hospitals (57.7% and 76%) reached the hospital within 6 hours of injury.

Neurosurgeons consider the CT scan as an important diagnostic tool to estimate the severity of the injury and concomitant management plans, which improves the outcome of head-injured patients dramatically.[10] In our study, on CT scan, abnormal findings were noted in 294 (33%) cases, which include subarachnoid hemorrhage in 49 cases, subdural hemorrhage in 134 cases, extradural hematoma in 27 cases and brain contusion in 84 cases. In a study by Shekar et al, abnormal CT scans were identified in 67% cases.[10] Bahloul et al in 2009 conducted a retrospective study over 8 years (1997-2004) on 454 cases with head injury admitted to ICU of a university hospital (Tunisia) and found that subdural hemorrhage was present in 35.2% cases and contusion was present in 34.5% cases.[21]

In the present study, 673 cases from a tertiary care hospital and 66 cases from a rural hospital were managed conservatively, 218 cases and 31 cases from both hospitals were referred to higher centers and 9 cases admitted in a tertiary hospital and 3 cases in the rural hospital died while receiving the treatment. In our study, the majority of the patients who had severe head injuries are candidates of scalp injury (craniotomy). Hence, most of the patients were managed conservatively, usually directed at reducing intracranial pressure. Shekhar et al, in their study, managed 89% of patients conservatively.[10] In a study by Bhole et al, 81% of patients were managed conservatively.[14]

In India, patterns of injury are different from other developed nations. The present policies, health schemes, and infrastructure related to health are not sufficient to meet the demands of poor and middle-class people. The segment of prevention and care of injury is a multidisciplinary area and requires coordination in different sectors of planning.

Prompt treatment of head injuries with better management plans by neurosurgeons within our limited resources will decrease the rate of morbidity and mortality related to head injuries.

CONCLUSION

In our study, the most common cause of head injury overall was road traffic accidents. The victims were mostly males of the age group 21-30 years. Most of the patients of head injury were managed conservatively indicating that the rural surgeons of the periphery can also handle the brunt of the attack of mild head injury if they have sound knowledge of initial basic resuscitation and early management. Mild head injury is difficult to diagnose and more difficult to differentiate from moderate to severe injury. The study had aimed to help this segregation at the peripheral rural center, so that judgment regarding triage of head injury patients can be done early.

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