PREDICTORS OF MORTALITY IN PATIENTS WITH SEVERE HEAD INJURY PRESENTING TO NEUROSURGICAL UNIT

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ABSTRACT

Background: Trauma is the most common cause of morbidity and mortality in people younger than 45 years and head injury is mostly highly weighted predictor of outcome in trauma population, timely intervention that can improve the outcome from severe head injury and has the potential of improving the lives of many accident victims.

Objective: A study regarding factors influencing mortality of severehead injury patients was conducted in a tertiary care hospital of Peshawar (Pakistan).

Methods: Severe head injury patients(n 395) were taken prospectively by simple random sampling method for a period of one year from January to December2011 for this study. The basic predictors in this study included age, sex, rural/urban, mechanism of injury, with injury to other organs, Glasgow Coma Scale, pupil size and reactivity, radiological findings, treatment given in hospital and referral to other hospitals.

Results: Majority of patients belonged to age group ofup to 10 years (27.5%) and maximum deaths (30) were seen in age group 31 to 40 years. Maximum number of patients were males 264 (75.9%) and 281 (71.1%) Traumatic brain Injury patients were from rural areas. All the patients were having GCS 4±2 (3-8) and 180 (45.56%) patients were having equal size and bilaterally reactive pupils at the time of presentation. The most common cause of severe head injury was Road Traffic Accident (154 patients) followed by History of all (128patients).The most common radiological features were Extradural hematoma (21%), followed by Depress skull fracture (20%) and brain contusion (17%). Most of the patients (65.06%) were treated conservatively. One hundred and thirty sex patients (34.43%) expired during course of treatment.

Conclusion: Head injury is one of the major problems in Khyberpakhthunkhwa. Lady Reading Hospital is the biggest tertiary care hospital for management of severe head injury patients. In spite of inadequate first aid facility at the site of injury, delays in transportation, lake of awareness, poor referral system, and many lives are saved and morbidity minimized after providing prompt and quality treatment at this premier medical centre.

Key words: Predictors, Mortality, Severe head injury, Glasgow Coma Scale (GCS), Traumatic Brain Injury (TBI)

INTRODUCTION

Traumatic brain injury is leading cause of mortality and morbidity worldwide. Every year about 1.5 million affected people die and several millions receive emergency treatment.[1]

Head injury is recognized as a major public health problem that is frequent cause of mortality and disability in young people and increased workload on health services.[2] The quality of survival after severe and moderate head injury is highly dependent on the adequacy of cognitive recovery. Outcome assessments are usually based on the integrity of neurological function and give little information regarding cognitive abilities.[3] The mortality of children's caused by trauma and head injury is second only to congenital disease in developed countries.[4] Since 1970's Glasgow coma scale (GSC) and computed tomography (CT) scanning has been used in evaluating head injury patients.[5] Trauma presents with variety of injuries and problems that demand rapid evaluation, discussion, improvisation and intervention to save lives and prevent permanent disability.[6] The purpose of this study was to identify risk factors associated with severe head injury.

MATERIAL AND METHOD

Data was obtained from Neurosurgery Department of Lady Reading Hospital, Peshawar for 395 patients sustaining severe head injury between January to December 2011, by simple random sampling method. The inclusion criteria were patients of all age groups, both sexes, patients with severe head injury and patients with GCS less than or equal to 8. The exclusion criteria were patients with GCS more than 8 and patients with GCS less than 8 due to systemic diseases or with no head injury.The basic predictors in this study included age, sex, rural/urban, mechanism of injury, with injury to other organs, Glasgow Coma Scale, pupil size and reactivity, radiological findings, treatment given at hospital and referral to other hospitals. The patients were followed from admission, up to discharge, to describe and identity risk factors associated with severe head

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injury. A questionnaire was developed and data was collected under following headings, Age in years, sex, rural / urban, Mechanism of injury, with injury to other organs, Glasgow Coma Scale, pupil size and reactivity, radiological findings, outcome of treatment and referral to other hospitals.

RESULTS

Age

The age of patient varied from six month to 80 years. Majority of patients belonged to age group of 0 – 10 years followed by age group of 21 – 30 years. The age distribution is given in Table 1. The rate of mortality according to age is given in Table 2.

GENDER:

Majority of patients were males, with male / female ratio as 3: 1. There were 264 (75.9 %) males and 131 (24.1%) females. Total deaths recorded were 136 of which 101 (74.26%) were males and 35 (25.73%) were females.

GEOGRAPHICAL DISTRIBUTION:

Majority of patient who sustained head injury were from rural areas 281 (71.1%) of which 109 (80.14%) died whereas 114 (28.9%) were urbanites out of which27 (19.85%) died.

Table 1. Distribution of patients according to age (n =395).

Age in years	No of patients with Head injury (GCS<8)	Percentage of Head injury (GCS<8)
0-10	107	27.5
11-20	76	18.5
21-30	99	25.2
31-40	47	12.2
41-50	24	6.1
51-60	28	7.0
61-70	8	2.0
71-80	6	1.5

Table 2. Distribution of age wise mortality.

Age in years	No of deaths	Percentage %
0-10	29	21.32
11-20	18	13.23
21-30	16	11.76
31-40	30	22.06
41-50	17	12.5
51-60	16	11.76
61-70	5	3.67
71-80	5	3.67

Table 3: Characteristics of the patients and nature of injuries:

Characteristic	Patients who survived	% age	Patients who died	%age	P value
No of patients	260	65.82	136	34.43	0.006
Mean age	23±6.9		31±15.7		0.002
Sex (M/F)	264/131	66.83/33.16	101/35	74.26/25.74	0.358
Mechanism of injury					0.089
RTA	154	38.98	51	37.5	
HOF	128	32.41	36	26.47	
FAI	57	14.43	25	18.38	
Assault	20	5.06	7	5.14	
No of patients W>1 other organ serious injury	36	9.11	17	12.5	0.645

Table 4: Pupil size and reactivity at presentation:

Pupil size and reactivity	No of patients who survived	%age	No of patient who died	%age	P value
Bilateral reactive	180	45.57	20	14.71	0.001
Unilateral fixed, dilated	98	24.81	27	19.85	
Bilateral fixed, not dilated	66	16.78	38	27.94	
Bilateral fixed, dilated	51	12.91	51	37.5	

Table 5: Pupil size and reactivity at presentation as a predictor of mortality:

Pupil size and reactivity	No of patients	Mortality rate %
Bilateral reactive	180	11.2
Unilateral fixed and dilated	98	27.55
Bilateral fixed not dilated	66	57.57
Bilateral fixed dilated	51	100

Gender

Male 264
Female 131
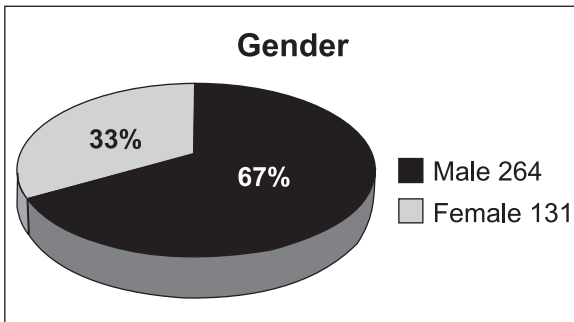
Figure1. Gender wise distribution

Geographical Distribution

Rural 71.1%
Urban 28.9%
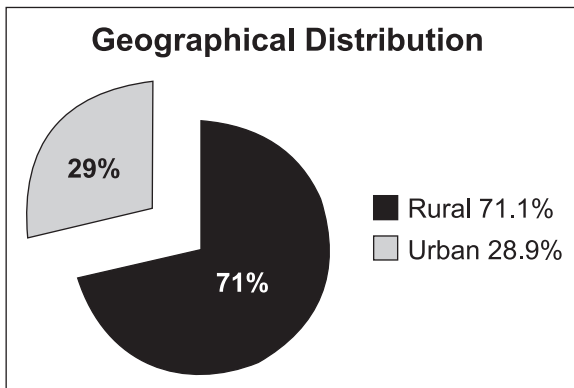
Figure 2.Geographic distribution of patients with severe head injury.

Patients 395

DAI 25
Contusion 70
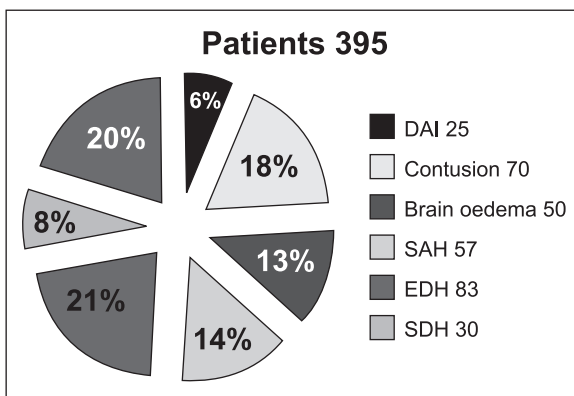Brain oedema 50
SAH 57
EDH 83
SDH 30

Figure 3. Details of the radiological findings in the affected patients:

DAI: Diffuse axonal injury, SAH: Subarachnoid hemorrhage, EDH: Extradural hematoma

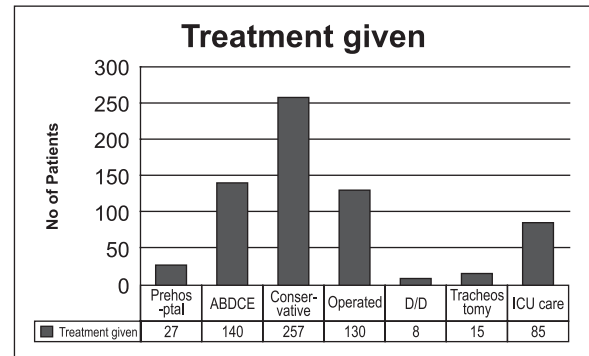SDH: Subdural hematoma, DSF: Depress skull fracture

Treatment given

	Prehos-ptal	ABDCE	Conser-vative	Operated	D/D	Tracheos tomy	ICU care
Treatment given	27	140	257	130	8	15	85

Figure 4. Details of management of patients with severe head injury

DISCUSSION

Traumatic brain injury is a leading cause of mortality and disability worldwide. Every year, about 1.5 million affected people die amongst several millions who receive emergency treatment. Most of the burden (90%) is in low and middle income countries. The quality of survival after severe and moderate head injury is highly dependent on the adequacy of cognitive recovery. Outcome assessments are usually based on the integrity of neurological function and give little information regarding cognitive abilities. The mortality of children's caused by trauma and head injury is second only to congenital disease in developed countries.

Lady Reading Hospital Peshawar, Pakistan is the biggest tertiary care hospital in Khyber Pakhthunkhwa province where Neurosurgical treatment facilities are available. Our study of severe head injury showed that all age groups were affected with maximum number of patients in the age group of 0 – 10 years (27.5%) of which 75.9% were males. Majority of these patients belong to rural areas (75.9%). The most common cause of severe head injury was Road Traffic Accident (38.98%) followed by history of fall (32.41%). All the patients were having GCS 4±2 (3-8) at the time of presentation and 180 (45.57%) patients were having equal size bilaterally reactive pupils. The most common Radiological findings were extradural hematoma 83 (21.01%) patients, followed by Depressed skull fracture 80 (20.25%) and Brain contusion 70 (17.72%). Most of the patients 257 (65.06%) were treated conservatively and 180 (45.57%) patients were operated.

This study of traumatic brain injury showed that all age groups were affected with maximum patients in the age group of 0 – 10 years (27.5%) of which 75.9% were males. This in consistence with the finding seen in Harlt R et al in their series 1449 patients which showed 90% were 0 – 40% old[7] and G H Yattoo et al in their series

of 547 patients showed 75.9% were male and 24.1% female patients.[8]

Our study showed higher rates of TBIs in rural areas (71.1%) than in urban areas (28.9%). This is in consistence with the findings of GH Yatoo; et al[8] who used a state surveillance system to identify cases of TBI for the year 2009. This study showed higher rates of severe traumatic brain injury in rural as compared to urban areas.

Since 1978 GCS has been used as a tool to assess the seriousness of head injury and the criteria used by international Data Bank (total of GCS score of 8 or less for 6 hours) be used to set the boundaries of patients study groups, and that GSC score outcome be used as the initial end point at a specified time from injury for measuring morbidity and mortality. Old age, low GCS score, pupil size and reactivity and presence of major extra cranial injury predict poor prognosis. Glasgow coma score showed clear linear relations with mortality.[10]

Perel et al in their study regarding outcome of the traumatic brain injury observed that practical prognostic models based on large cohort of international patients showed that most of patients were men (81%) and more than half (58%) of these patient were admitted within three hours of injury. The relation between age and log odds of deaths within 14 days showed no association until age of 40 and linear increase after wards.[1]

Since Lady Reading Hospital is the biggest tertiary care hospitals of Khyberpakhtunkhwa where all TBI patients are being treated its services need to be up-graded. Commissioning a separate Advanced Trauma Centre with neurosurgical facilities having its own ICU, dedicated nursing staff & neuroanaesthesia to provide prompt and quality treatment to all TBI patients. Ambulance service of Khyberpakhtunkhwa valley needs to be properly organized to have all the life saving facility to treat emergency patients as well as TBI patients on time. There is an urgent need to establish trauma services at district and tehsil level to treat all trauma patients, as well as TBI patients without any delay. Referral system in Peripheral Health System need to be improved so that only critically ill patients are referred to tertiary care center, in time for better management and outcome.

CONCLUSION

This study revealed that the head injury is one of the major health problems in Khyber pakhtunkhwa. The age of head injury patients ranged from 6 months to 80 years and the maximum number of patients (27.5%) sustained head injury in the first decade of life. Lady Reading Hospital is the biggest center for management of traumatic brain injury and patients are referred here from all over the province, particularly from rural areas. In spite of inadequate first aid at the site of occurrence of injury, delays in transportation, lack of awareness, poor referral system, many lives are saved and morbidity minimized after providing prompt and quality treatment at this premier medical centre.

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