Patterns of Traumatic Brain Injuries in Patients Presenting at a Tertiary Care Unit

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A B S T R A C T

Objective: The purpose of this study was to evaluate the distribution of traumatic brain injuries.

Patients and Methods: Questionnaire based data was collected from an inpatient population of patients who presented to the Neurosurgical Unit of Ayub Teaching Hospital with traumatic brain injuries. CAT scan (Computerized Automated Tomography scan) was used as the imaging modality for preliminary diagnosis. The data was collected over a period of three years. Non-probability purposive sampling was used as the sampling technique. Patients of both sexes and all ages were included in the study.

Results: Out of a total of 1938 patients, 1470 (75.9%) were males and 468 (24.1%) were females. Patients from 20 to 40 years' age group (38.1%) represented the greatest number. Fall (52.6%) was found to be the most common external cause of Traumatic brain injury, followed by Road Traffic Accidents (34.1%). Most of the patients (42.4%) had a GCS score falling between 8 and 12. No lesion was found at the initial CAT scan in most of the patients (27.2%). Depressed Skull Fracture (21.4%) was the most common abnormal finding in initial imaging. Conservative (78.3%) treatment was provided to most of the patients keeping in view the appropriate management requirements. 97.8% of the patients were treated successfully.

Conclusion: The quality of care at Neurosurgery Ayub Teaching Hospital was found to be up to the mark for traumatic brain injuries patients. However, the standard of care at Kashmir and Balakot needs to be re-evaluated.

Key words: Extradural hematoma, Glasgow Coma Scale, Intracranial bleed, Trauma, Subdural hematoma, Subarachnoid hemorrhage

Introduction

A traumatic brain injury can be defined as a no degenerative, noncognital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness.[1] Traumatic brain injury is a

substantial contributor of mortality and morbidity throughout the world.[2]

Traumatic brain injuries cost an average of $56 billion annually in U.S [1] while in Europe, approximately 1.6 million people are admitted to the hospital every year with traumatic brain injuries.[4] In Pakistan, the number of deaths attributed to traumatic brain injuries is increasing day by day.[5] The annual incidence of traumatic brain injuries in Pakistan has been estimated to be 50/100,000 with bread earning youth contributing the most to this figure.[6] The situation in Pakistan is particularly alarming because with the greater increase in the number of road traffic accidents and violence gaining its hold in the society, trauma patients are increasing in number substantially.[7] A World Bank study established the fact that each year almost four percent of Pakistan's total population is pushed below poverty due to health shocks.[8] Social re-emergence of a traumatic patient, both physically as well as mentally is a big problem in our setup.[9] The prognostic model of Traumatic Brain Injuries for a developing country like Pakistan differs significantly from the developed world and hence based on epidemiological studies more valid and suitable prognostic and management models should be come up.[10] The purpose of this study was to bring into light the distribution of traumatic brain injuries and to come up with recommendations to enrich research, ameliorate patient care and improve prevention of trauma. The pattern of traumatic brain injuries was followed in a number of variables like age, gender, area of residence, type of trauma, Glasgow Coma Scale (GCS), preliminary diagnosis, management and outcome. Keeping all these factors this study was conducted at Ayub Teaching Hospital, Abbottabad, which is a 1000 bed tertiary care hospital.

Patients and Methods

This cross-sectional study was conducted at the Neurosurgery Unit of Ayub Teaching Hospital in three years' time. One thousand nine hundred and thirty-eight patients were included in the study. Non-probability purposive sampling was used as the sampling technique. Neurosurgical in-patients who presented with brain injury secondary to trauma and only those patients who had no abnormality or a single abnormality on imaging out of the predefined lesions were included in the study. Outdoor patients were excluded from the study. A detailed questionnaire that was filled after taking informed consent from the patients or their attendants was used as the data collection tool. Preliminary diagnosis was made by CAT scan as the imaging modality. Glasgow Coma Scale (GCS) score was used as a mode of estimation of consciousness of the patients and the extent of their brain damage. The data was processed by using SPSS-16. Descriptive statistics were calculated as frequency and percentages.

Results

Out of a total of 1938 patients, 1470(75.9%) were males and 468(24.1%) were females, 624 (32.2%) were less than 13 years of age, 318 (16.4%) between 13 and 19 years of age, 738 (38.1%) 20 to 40 years old while 258(13.3%) patients were more than 40 years old. The vast majority of patients i.e. 810(41.8%) were from District Abbottabad. Patients from Swat, Afghanistan and Balakot contributed the least to the figure with 12(0.6%) from each of these areas. There were 132(6.8%) patients from District Haripur, 468(24.1%) from District Mansehra, 228(11.8%) from Batagram, 48(2.5%) from Northern areas including Gilgit Baltistan and 216(11.1%) from Kashmir.Fall was found to be the most frequent contributor to traumatic brain injuries i.e. 1020(52.6%) patients presented with a history of fall. This was followed by Road Traffic Accidents contributing a total of 660(34.1%) patients, 204(10.5%) patients had a history of assault while only 54(2.8%) patients had Firearm injury as the cause of Traumatic Brain Injury. (Table 1)

On Glasgow Coma Scale, 660(34.1%) patients scored from 13 to 15.

Table:1 Cause of Trauma		
Cause of Trauma	Frequency(%)	Cumulative Percent
Fall	1020(52.6)	52.6
Road Traffic Accident	660(34.1)	86.7
Assault	204(10.5)	97.2
Firearm Injury	54(2.8)	100.0
Total	1938	

Table:2 Glasgow Coma Scale at the time of presentation (n=1938)		
Glasgow Coma Scale	Frequency(%)	Cumulative Percent
13-15	660(34.1)	34.1
8-12	822(42.4)	76.5
5-7	444(22.9)	99.4
3-4	12	100.0

Table:3 Preliminary Diagnosis on CAT Scan		
Preliminary Diagnosis on CAT Scan	Frequency(%)	Cumulative Percent
No Lesion	528(27.2)	27.2
Extra Dural Hematoma	258(13.3)	40.6
Subdural Hematoma	54(2.8)	43.3
Intracranial Bleed	234(12.1)	55.4
Linear Skull Fracture	294(15.2)	70.6
Depressed Skull Fracture	414(21.4)	92.0
Subarachnoid Hemorrhage	156(8.0)	100.0
Management		
Conservative	1518(78.3)	78.3
Operated	420(21.7)	100.0
Outcome		
Alive	1896(97.8)	97.8
Dead	42(2.2)	100.0
Total	1938	

Most of the patients had GCS between 8 and 12 i.e. 822(42.4%) patients fell in this category at the time of their presentation. 444(22.9%) patients had a GCS score of 5 to 7 while 12(0.6%) patients were graded as 3 to 4 on Glasgow Coma Scale at the time of their presentation. (Table 2). Patients with no lesion i.e. 528(27.2%) had the lion's share. This was followed by Depressed Skull Fracture i.e. 414(21.4%) patients out of the total had a depressed skull fracture. 258(13.3%) patients were found to be positive for an Extra Dural Hematoma while only 54(2.8%) patients had a Subdural Hematoma as their diagnosis on CAT Scan. 234(12.1%) patients had an Intracranial Bleed, 294(15.2%) Linear Skull Fracture and 156(8%) patients had Subarachnoid Hemorrhage as their preliminary diagnosis. 1518(78.3%) of the patients were treated conservatively while 420(21.7%) had to be operated on as part of their management. The outcome was found to be exceptionally good with 1896(97.8%) being treated successfully while a meager number of 42(2.2%) out of 1938 could not make it back to life. (Table 3)

Discussion

A physical injury to the living tissue caused by an external source is called a trauma.[11] Traumatic brain injury is therefore a physical injury to the brain that is not caused by a progressive process, is acquired and is caused by an external mechanical insult that may cause a long term or short term abnormality of behavioral, physical, social and/or psychological functions with an associated impaired consciousness.[12] Age was found to be an important factor while taking into consideration the epidemiology of Traumatic Brain Injuries. Majority of the patients were found to be below 40 years of age. This is in consistence with a study performed by John Bruns et al.[13]

As most of the patients were relatively young, the outcome was positive for majority of the patients. This is in accordance with the study done by Hilaire J et al.[14] As per this study, majority of the patients were found to be males. This is in agreement with a study performed in 2004 in which 121 previous studies were critically studied for the prevention, incidence and risks of traumatic brain injuries.[15] The finding of males being more sufferers of traumatic brain injuries is also strongly supported by the Center for Disease Control and Prevention (CDC), USA, according to which Traumatic Brain Injuries rates are higher in males in every age group as compared to females.[16] A study conducted by Kraus J. et al also supports this statistical outcome.[17] Men below 40 years of age are more vulnerable to Traumatic Brain Injuries.[18] Other studies have also reported male predominance, when it comes to contribution to the number of total TBI patients.[19] Despite the weak practical translation of healthcare hierarchy in Pakistan[20], it can be assumed that our tertiary care unit had a much lesser load of TBI patients because majority of the patients were being treated at their respective areas local healthcare facilities. However, TBI patients from Kashmir and Balakot surpassed the rest of the areas in number taking into

account the relative distances and the time that it takes to reach our healthcare unit from the different areas studied. As far as time of the day that has the greatest load of TBI patients is concerned, the outcome is dispersed. However, evening and night timings are definitely ahead of morning timings in numbers as evident by the data. Fall was found to be the most frequent external source of injury in our setup followed by Road Traffic Accidents and Assault. Surprisingly our region shared the trend with USA as the same distribution was found by a survey conducted from 2002-2006 at USA by the Center for Disease Control and Prevention.[21] Fall was also found to be the most frequent contributor to Traumatic Brain Injuries by a survey conducted at Tennessee and the number was found to be on the rise from 1996-2010.[22] However, by comparison and contrast of different studies, it can be concluded that the external source of TBI varies depending on the geography and a fixed or nearly consistent pattern cannot be established between two different geographical regions or even within the region. Glasgow Coma Scale (GCS) for majority of the patients was found to be more than 8 and that had an impact on the positive outcome of majority of the patients. This is consistent with a study performed by Cisu D.[23]

Linear Skull Fracture was found to be the most frequent finding on CAT Scans of patients presenting with TBIs while Subdural Hematoma was found to be the least contributor. The use of CAT scan in establishing appropriate diagnosis and planning management accordingly is of utmost importance.[24] Majority of the patients were treated conservatively in view of their GCS findings at the time of their presentation and diagnosis. This was in agreement with a study conducted in 2008 by GH Yattoo who concluded that only 10% to 20% of TBI patients need surgical management while the rest benefit from nonsurgical management options.[25] With majority of the patients falling in a category of younger age i.e. below 40 years [26], GCS score of more than 8 [27] and most of the patients requiring conservative treatment, the outcome for a tremendous number of patients was good as expected.

Conclusion

Fall by far is the most common external cause of TBI followed by road traffic accidents. GCS correlates positively with the outcome and most of the patients fall between a GCS score of 8 and 12. Most of the patients have no lesion at the time of their preliminary diagnosis on CAT scan while depressed skull fracture is the most common abnormality of all on CAT scans at the time of their presentation. Majority of the patients are managed conservatively and the results are substantially positive for a great number of patients. With the exceptionally great number of patients being treated successfully at Ayub Teaching Hospital, it can be safely concluded that the quality of care for traumatic brain injuries patients is up to the mark at the Neurosurgery Unit of ATH.

Recommendations

Specific trauma centers with staff specifically trained for traumatic brain injuries should be established in Northern parts of the country including Abbottabad. The healthcare units at Kashmir and Balakot should be looked into for flaws and thus should be corrected accordingly. Data regarding traumatic brain injuries is lacking in Pakistan. Statistical analysis of traumatic brain injuries should be conducted at regular intervals of time and therefore standardized requirements should be met according to the needs of different localities. More studies should be conducted and thus an accurate and reliable prognostic scoring system should be introduced keeping in view the patterns of traumatic brain injuries identified

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