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Traumatic Brain Injuries: Experience of an Industrial Hospital in Eastern India

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ABSTRACT
Background: *Traumatic Brain Injury (TBI) is one of the leading causes for morbidity, mortality and economic loss.*
Aim: *To study the etiology, epidemiological aspect and outcome of Traumatic Brain Injuries admitted at Tata Main Hospital.*
Material and Methods: *Retrospective case series study undertaken for a period of 2 years from January 2014 to December 2015.2855 patients presenting to our Emergency Department with head injury were included in the study. Patients underwent detailed clinical and radiological evaluation as per trauma protocol.*
Results: *The most commonly affected age group was 21 to 30 years (25,6%)%) with male to female ratio of 2.3:1. Injuries were predominantly caused by road traffic accident (69.4%), followed by fall from height (15%) and assault (5.1%). The most common CT scan finding was brain contusion (14%); others included acute subdural hematoma (9%), extra-dural hematoma (6%) and depressed skull fracture (4%) and traumatic sub-arachnoid hemorrhage (2%).Out of 400 severe head injuries 227 (57%) expired. Out of 685 casas with moderate Head Injury 301 (44%) cases showed complete recovery.100% recovery was seen in Mid Head Injury cases.*
Conclusion: *Road Traffic Accidents are a major cause of severe traumatic brain injury. About 66% cases reported to Emergency after 2 hours suggestive of an imperetive need of timely referral to hospitals so as to minimize the consequences of secondary brain injury. Only 5.5% cases required surgical intervention signifying the need for proper treatment measures.*
Keywords: *Traumatic Brain Injury, Industrial hospital, CT Brain , Mortality.*

INTRODUCTION

Traumatic Brain Injury (TBI) is a non-degenerative, acquired insult to the brain resulting from an external mechanical force.[1] It is still one of the leading causes of mortality and socioeconomic losses in India and other developing countries. It is estimated to cause an annual loss of $30 billion in developed countries [2]. The impact is much worse in developing countries like India where per capita income is low. It is estimated that nearly 1.5 to 2 million persons suffer from injuries and 1 million succumb to death every year in India[3]. The course

of disease process and sequel of ailments are exacerbated by illiteracy, poverty, negligence and frequent delays in acquiring of medical attention. The major challanges faced by Indian population are of prevention, prehospital care and rehabilitation in their changing environments to reduce the burden of TBIs.

Unfortunately, enough data is not available on epidemiology of TBI in our region. The annual incidence of head injury in India has been estimated as 50/100,000 population based on data from public sector hospitals[4]. These victims are frequently males in their most productive years of lives[5]and often the earning members of their families. The problem seems to be much more than being reported as many patients do not have access to hospital facilities due to lack of knowledge and financial constraint. The objective of this study was to highlight the pattern and distribution of Traumatic Brain Injuries(TBI) in order to reduce the burden from severe TBI. We describe its distribution at Tata Main Hospital, Jamshedpur and have tried to find the causative factors and means of treating them so as to reduce the morbidity and mortality associated with Head Injury.

AIM

To study the etiology, epidemiological aspect and outcome of Traumatic Brain Injuries admitted at Tata Main Hospital, Jamshedpur, Jharkhand

MATERIAL AND METHODS

The study was carried out at Tata Main Hospital, Jamshedpur which is an industrial hospital mainly catering to Tata Steel employees and their families. It also renders services to neighbouring areas.

Study Design: Retrospective case series study

Study Period: January 2014 to December 2015.

Study Group: 2855 indoor (admitted) patients with traumatic brain injuries.

All these patients underwent a detailed clinical and radiological assessment and were managed conservatively or surgery as per indication and treatment protocol.

Exclusion criteria

All admissions with polytrauma (chest, abdominal or bone injuries) were excluded in these studies

RESULTS

Over the two- year study period, 2855 patients were included in the study. Out of which 1991 (70%) were males and 864 (30%) were females. The mean age at presentation was 27.6 years (3 months - 94years). The most common age group was 21-30 years with 690 (24.16%) patients, followed by 470 (16.46%) patients between 31-40 years.

Table: 1 Showing the Distribution of Age and Gender

AGE(YEARS)	PATIENTS	MALE	FEMALE
>10	46(1.6%)	28(60.87%)	18(39.1%)
11-20	481(16.8%)	372(77.3%)	109(22.7%)
21-30	731(25.6%)	493(67.4%)	238(32.5%)
31-40	470(16.5%)	312(66.4%)	158(33.6%)
41-50	392(13.7%)	281(71.7%)	111(28.3%)
51-60	307(10.7%)	219(71.3%0	88(28.7%)
61-70	237(8.3%)	161(67.9%)	76(32.1%)
71-80	138(4.8%)	95(68.8%)	43(31.2%)
81-90	44(1.54%)	25(56.8%)	19(43.2%)
>90	09(0.31%)	05(55.5%)	04(44.4%)
TOTAL	2855	1991(69.7%)	864(30.3%)

Majority (66% n=1884) of patients arrived at the Emergency Department between 2-6 hours following trauma. Only 15%(n=428) patients were brought at the Emergency within 2 hours while 543(19%) patients reached Emergency more than 6 hours after injury.

Table-2 Showing the time of Reporting of patients in Emergency after Head Injury

TIME OF REPORTING AFTER INJURY	NUMBER OF CASES
<2 hours	428(15%)
2-6 hours	1884(66%)
>6 hours	543(19%)
TOTAL	2855

Road Traffic Accident (RTA) was the predominant cause of TBI with 1980 (69.4%) patients.. Fall from height was the second commonest cause of TBI with 428 (15%) patients presenting with this history. 302 (10.6%) patients had the history of falling of heavy object over head.145 (5.1%) patients in the study were the victims of assault.

Table 3 Showing Mode of Injury

RTA		1980(69.4%)
	2 Wheeler	1340(67.7%)
	4 Wheeler	118(5.9%)
	Pedestrian	522(26.4%)
FALL FROM HEIGHT		428(15%)
	Roof top	111(25.9%)
	Stairs	290(67.7%)
	Balcony	27(6.3%)
FALL OF HEAVY OBJECT OVER HEAD		302(10.6%)
	Brick wall	177(58.6%)
	Stone boulder	96(31.8%)
	Television	29(9.6%)
ASSAULT		145(5.1%)
	Blunt	120(82.7%)
	Sharp	17(11.7%)
	Firearm	08(5.5%)

GCS at presentation was 14-15 in 1770 (62%) patients, 9-13 in 685 (24%)and < 9 in 400 (14%)patients.

Table-4 Showing Glasgow Coma Scale (GCS) at the time of admission

GCS AT THE TIME OF ADMISSION	NUMBER OF CASES
3-8 (Severe head injury)	400(14%)
9-13 (Moderate head injury)	685(24%)
14-15 (Mild head injury)	1770(62%)

An overwhelming number of patients (65%) had a Normal CT scan. However, brain contusion was seen in 400 (14%) patients, sub-arachnoid hemorrhage (SAH) in 57 (2%), acute sub-dural hematoma (SDH) in 257 (9%), extradural hematoma (EDH) in 171 (6%), depressed skull fracture in 114 (4%)

Table- 5 Showing predominant finding in CT Scan Brain

CT SCAN BRAIN FINDING	NUMBER OF CASES
Normal	1856(65%)
Haemorrhagic Contusion	400(14%)
Acute Sub Dural Haemorrhage	257(9%)
Extra Dural Haemorrhage	171(6%)
Skull Fracture	114(4%)
Sub Arachnoid Haemorrhage	57(2%)
	2855

Neurosurgical intervention was performed in 157 (5.5%) patients. Rest of patients were treated conservatively. Contusionectomy was done in 24 patients, Decompressive Craniectomy was done in 13 patients. Evacuation of SDH in 63 patients. Evacuation of EDH was 39 patients. Elevation of depressed fracture was done in 13 patients.

Table-6 Showing types of surgery performed

SURGERY	MILD	MODERATE	SEVERE	TOTAL
Contusionectomy	0	13	11	24
Decompressive Craniecomy	0	0	13	13
Evacuation of SDH	5	30	28	63
Evacuation of EDH	4	28	07	39
Elevation of depressed fracture	0	10	03	13
Base Repair	0	04	01	5
	9	85	63	157(5.5%).

Out of 400 severe head injuries 227 (57%) expired.Out of 685 casas with moderate Head Injury 301 (44%) cases showed complete recovery.100% recovery was seen in Mid Head Injury cases.

Table-7 Showing Glasgow Outcome Score at 6 months of follow-up.

Glasgow Outcome Score	MILD	MODERATE	SEVERE	TOTAL
5(Good recovery)	1770(100%)	301(44%)	-	2071
4(Moderate disability)	-	184(27%)	-	184
3(Severe disability)	-	172(25%)	83(21%)	255
2(Vegetative state)	-	28(4%)	90(22%)	118
1Dead)	-	-	227(57%)	227
TOTAL	1770	685	400	2855

DISCUSSION

Some authors have considered Head injury as a "Silent epidemic of the post industrializationera" with concussion being the hallmark of TBI[6]. Head Injury has conventionally been classified on the basis of GCS at presentation as Mild (13-15), Moderate (9-12) and severe (<9). In our study, males of second and third decade were the predominant victims of TBI. Although male gender is anindependent risk factor for TBI[7] also confounded in our study but was not clear whether it had any impact on the outcome. Bazarian JJ et al. Found poorer outcome after mild TBI in females[8]. In our study most of the patients were in the third decade of life. Similarly, Raja at al.[9] and Jooma et al.[10] in two separate studies estimated second and fourth decade respectively as the most vulnerable age group from the same region. Most of our patients took at least 4 hours to reach the hospital. This delay shows the lack of first aid services in and around the city along with lack of awareness amongst the general public. Road Traffic Accident was the commonest cause of TBI in our study. This may be due to the high vehicle density on the roads, lack of traffic rule awareness and most importantly neglect of safety measures. Hyder et al.[11] demonstrated proportional increment in RTA associated deaths with increasing level of motorization in Pakistan.. Fall from height is another common cause of TBI which was found in about 15% of cases in our study.TBI following assault is common in our country because of relatively easy access to weapons in addition to illiteracy and poverty. Skull fracture itself is considered as an independent risk factor of mortality in severe blunt TBI[12].

In TBI, during the first 24 hours CT scan is the imaging modality of choice [13]. Recent evidence suggests that MRI is at least as accurate as CT in detecting acute hemorrhage[14].It still cannot be considered as the first choice investigation in acute phase. CT scan is superior in assessing bony

pathologies, more easily available and correlates with the outcome[15]. Although CT scan finding may lag behind actual intracranial damage especially if performed within first 3 hours of injury it is still not proven if it should be repeated in absence of neurological deterioration. Stippler M et al.[16] in a review of literature found that routine follow-up scan did not predict the need for neurosurgical intervention however, deterioration of neurological status did. Moreover, hemorrhagic progression was estimated at 19.9% (n = 324). Another study from Pakistan estimated the yield of repeat CT scan at only 6 %(28). MRI Brain is also considered superior for visualizing deeper brain structures and in detecting abnormalities missed by CT scan, especially diffuse axonal injury, minor contusions and restrained neuronal damage. Besides this small acute or sub acute subarachnoid hemorrhage can be picked up with FLAIR sequences of MRI[17].It is still to be established if MRI done would have any extra role in outcome of TBI acute management.

In our study CT scan was performed in all patients, out of which 35% had positive CT findings. Amongst patients with extra dural hematoma, those with clot thickness > 1 cm or midline shift, with deteriorating neurology are the candidates for emergent surgical evacuation. Patients who have evolving contusions on initial scan were followed neurologically and radiologically. Those who showed increase in size of contusion on repeat CT scan underwent contusionectomy or lobectomy. Incidence of SDH has been estimated up to 5% (19) with mortality as high as 1 out of 5 cases. However, mortality is directly correlated with pre-operative GCS and interval

CONCLUSION

Road Traffic Accidents is the most common cause of head Injury as seen in our Study. The most common age group affected was the third decade of life due to lack of proper road safety and negligence. Major bulk of Head Injuries could be managed conservatively with good hospital care. Only 5.5% cases required surgical intervention. Proper and timely management plays an important role in preventing mortality in such cases. So proper road safety measures and imparting knowledge to the genral public can help in reducing the burden of Head Injury.

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