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A Retrospective Study of Traumatic Brain Injuries at a Tertiary Care Hospital in AP

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Abstract
Introduction: *Traumatic brain injury (TBI) is one of the most devastating types of injury. It affects all ages; however majority of road traffic injuries (RTI) occurs in young adults of productive age group. As per report by the ministry of road transport, Government of India (2007) 1.4 lakhs road accident happened in 2007 with 40,612 people killed and 1.5 lakhs people injured. Hence, India is leading the world in fatalities due to road accidents. TBI is also associated with significant socioeconomic losses in India as well as in other developing countries.*
Materials and Methods: *The prospective study was conducted over a period of 24 months from July 2016 to June 2018 in Department of Neurosurgery, Kurnool medical College and Govt general hospital, Kurnool, AP. A total of 1378 patients presenting with head injury to our major trauma referral center were included in the study. All patients were subjected to detailed primary head-to-toe clinical survey to rule out involvement of other organ systems, following initial stabilization. During the post-resuscitative period an accurate history was taken from the family and/or eyewitnesses along with meticulous neurological and systemic examination including Glasgow Coma Score (GCS). This was followed by neuroimaging along with imaging of other relevant systems.*
Results: *Over the two- year study period, 1378 patients were includedin the study. Out of which 1057 (76.7%) were males and 321(23.3%) were females. The mean age at presentation was 29.2 years (3 months-72 years). The most common age groupwas 21-30 years with 470 (34.1%) patients, followed by 331(24.02%) patients between 31-40 years (Table I).Majority (58.3% n=803) of patients arrived at the A & Edepartment between 2-6 hours following trauma. Only 17.2%(n=237) patients were brought at the A & E within 2 hourswhile 338 (24.5%) patients reached A & E more than 6 hoursafter injury.*
Conclusion: *By improving our system with better reporting and documentation of cases, we will be able to make a better plan to decrease the incidence of TBI and their timely appropriate multimodality approaches to achieve better outcome of these cases within our limited resources.*
Key Words: *Traumatic brain injury, Glasgow Coma Score,*

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I. Introduction

Traumatic brain injury (TBI) is one of the most devastating types of injury. It affects all ages; however majority of road traffic injuries (RTI) occurs in young adults of productive age group. As per report by the ministry of road transport, Government of India (2007) 1.4 lakhs road accident happened in 2007 with 40,612 people killed and 1.5 lakhs people injured.Hence, India is leading the world in fatalities due to road accidents. TBI is also associated with significant socioeconomic losses in India as well as in other developing countries.[1]

Worldwide it is a major public health problem and is predicted to surpass many diseases as a major cause of death and disability by the year 2020.The majority (60%) cases are due to road traffic injuries (RTI), followed by falls (20-25%) and violence (10%).[2]

Due to rapid surge in urbanization, motorization and economical liberation, many Asian countries have an increased risk for TBI.Similarly in many low and middle income countries (LMIC), non-communicable disease including injuries are becoming a leading cause of mortality and morbidity. LMIC face a higher preponderance of risk factors for TBI yet often do not have the efficient health care capacity to deal with the associated health outcomes. The significant disabilities associated with TBI also places a considerable burden on health care system in these countries, therefore knowledge of the epidemiological profile of TBI and

development of preventive measures to alleviate this burden are vital, particularly in the limited resources setting.

Young male are commonly affected population in TBI.In children younger than 15 years, head injury is the leading cause of mortalitybut in elderly most frequent cause of TBI is fall.69% cases of injury were reported from age group 15-35.[3]

Most common clinical presentation in TBI patient is headache and vomiting followed by skull fracture with history of loss of consciousness (LOC). Associated clinical findings suggestive of basal skull fractures are nasal bleed, ear bleed, ecchymoses over mastoid (battle's sign) and CSF rhinorhea/otorrhoea. Neurological assessment for assessing severity of TBI is commonly done by Glasgow coma scale (GCS) but low score of GCS do not necessarily predict bad outcome.[5]

Since GCS do not follow a normal distribution, studies employing mean GCS values and standard statistical analysis are misleading.X-Ray skull can detect skull fracture that is an indicator for more severe internal brain injury and is frequently associated with development of intracranial hematoma.

The computed tomography (CT) classification for TBI yields important prognostic information. It provides an objective assessment of the structural damage to brain following TBI. Individual CT characteristics are important predictors of outcome in TBI. Despite various advances in radiology, CT remains the investigation of choice in case of suspected TBI. Treatment plan and prognostication can also be done easily. Cases of head injury with fracture tend to have more complication and are more often fatal than those without fracture.[6]

The quality of pre-hospital and emergency room care is an extremely important determinant of outcome in trauma patients. Trauma presents with variety of injuries and problems that demand rapid evaluations, discussion, improvisation and interventions to save life and prevent permanent disabilities.[7]There are numerous factors that determines the outcome in head injury patients namely age, sex, severity of injury, intracranial pathology, intracranial pressure and associated injuries.

II. Materials And Methods

The prospective study was conducted over a period of 24 months from July 2016 to June 2018 in Department of Neurosurgery, Kurnool medical College and Govt general hospital, Kurnool, AP. A total of 1378 patients presenting with head injury to our major trauma referral center were included in the study. All patients were subjected to detailed primary head-to-toe clinical survey to rule out involvement of other organ systems, following initial stabilization. During the post-resuscitative period an accurate history was taken from the family and/or eyewitnesses along with meticulous neurological and systemic examination including Glasgow Coma Score (GCS). This was followed by neuroimaging along with imaging of other relevant systems.

Head injury was classified as mild when GCS at presentation was 13 - 15. Patients with GCS 9 – 12, LOC > 5 mins, post traumatic amnesia > 30 mins or focal neurology were categorized as moderate while severe head injury was labeled when GCS was < 8 at presentation. Canadian CT Head Rule was used for performing CT scan brain in patients with GCS 13 – 15 at presentation. (45) However, all patients with GCS < 12, age younger than 16 years, on anticoagulation therapy or bleeding disorder were the candidates for CT brain.

Patients with mild head injury and normal CT brain were discharged after initial emergency management; however, all patients with moderate to severe head injury were offered admission in neurosurgical unit. Patients with more severe injuries of other organ systems were admitted under respective services with routine neurosurgical follow-up

III. Results

Over the two- year study period, 1378 patients were includedin the study. Out of which 1057 (76.7%) were males and 321(23.3%) were females. The mean age at presentation was 29.2 years (3 months-72 years). The most common age groupwas 21-30 years with 470 (34.1%) patients, followed by 331(24.02%) patients between 31-40 years (Table I).Majority (58.3% n=803) of patients arrived at the A & Edepartment between 2-6 hours following trauma. Only 17.2%(n=237) patients were brought at the A & E within 2 hourswhile 338 (24.5%) patients reached A & E more than 6 hoursafter injury.

GCS at presentation was 13-15 in 893 (64.8%) patients, 9-12 in382 (27.7%) and < 8 in 103 (7.5%) patients.

A total of 1241 (90.05%) patients were the candidates for CTscan brain. An overwhelming number of patients (55.7%)had a normal CT scan. However, brain contusion (figure 1) was seen in175 (14.1%) patients, sub-arachnoid hemorrhage (SAH) in 88(7.1%), acute sub-dural hematoma (SDH) (figure 2 &3) in 94 (7.6%), extraduralhematoma (EDH) (figure 4) in 72 (5.8%), depressed skull fracturein 57 (4.6%) while pneumocephlous (figure 5) was the predominantfinding on 63 (5.1%) CT scans (Table III).All patients with moderate to severe TBI were offeredadmission in addition to 97 (10.86%) patients with mild TBI.

Age (Years)	Patients	Male	Female
≤10	62(4.49%)	41(66.12%)	21(33.87%)
11-20	209(15.16%)	151(72.24%)	58(27.75%)
21-30	470(34.10%)	414(88.08%)	56(11.91%)
31-40	331(24.02%)	271(82.17%)	60(18.12%)
41-50	104(7.54%)	81(77.88%)	23(22.11%)
51-60	111(8.05%)	96(86.48%)	15(13.51%)
60+	91(6.60%)	79(86.81%)	12(13.1%)
	1378	1057(76.7%)	321(23.3%)

Table 1: Distribution of age and gender

S.No	Mode		Frequency
1	RTA		862(62.6%)
2		2-Wheeler	528(61.3%)
3		4 Wheeler	114(13.2%)
4		Pedestrian	196(22.7%)
5		Train	24(2.8%)
6	Fall		437(31.7%)
7		Roof top	58(13.27%)
8		Stairs	258(59.03%)
9		Balcony	72(16.47%)
10		Pole	49(11.21%)
11	Assault		76(5.5%)
12		Blunt	61(80.2%)
13		Sharp	4(5.3%)
14		Firearm	11(14.5%)
15	Other		3(0.21%)

Table 2: Mode of Injury

S.No	CT Finding	Mild	Moderate	Severe
1	Contusion	21	118	36
2	SAH	17	60	11
3	EDH	12	54	6
4	SDH	3	61	30
5	Depressed fracture	11	43	3
6	Pneumocephalus	11	46	6
7	Total	75	382	92

Table 3: CT Scan findings

S.No	Surgery	Mild	Moderate	Severe
1	Contusionectomy	0	47	29
2	Decompressive Craniotomy	0	0	5
3	SDH	1	42	30
4	EDH	5	41	6
5	Elevation of depressed fracture	7	32	3
6	Base repair	1	7	2
7	Wound Debridement	3	27	5
8	Total	17	196	82

Table 4: Surgical procedures

S.No	GOs	Mild	Moderate	Severe	Total
1	5	893(100%)	180(47.1%)	-	1073(77.9%)
2	4	-	102(26.7%)	-	102(7.4%)
3	3	-	88(23%)	21(20.4%)	110(7.9%)
4	2	-	12(3.1%)	23(22.3%)	35(2.5%)
5	1	-	-	59(57.3%)	59(4.3%)
6		893	382	103	1378

Table 5: Glasgow Outcome Score (at 6 months)

IV. Discussion

Similar to various other studies majority of our patients were males. No correlation was observed between the sex of patient and final outcome (*P* value > 0.05).

As per analysis sex distribution did not have any specific impact on outcome of TBI patients but it is important to note that majority of TBI affected population were male. TBI continues to be a nightmare for both

the public as well as for the neurosurgeons due to associated high morbidity and mortality. It is also associated with significant socioeconomic losses in developing countries including India. Road traffic injuries is an increasing health problem globally and especially in South-East Asia. In India, the incidence is basically reported from metropolis and are based on medico legal reports which may not be absolutely correct.[8] This study is a retrospective and prospective analysis of small number of patients seen in our institute.

Highest incidence of TBI has been reported in the age group of 2-10 years by most of the authors. Whereas others have reported that 69% cases were in age group of 15-35 years.[9]In a study from central India reported mean age of TBI cases were 32-64 years.

In our study the age of the patients varied from 1 month to 92 years. Out of which 64% patients were found to be adults and age above 12 years, followed by 36% in pediatric age group (<12 years). Mean age noted was 24.57.[9]

As per present study, analysis indicates all univariate factors like age of patient, place of residence (urban/rural), person who brought the patient to hospital, place of injury, mode of injury, provision of first aid by trained personal, distance covered by patients to reach hospital, mode of patient transportation, presence of unconsciousness, history of LOC/vomiting/seizure, on examination-abnormal pupillary reflex/motor power/plantar reflex/cranial nerve dysfunction/ear bleed/raccoons eye sign, requirement of resuscitation, severity of TBI as per GCS, presence of local injury on head and face, evidence TBI on CT scan, radiologically positive injuries on other body parts and complications were found to be significant (P value < 0.05).[10]

The IMPACT study has concluded that outcome in TBI cases are dependent on age, but in our study outcome remained to be closely related with the impact of primary injury as shown by the initial GCS.[11]Male: Female ratio was 2.56:1. Similar observation of male predominance was noted by many other authors also. The probable reason may be that the male population move out of their home more frequently for work. No correlation of sex with treatment outcome is noted in present study (P value > 0.05). Our observation corresponds with those made by other studies. The reason is that the mobility of male population is higher than their female counter part and they are exposed to more accidental risk factors at various places. 45% cases were either preschool group or illiterate and 44% cases were from school going age group (P value was > 0.05).[12]

V. Conclusion

In India injury patterns/modes are different from the developed nations. We are in a fast transient phase of development with a wide gap between large poor population and rich people. The present health infrastructure is not able to meet the demand of common people, further aggravated with the ever expanding slum population in urban areas. Prevention of Prevention and care of injury is a multidisciplinary area and requires inter-sectoral coordination for planning.

Prompt treatment of head injuries involves immediate GCS, radiological evaluation, surgical intervention and intensive care in all appropriate cases, as the first few minutes are crucial for the final outcome. Surgeons should follow the general management plan — Resuscitation, Review and then Repair. The Advanced Trauma Life Support (ATLS) guidelines should be adhered to, while treating all cases of suspected head injury.

By improving our system with better reporting and documentation of cases, we will be able to make a better plan to decrease the incidence of TBI and their timely appropriate multimodality approaches to achieve better outcome of these cases within our limited resources.

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Fig.1 CT of the brain showing bifrontal contusion

Fig.2 CT showinga crescent shaped hyperdense collection on right fronto parietal area - acute subdural haematoma with depressed fracture with mass effect

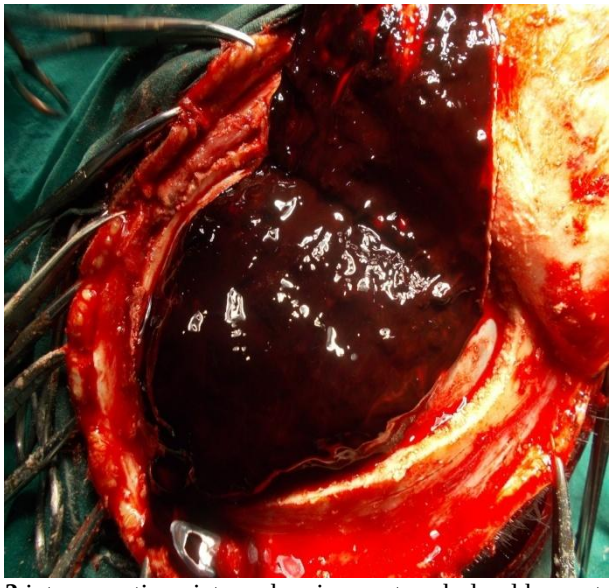

Fig.3 intraoperative picture showing acute sub dural haematoma

Fig. 4 CT showing left parietal bi-convex hyperdense area adjacent the vault - extra dural haematoma

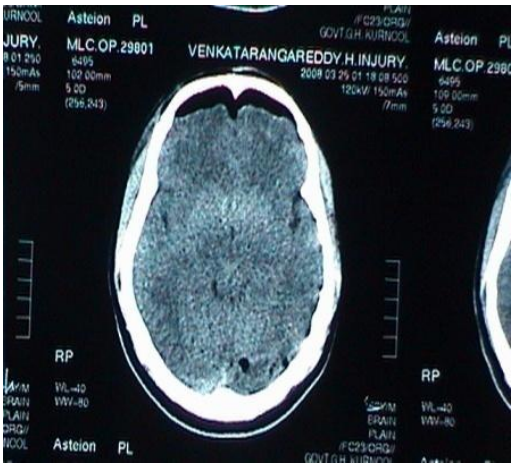

Fig.5 CT showing bifrontal pneumocephalus

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