

Clinicopathological features, imaging and outcome in patients with traumatic brain injury-A 1 Year Study at Tertiary Health Care Centre

¹Dr. Neelima Arora, Associate Professor, Department of Pathology, Sardar Patel Medical College, Bikaner

²Dr. Kapil Pareek, Associate Professor, Department of Neurosurgery, Sardar Patel Medical College, Bikaner

³Dr. Dinesh Sodhi, Professor, Department of Neurosurgery, Sardar Patel Medical College, Bikaner

Corresponding Author: Dr. Dinesh Sodhi, Professor, Department of Neurosurgery, Sardar Patel Medical College, Bikaner

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Abstract

Traumatic Brain Injury (TBI) is an injury to the brain caused by an external force. TBI is a form of acquired brain injury which occurs when a sudden trauma causes damage to the brain tissue. Brain function is temporarily or permanently impaired.

This prospective observational study was conducted in the Neurosurgery Department at Trauma Centre , in the tertiary care teaching hospital, Bikaner, Rajasthan during the study period of first January to 31st December 2020.1655 cases were included in the study It was observed that extradural hematoma was the commonest TBI. The outcome was favorable in 75% of the patients.

Keywords, TBI: Traumatic Brain Injury, EDH: Extradural Hematoma, SDH: Subdural Hematoma, GCS: Glasgow Coma Scale

Introduction

Traumatic Brain Injury (TBI) is a disruption in the normal function of the brain that can be caused by a

blow, bump or jolt to the head, the head suddenly and violently hitting an object or when an object pierces the skull and enters brain tissue. Observing one of the following clinical signs constitutes alteration in the normal brain function:¹

- Loss of or decreased consciousness
- Loss of memory for events before or after the event (amnesia)
- Focal neurological deficits such as muscle weakness, loss of vision, change in speech
- Alteration in mental state such as disorientation, slow thinking or difficulty in concentrating.

Types of traumatic brain injuries²

- Concussion is a mild head injury that can cause a brief loss of consciousness and usually does not cause permanent brain injury.
- Contusion is a bruise to a specific area of the brain caused by an impact to the head; also called coup or contrecoup injuries. In coup injuries, the brain is

injured directly under the area of impact, while in contrecoup injuries it is injured on the side opposite the impact.

- Diffuse axonal injury (DAI) is shearing and stretching of the nerve cells at the cellular level. It occurs when the brain quickly moves back and forth inside the skull, tearing and damaging the nerve axons. Axons connect one nerve cell to another throughout the brain, like telephone wires. Widespread axonal injury disrupts the brain's normal transmission of information and can result in substantial changes in a person's wakefulness.
- Traumatic Subarachnoid Hemorrhage (tSAH) is bleeding into the space that surrounds the brain. This space is normally filled with cerebrospinal fluid (CSF), which acts as a floating cushion to protect the brain. Traumatic SAH occurs when small arteries tear during the initial injury. The blood spreads over the surface of the brain causing widespread effects.
- Hematoma is a blood clot that forms when a blood vessel ruptures. Blood that escapes the normal bloodstream starts to thicken and clot. Clotting is the body's natural way to stop the bleeding. A hematoma may be small or it may grow large and compress the brain. Symptoms vary depending on the location of the clot. A clot that forms between the skull and the dural lining of the brain is called an epidural hematoma. A clot that forms between the brain and the dura is called a subdural hematoma. A clot that forms deep within the brain tissue itself is called an intracerebral hematoma. Over time the body reabsorbs the clot. Sometimes surgery is performed to remove large clots.

Symptoms of a TBI can be mild, moderate or severe, depending on the extent of damage to the brain. Mild

cases may result in a brief change in mental state or consciousness. Severe cases may result in extended periods of unconsciousness, coma, or even death³.

The present study was designed to study the Clinicopathological, characteristics, imaging and in-hospital outcome in patients presenting with TBI.

Material and Methods

A prospective, observational study was conducted at Neurosurgery Department, Trauma Centre, P B M Hospital, Bikaner. All patients with TBI who presented to the trauma centre of P.B.M. Hospital and Associated Group of Hospitals, Bikaner, Rajasthan during the study period of Jan 2020 to Dec 2020. Total Number of 1655 were included in the study.

After receiving the patients in trauma center, all patients were immediately taken to resuscitation room. Thorough primary and secondary survey was done in all study patients. All the necessary haematological and radiological investigations required for the patient as per the institute protocol were done and results were noted. After initial stabilisation and observation in trauma centre, all the study patients were shifted to neurosurgery unit as per protocol.

Based on clinical features and investigation findings, all patients were managed either medically or surgically as per the standard institute protocol. All the patients were followed-up until discharge from hospital or in-hospital death.

The following parameters were recorded from all the patients: age, gender, mechanism of injury, presenting features, influence of alcohol, initial Glasgow Coma Scale (GCS) score, imaging findings, Rotterdam computed tomography (CT) score, mode of management, Glasgow Outcome Score (GOS), outcomes-either discharge from the hospital or in-

hospital death and the duration of hospital stay.

Statistical analysis

Data were recorded on a pre-designed structured proforma and managed using Microsoft Excel 2007. Descriptive statistical data were presented as mean ± standard deviation for continuous variables and as percentages for categorical variables.

Results

Table 1: Age wise distribution of TBI

Age Range (years)	No. of cases	Percentage
0-10	202	12.20
11-20	233	14.07
21-30	501	30.27
31-40	299	18.06
41-50	194	11.72
51-60	104	6.28
>60	122	7.37
Total	1655	100.00

1655 patients were included in the study . The majority of TBIs were in the age group of 21–30 years (30.27%), followed by 31–40 years (18.06%) and 11–20 years (14.07%).

Table 2: Sex wise distribution of TBI

No of cases	Male	Percentage	Female	Percentage
1655	1283	77.5	372	22.5

In the present study 77.5 % patients were male and 22.5 % were female .

Table 3: GCS score wise distribution of patients

GCS score	No of cases	Percentage
Mild (GCS 13-15)	900	55
Moderate (GCS 9-12)	338	20
Severe (GCS 3-8)	417	25
Total	1655	100.00

In the present study, patients were classified by GCS as mild TBI in 900 cases (55.00%) ; moderate in 338 cases (20.00%) and severe in 417 (25.%) patients.

Table 4: CT findings wise distribution of TBI

CT findings	No of cases	Percentage
EDH	742	44.8
Acute SDH	402	24.3
Contusion	477	28.9
ICH	15	0.9
Chronic SDH	19	1.1
Total	1655	100

Regarding CT findings, EDH was the most common finding (44.8%) followed by contusion (28.9 %) and acute SDH (24.3%).

Tables 5: Showing the operative procedures

Type of TBI	No of cases	Type of surgery
EDH with or without fracture	11	Craiotomy with suction and evacuation of EDH
Acute SDH	15	Craniotomy with suction and evacuation of SDH
Contusion	5	Craniotomy with suction and evacuation of contusion
ICH	5	Craniotomy with suction and evacuation of ICH
Chronic SDH	19	Burr hole with suction and evacuation of chronic SDH
Total	55	

In this study out of the 1655 cases 1600 cases were managed conservatively and 55 cases underwent surgical intervention. The operative cases included 11 patients of EDH with or without fractures, 15 cases of acute SDH, 5 cases of contusion, 5 cases of ICH and 19 cases of chronic SDH. The mortality rate was 25% in the present study and 75% of the patients were discharged after treatment from the neurosurgery department.

Discussion

India being one of the developing nations in the world with a high population density, the road traffic accidents are showing increasing trend. About 10% of worldwide road traffic accident fatalities have been accounted to India. Head injury is defined as 'a morbid state, produced by mechanical forces resulting in gross or subtle structural changes in the scalp, skull and/or the contents of the skull'.⁴ Till date, TBI remains the leading cause of death and severe disability in young adults which contributes to significant traumatic mortality and morbidity.⁵ In a large study of patients involved in trauma, it was found that the presence of head injury resulted in a 1.5 times increase in death when compared with mortality due to other injuries.⁶

In our study EDH was the commonest CT finding (44.8%) followed by contusion (28.9%). Contusion are the common findings in some studies.^{7,8}

In the present study, patients were classified by GCS as mild TBI in 900 (55.00%) patients; moderate in 338 (20.00%) and severe in 417 (25.0%) patients. In this study out of 1655 patients, 1600 patients were managed conservatively while 55 patients were managed surgically.

Conclusion

It was concluded that level of consciousness, pupillary changes, abnormal motor response and Glasgow

coma scale are important factors not only to indicate the seriousness of TBI but also to assess the patients as a whole to determine the management, progress and outcome of the patients. TBI was commonest in the 21-30 yrs age group and males were significantly more affected than the females. EDH was the most commonly observed type of traumatic brain injury.

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