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Prognostic factors in severe head injury: A Clinico radiological study

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Abstract
Background: Traumatic Brain injuries (TBI) are a real social problem with an upward trend worldwide. For these reason prognostic factors in head injury are of major importance to all surgeons who treat patients with severe head injury especially for countries like India for better targeting of limited health care resources and implementation of specific methods of treatment to patients and to determine the incidence of age, sex, distribution, etiological factors, clinical presentation, neurologically assessment and mode of head injuries with particular reference to severe head injury.
Methods: This study was conducted in the Neurosurgery unit of Surgery department of Index Medical College, Hospital & Research Centre, Indore from Jan 2016 to Jun 2017. In this study 150 patients of severe head injury were included These patients were evaluated for the severity of the head injury (GCS), clinical presentation, X-rays, C T scan/MRI, early complication (Hypoxia and Hypotension) and Post traumatic seizures.
Result: In all 150 patients with severe head injury were identified shows that road traffic accident is the main cause of head injury in majority of cases with male preponderance. Incidence of head injury due to fall from height was nearly equal in both sex. It was found that maximum number of head injury patients belonged to the age group of 21-40 years (78%) in male. Maximum number of head injury was caused due to road traffic accidents (72%).
Conclusion: Males are more prone to head injury due to road traffic accident with maximum in two – wheeler accidents as most of the patients were not wearing helmets. CSF otorrhoea was more common than CSF rhinorrhoea. Extradural hematoma was more common in tempero-parietal region and Coup injuries were more common than contre coup injuries. Types of trauma and brain lesion, hypoxia and hypotension, hyperglycemia and early post traumatic seizures are the important prognostic factors.

Keywords: Prognostic, severe head injury, CT scan & radiological

Introduction
Injury has been defined as any harm whatever illegally caused to any person in body, mind, reputation or property, vide section 44 Indian Penal Code (Mallick) [1]. Head Injury (HI) is the lesion or dysfunction of cranium, meninges and/or brain caused by any external mechanical force (Bordignon and Arruda, 2002) [2]. In a rapidly developing country led to the increased incidence of road traffic accidents (RTA) which is one of the leading causes of HI accounting for upto 60% of the total cases (Amanda *et al*., 2014). The other causes include fall from height - at work or home, sports injuries, physical assault etc (Amanda *et al*., 2014). HI imposes a huge socio-economic burden in terms of unfortunate deaths, injuries and loss of potential income. The negative impact is felt not only by the person suffering from HI but also on the relatives & the economy. The Glasgow coma scale is a standardized measurement of coma which numerically rates the response of eye opening, verbal response and motor response of the patients with head injury.
Prediction of outcome of severe head injury should be based upon GCS evaluation, brain stem reflexes, Type of CNS lesion, papillary response, eye movements, motor posturing and presence of increased intra cranial pressure. Patients with focal brain lesion especially acute subdural haematoma have a higher mortality, raised ICP indicates unfavorable outcome.
Decision regarding surgical and Medical management of patients with severe head injury should be based upon these prognostic factors.
Traumatic brain injury (TBI) is a non-degenerative, non-congenital insult to the brain from an external mechanical force, perhaps foremost to permanent or temporary impairment of cognitive,

physical and psychological functions with an associated diminished or changed state of consciousness.

Trauma is the most vital origin of fatality in people from 1st year to 44 years of life. It is the main determinant of morbidity, disability & mortality in this group [3]. Severe TBI is related with 30 to 70% mortality rate [4] & recovery of survivors is marked by severe neurological sequels therefore impairing quality of life [5].

Material & Method

To determine the incidence of age, sex, distribution, etiological factors, clinical presentation, neurologically assessment and mode of head injuries with particular reference to severe head injury. This prospective study was carried out in the Index Medical College Hospital & Research Centre, Indore in the patients of head injury who were admitted during Jan 2016 to Jun 2017. In this period 150 patients of severe head injury were identified and included in the study.

Inclusion criteria

1. Patients of all age groups &all sexes were included.
2. Patients of poly- trauma with head injury were included.
3. Those were having skull fractures & cases with intra-cranial air on CT were included.

Exclusion criteria

Those patients who refused investigations or were not available for a 6 month follow up were excluded.

All the details about patient's profile (Name. Age, Sex, Date of admission and discharge, Short history: mechanisms of injury, unconsciousness, vomiting, convulsions, ENT bleeds) was taken into account of patients of head injuries and examinations and investigations were conducted.

1. General examination

a. **External injury:** laceration, abrasion or contusion.
b. **Systemic injury:** long bone or pelvic fracture, maxillary or mandible fracture chest injury, abdominal visceral injury or spinal injury.

2. Clinical examination: Patients were assessed clinically in terms of:

a. Pupillary examination: size & reaction were noted.
b. Planter reflexes: flexor or extensor
c. Pulse & Blood pressure
d. Localizing sign: mono paresis, hemi paresis & quadric paresis or sign of any cranial nerve injury
e. Evaluation of discharge from ear & nose. (CSF otorrhoea/rhinorrhoea)

3. Radiological investigations: x- ray Skull- A.P./ Lateral view, CT scan/ MRI

4. Management: Conservative / Operative

5. Final outcome

Results

Table 1: Age and sex distribution of cases.

S. No.	Age Groups	Male (n=117)	Female (n=33)	Total (%)
1.	0-5	4	1	05(04%)
2.	6-10	5	3	08(05%)
3.	11-15	3	5	08(05%)
4.	16-20	13	2	15(10%)
5.	21-40	63	16	79(53%)
6.	41-60	16	3	19(13%)
7.	>60	13	3	16(10%)

The above table shows that road traffic accident is the main cause of head injury in majority of cases with male preponderance. Incidence of head injury due to fall from height was nearly equal in both sex. It was found that maximum number of head injury patients belonged to the age group of 21-40 years (78%) in male.

Table 2: Distribution of cases according to mode of injury.

S. No.	Mode of head injury	No of patients	Incidence (%)
1.	Road traffic accidents(RTA)	109	72%
2.	Fall from height	29	19%
3.	Non-fire arm assault	12	08%

Maximum number of head injury was caused due to road traffic accidents (72%).

Table 3: Relationship between mode of head injury and associated systemic injuries.

S. No.	Type of Injury	Mode of Injury	Fall from	Non-firearm
		Road traffic accident	height	Injury
1.	Long bone or pelvic fracture	54 (81%)	7 (10%)	6 (9%)
2.	Maxillary or mandibular fracture	12 (50.0%)	6 (25.0%)	6 (25.0%)
3.	Major chest injury	19 (75.0%)	8 (25.0%)	-
4.	Abdominal visceral injury	18 (100%)	-	-
5.	Spinal injury	6 (42.0%)	8 (58.0%)	-

Long bone or pelvic fracture was the most common associated injury 06 (9%) in these patients. Road traffic accident was the most common cause of associated systemic injury affecting the long bone or pelvis 54 (81%) followed by major chest injury and maxillary or mandibular fracture.

Discussion

As stated by Carey [6], the aim of surgery in open compound head injuries is to convert an open injury to a close injury by debriding the scalp and damaged brain, through removing the bone fragments & elevation of depressed fractures & dural repair either by using the existing adjacent dura or by grafting. Wylen and Nanda [7] in a series of 52 patients of depressed skull fracture & conceded out elevation & repair within 72 hours in 32 cases with good results.

Ommaya *et al*. [8] observed that maximum number of post-traumatic CSF leakage, i.e. CSF rhinorrhoea and CSF otorrhoea will cease within one week with conservative treatment. Current study, conventional treatment was given to all cases of CSF rhinorrhoea and CSF otorrhoea and all cases of CSF rhinorrhoea stopped within one week which was similar to the study of Ommaya (1977) [8], which stated that maximum number of CSF rhinorrhoea will stop within one week.

TBI are more common in males then females increasing age was

associated with worse outcome [9, 10, 11] other author also state that the association was apparent after the age of 40 [12] and especially above 60 [13] there is strong evidence for the prognostic value of GCS on admission in the hospital and lower GCS motor scores were associated worse outcome [14, 15]. The absence of or abnormal papillary reaction also have worse outcome in TBI [16].

Computerized tomography (CT) scanning provide structural damage to the brain and associated outcome following TBI. The most common classification used after TBI was the Marshall classification with was proposed in 1991 by Marshall *et al*. [17].

The prognosis in patients with mass effect was better in patients with EDH and poor for patients with acute SDH [18]. Also the mid-line shift and increasing size of shift was associated poor outcome. Hypotension and hypoxia following TBI were associated with adverse outcome [19, 20] Hyperglycaemia and anemia which is common problem in critically ill patients is associated with poor outcome in TBI [21].

Conclusion

Males are more likely to have head injury due to road traffic accident with maximum in two-wheeler accidents as most of the patients were not wearing safeguards. CSF otorrhoea was more familiar than CSF rhinorrhoes. Extradural hematoma was more widespread in tempero-periental region & Coup injuries were more familiar than contre coup injuries.

Different prognostic factors age, GCS, pupil response, Marshall CT classification and traumatic SAH are important prognoses factors. Other important prognosis factors included hypotension, hypoxia, anemia, hyperglycemia and mid-line shift.

Various Advantage of reducing pressure by decompressive craniotomy with duraplasty. Early and aggressive management always gives good results.

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