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A STUDY OF ANALYSIS OF FACTORS AFFECTING OUTCOMES IN CASES OF HEAD INJURIES

General Surgery

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ABSTRACT

Outcome prediction after severe head injury is of great clinical importance especially for countries like India for better targeting of limited healthcare resources. This study was undertaken to evaluate various factors as predictors of outcome in severe head injury. The management of severe head injury patients demands the dedication of expensive but limited intensive care resources for considerable length of time. In spite of these efforts, mortality and long-term morbidity remains high. In all reported series of significant number of patients, a mortality rate of the order 30 to 40% was seen. [1] Outcome prediction after severe head injury continues to be an area of intense interest. In part, this reflects the natural curiosity of the neurosurgeon, but as an increasing attention is paid to resource allocation in all societies, our ability or inability to accurately predict outcome becomes very important for targeting of scarce resources.

KEYWORDS

Head injury, Predictors, GCS, GOS, Trauma.

INTRODUCTION

India comprises 29 states and 7 union territories. It is second most populous country in the world with estimated population of 1.27 billion during 2014-2015. Traumatic brain injury is a major public health problem in India. The increase in economic growth in India coupled with rise in population, motorization and industrialization has contributed to a significant increase in TBI with each advancing year. TBI results in deaths, injuries and disabilities in all age groups but more in young and productive persons and higher in males than females. National level data in India is not available for TBI as in many other developed countries. An epidemiological study in Bangalore indicates that the incidence, mortality and case fatality rates were 150/100000, 20/100000 and 10% respectively. The most common cause of TBI normally reported in our country are road traffic accidents (RTA) accounting for 60%, followed by falls and assaults contributing to 25% and 10% of traumatic brain injuries respectively. The economic losses to India due to TBIs are phenomenal, though unmeasured.

However, despite the increase in TBI burden, research as evidenced by publications in scientific journals pertaining to TBI is grossly inadequate in India. There are no studies in India that have evaluated the publishing strength of medical departments and institutes and the number of articles published by researchers from related disciplines and the scientific impact of these articles. The purpose of our study is to understand the scientific contribution of India in published research of TBI.

MATERIALS AND METHODOLOGY

This study is based on the prospective analysis of 107 patients with the Traumatic Brain Injury hospitalised in the Emergency Department of General Surgery, B J Medical College, Civil Hospital, Ahmedabad between Oct 2017 to Oct 2018.

After initial resuscitation they were evaluated and investigated. CT scan was done in all patients and if any significant operable lesion was found, they were transferred to Department of Neurosurgery and operated upon immediately. Other patients were managed conservatively using ventilatory support, anti convulsants, ICP monitoring, anti-oedema drugs. Clinical outcome was evaluated at the time of discharge and at one month according to Glasgow outcome score: Grade I (death), Grade II (vegetative), Grade III (mostly dependant), Grade IV (minimally dependant) and Grade V (good recovery) GOS of I to III was considered as unfavourable outcome and GOS of IV, V was considered as favourable outcome for statistical analysis, shown in *Table no: 5.*

Table: 1

Glasgow Outcome Score		
Good recovery	V	Favourable Outcome(FO)
Moderate disability	IV	
Severe disability	III	Unfavourable Outcome(UO
Persistent vegetative state	II	
Dead	I	

Study Type: Prospective Longitudinal Observational Study

Study Strength: 107 Patients

Study Duration: 12 Months (1 Oct 2017 to 30 Sept 2018)

SUBJECT SELECTION:

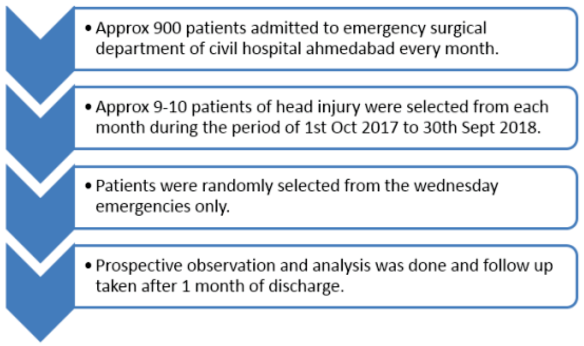
- **Inclusion Criteria**

1. Patients of head injury came to Emergency Surgical Department of Civil hospital Ahmedabad and admitted during the period of 1st October 2017 to 30th September 2018.
2. Age >12 Years
3. Patient having solitary Head Injury and no other Organ Systems involved
4. Patient directly came to our institute after trauma and not having taken primary care at anywhere else.

- **Exclusion criteria**

1. Pregnant women.
2. Patients with associated severe chest Trauma & Blunt Abdominal Trauma.
3. Patients having multiple long bone fractures and having severe orthopaedic trauma were excluded.
4. Age <12 years
5. Patients leave against medical advice which prevents follow up of them.
6. Patients who were treated on OPD basis.

Study Design:



RESULTS

During this twelve-month study period, 107 consecutive patients of head injury were enrolled in this study. Following parameters were observed and analysed.

Table: 1 Epidemiological Prognostic Factors in Head Injuries

Prognostic Factors	Sub-group	No. of Patients		Glasgow I	II	III	IV	V	% of UO	P Value
Age	12 – 20	20	19%	1	-	2	6	11	15	0.005
	21 – 40	43	40%	7	3	2	9	22	30	
	41 – 60	29	27%	6	-	3	8	12	31	
	>60	15	14%	6	1	2	3	3	60	
Sex	Male	87	81%	16	4	6	17	44	30	0.041
	Female	20	19%	4	-	3	9	4	35	
Mode of Injury	RTA	77	72%	16	1	6	18	36	30	0.507
	Fall	17	16%	3	2	1	5	6	35	
	Assault	13	12%	1	1	2	3	6	30	
H/O Alcohol	Present	11	10%	3	1	1	3	3	45	0.677
	Absent	96	90%	17	3	8	23	45	29	
Time of Presentation	<8 hours	79	74%	13	1	6	18	41	25	0.047
	>8 hours	28	26%	7	3	3	8	7	46	

Table: 2 The influence of various clinical factors on neurological outcome

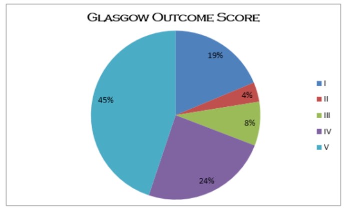
Pr ognostic Factor	Sub-group	No. of Patients		Glasgow Outcome Score I	III	II	IV	V	% of UO	P value
H/O LOC	Absent	29	27%	2	-	3	8	16	17%	0.052
	<15 Minutes	55	51%	10	3	4	12	26	31%	
	>15 Minutes	23	22%	8	1	2	6	6	48%	
H/O Vomiting	Absent	64	60%	10	2	5	15	32	27%	0.732
	Present	43	40%	10	2	4	11	16	37%	
H/O convulsions	Absent	79	73%	12	1	6	20	40	24%	0.048
	Present	28	27%	8	3	3	6	8	50%	
H/O ENT Bleed	Absent	54	50%	11	1	5	12	25	31%	0.819
	Present	53	50%	9	3	4	14	23	30%	
Hypotension	Absent	83	77%	14	3	7	17	42	29%	0.229
	Present	24	23%	6	1	2	9	6	38%	
Hypoxia	Absent	75	70%	9	1	6	21	38	21%	0.001
	Present	32	30%	11	3	3	5	10	53%	
GCS	14 or 15	32	30%	1	-	4	6	21	16%	0.016
	9 – 13	48	45%	9	2	4	15	18	31%	
	3 – 8	27	26%	10	2	1	5	9	48%	
Pupillary Reflex	Normal	61	57%	7	1	4	19	30	20%	0.02
	Both dilated	33	31%	10	1	3	7	12	42%	
	Anisocoria	13	12%	3	2	2	-	6	54%	
Treatment	Operative	22	21%	5	1	3	5	7	41%	0.682
	Conservative	85	79%	15	3	6	21	41	28%	

Table 3: The influence of various CT Brain Findings on neurological outcome

Prognostic Factor	Sub-group	Patients No.	%	Glasgow Outcome Score I	II	III	IV	V	% of UO	P Value
Midline Shift	Absent	68	64%	8	3	3	18	36	21%	0.004
	<5 mm	25	23%	6	-	2	7	10	32%	
	>5 mm	14	13%	6	1	4	1	2	79%	
EDH	Absent	60	56%	9	3	5	12	31	28%	0.043
	<10 mm	38	36%	8	-	3	12	15	29%	
	>10 mm	9	8%	3	1	1	2	2	55.5%	
SDH	Absent	68	64%	8	4	3	17	36	22%	0.045
	<10 mm	32	30%	9	-	5	7	11	44%	
	>10 mm	7	6%	3	-	1	2	1	57.1%	
SAH	Absent	59	55%	11	3	5	11	29	32%	0.572
	Present	48	45%	9	1	4	15	19	30%	
HC	Absent	43	40%	7	3	3	14	16	30%	0.251
	Present	64	60%	13	1	6	12	32	31%	
Pneumocranium	Absent	80	75%	10	4	4	21	41	23%	0.003
	Present	27	25%	10	-	5	5	7	55%	
Depressed #	Absent	91	85%	15	2	7	25	42	32%	0.05
	Present	16	15%	5	2	2	1	6	56%	
DAI	Absent	98	95%	18	-	9	25	46	28%	0.007
	Present	9	5%	2	4	-	1	2	67%	

The prevalence of various outcomes at the one month follow up is depicted in *chart no 1.*

CHART NO. 1



48 patients out of 107 have good recovery from the head injury after the 1 month and they can fit to their social and vocational place before the injury, 26 patients having moderate disability but they can do daily routine activities by themselves and partially fit to their role before injury. That means 74 patients have favourable outcome. 20 patients become dead within one month of injury and 4 and 9 patients fall into GOS II and III respectively. So, 33 patients have unfavourable outcome.

SUMMARY

- Majority of patients of head injury came to civil hospital were young males. And outcomes worsen as the age advances in cases of head injury.
- Road traffic accident was commonest mode of severe head injury. Outcomes were independent of mode of trauma.
- History of alcohol intake presents or not, it has no role in the outcomes in head injury. Though there is more chances of trauma after alcohol ingestion.
- Large number of patients came to an emergency department within 8 hour of injury, and they have more favourable outcome compare to those who came late.
- History of loss of consciousness has significant association with the outcomes. As time of LOC increases chances of unfavourable outcome increases.
- History of vomiting and ENT bleed has not significant association with the outcomes.
- Patients presented with convulsions have poor outcomes.
- In our study, Hypotension at presentation has no role in outcomes.
- Unfavourable outcome is more common in patients of head injury presented with hypoxia.
- As GCS score is decreases chances of unfavourable outcome are increases.
- Pupillary reflex has a significant association with the outcomes, patients with normal reflex have more chances of favourable outcome, both pupil dilated poor outcome and in anisocoria very poor outcomes.
- Treatment weather surgical or conservative has no significant association with the outcomes.
- In Ct Brain findings, very less number of patients having midline shift, but it was strongly associated with unfavourable outcomes.
- Unfavourable outcomes have linear relationship with the size of the EDH and SDH
- In my study SAH has no significant association with the outcomes.
- Though haemorrhagic contusion larger in size definitely leads the patient to unfavourable outcomes, in my study HC have no association with the outcomes.
- Chances of unfavourable outcomes are more with the patients having CT Brain findings suggestive of Pneumocranium.
- Depressed fracture of skull leads patient towards the unfavourable outcomes.
- Diffuse axonal injury has a significant association with the unfavourable outcomes in patients of head injury.

Thus, predicting outcome following traumatic severe head injury is an assimilative and integrative process of various pre-injury, injury and post-injury variables.

CONCLUSIONS & RECOMMENDATIONS

- The majority of patients were young males with RTA so, It can be concluded from this study that strict enforcement of traffic rules in young generation can help us to save life by reducing the incidence of head injury.
- As early patients presents to emergency surgical services outcomes go more towards favourable, this study helps us to allocate the areas where emergency medical transportation and referral services are poor and recommends bringing it at optimum level.
- Advance age, H/O LOC, H/O convulsions, hypoxia, low GCS and

papillary reflex are the epidemiological and clinical factors which affects the outcomes in cases of head injury. Hypoxia should be avoided on an absolute basis.
- Midline shift, EDH, SDH, Pneumocranium, Depressed fracture and diffuse axonal injury are the CT Brain findings which affects the outcomes of Head Injury patients.

This study increases our ability to accurately predict the outcomes in cases of head injury and thus to identify the right candidate to utilize limited resources in our institution.

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