A PROSPECTIVE CONSECUTIVE OBSERVATIONAL STUDY OF MODERATE AND SEVERE TRAUMATIC BRAIN INJURY IN MAHARAJA YASHWANTRAO HOSPITAL, INDORE

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ABSTRACT

BACKGROUND

Traumatic brain injury is a major public health problem in India resulting in deaths, injuries and disabilities of young and productive people of our society. With increasing pace of growth, urbanization, motorization, India is going to witness an alarming epidemic of trauma victims in near future**.** Growing incidence of trauma in MP is a national concern at present. It was observed that approx. 50% of total head injury cases fell in the category of moderate or severe head injury.

The objectives of this study were- 1. to prospectively evaluate the patients of moderate and severe traumatic brain injury, admitted in Department of Surgery, Maharaja Yashwantrao Hospital, Indore, during the one-year study period (March 2015-March 2016). 2. analysis of pattern of injuries, their cause and contributing factors like alcohol and outcome in terms of hospital stay and mortality.

MATERIALS AND METHODS

This prospective study was conducted at Maharaja Yashwant Rao Hospital, Indore during the period of one year from March 2015 till March 2016. All consecutive patients of moderate and severe traumatic brain injury (GCS <12/15) admitted at Department of Surgery, Maharaja Yashwantrao Hospital, Indore were enrolled for this study.

RESULTS

A total of 490 cases were enrolled as per the inclusion criteria, of which 242 patients had a GCS Score of 9/15 (moderate head injury), and 248 patients with GCS score of less than 8/15 (severe head injury). The average male: female ratio was 3.9:1. Road traffic accident was the single most important cause in all age groups. More than 20% patients had other significant injuries of which lower limb fractures was the most common. Less than 32% patients required neurosurgical intervention on emergency basis.

CONCLUSION

The study witnessed a rising no of cases with moderate & severe head injury cases with GCS <13/15. No seasonal variations were seen. Road accident is major cause in all ages with male preponderance of more than three times. Most affected age is 21-50 years. Alcohol consumption is seen in >31% cases. Despite optimum management, a mortality of more than 27% was observed.

KEYWORDS

Road traffic Accidents, M.Y.H. Indore, Head Injury, Alcohol and Head Injury, Traumatic Brain Injury.

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BACKGROUND

Maharaja Yashwantrao Hospital, Indore (M.P.), is a multispecialty 1200 bedded hospital in public sector, established in 1955. It is attached to a teaching college for MBBS and almost all postgraduate courses. It is a tertiary health centre which caters the population of most of the state but also the adjacent areas of states of Gujarat, Rajasthan and Maharashtra. The nearest similar public sector tertiary centers are located not less than 200 km radius. This hospital alone holds the burden of Indore region, including 8 districts of the surrounding area. Everyday approximately 2000 patients visit the hospital. Total no of bed in surgery department are 157 excluding 16 beds in trauma ICU and 8 beds in surgical ICU. There is always a scarcity of life saving equipment like ventilators as is the scenario in almost all government run hospitals.

Growing incidence of trauma in MP is a national concern at present. Between Jan. 2011 to Dec. 2013 a total number of 24477 cases were admitted in surgery department.[1] Out of these 2822 were diagnosed as head injury cases.

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Retrospective study was done about the admission of TBI patients and their management in M.Y. Hospital Indore M.P., it was found that number of head injury admission in M.Y. Hospital increased consecutively during the period of three years. 793 in 2011, 901 in 2012 and 1128 in 2014.[1] It was observed that approx. 50% of total head injury cases fell in the category of moderate or severe head injury. Based on the above previous work it was decided to do a detailed study of the aetiology of head injury patients and study the burden of this epidemic on society and hospital resources in terms of days of hospitalization, morbidities and mortalities.

Aims and Objectives

1. To prospectively evaluate the patients of moderate and severe traumatic brain injury admitted at Department of Surgery at Maharaja Yashwantrao Hospital, Indore during the one year(March 2015 - March 2016)
2. Analysis pattern of injuries, their cause and contributing factors like alcohol and outcome in terms of hospital stay and mortality.

MATERIALS AND METHODS

This prospective study was conducted at Maharaja Yashwant Rao Hospital Indore during the period of one year from March 2015 till March 2016. All consecutive Patients of moderate and severe traumatic brain injury (GCS <12/15) admitted at Department of Surgery Maharaja Yashwantrao Hospital, Indore Were enrolled for this study. The patients who were brought dead or had a GCS of more than 13/15 were not included in this study. Similarly, due to restrains of manpower, those patients who were not admitted or transferred in department of surgery were not included in this study. The data was collected in tabulated excel sheet regarding various parameters like, patient age, sex, cause of injury, associated injuries in addition to head injury, consumption of alcohol, surgical or medical treatment given, days spent in ICU or ventilator, outcome at the time of discharge, etc. outcome was assessed on simple scale of GCS 15/15, less than 15/15 or death at the time of discharge.

RESULTS

Year	Aetiology					Total
	RTA	Fall From Height	Assault	Animal Related Injury	Others#	
Mar-2015	27	5	3	0	7	42
Apr-2015	28	3	3	1	2	37
May-2015	27	4	4	1	1	37
Jun-2015	29	3	2	1	2	37
Jul-2015	27	2	3	0	5	37
Aug-2015	33	3	4	1	1	42
Sept. 2015	32	5	2	0	3	42
Oct. 2015	32	5	4	0	1	42
Nov. 2015	31	7	3	1	0	42
Dec. 2015	28	5	5	0	4	42
Jan-2016	25	2	1	0	2	30
Feb. 2016	24	1	2	1	2	30
Mar-2016	22	3	3	0	2	30
Total	**365**	**48**	**39**	**06**	**32**	**490**

Table 1. Month Wise Distribution of Head Injury Cases and Their Aetiology

- 74.5% of all cases were victims of road accident.

#others – proper details of injury cannot be obtained as in unknown patients, train accidents, sports injury, etc.,

Age Group (years)	Male (Total= 390)	Female (Total=100)	M/F Ratio 3.9
0-10	26	9	2.8
11-20	47	8	5.87
21-30	120	11	10.9
31-40	81	19	4.26
41-50	62	30	2.06
51-60	33	15	2.2
>60	21	8	2.62

Table 2. Age and Sex Distribution

Age Group	RTA	Fall From Height	Assault	Animal Injury	Other	Total
0-10	22	9	2	0	2	35
11-20	42	2	4	2	5	55
21-30	91	14	14	1	11	131
31-40	80	9	4	2	5	100
41-50	71	8	9	0	4	92
51-60	39	0	5	0	4	48
>60	20	6	1	1	1	29

Table 3. Causes of Head Injury in Different Age Groups

Time Interval	Cases (N=490)	Percentage (%)
< 12 Hours	402	82.2
12-24	28	5.6
> 24 hours	60	12.2

Table 4.Time Interval between Injury and Admission

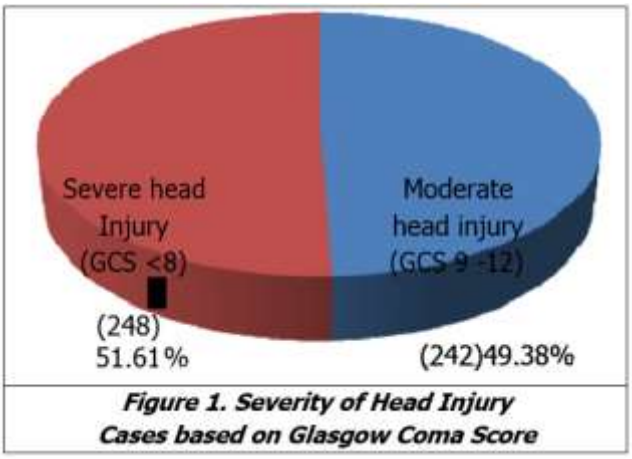

Figure 1. Severity of Head Injury Cases based on Glasgow Coma Score

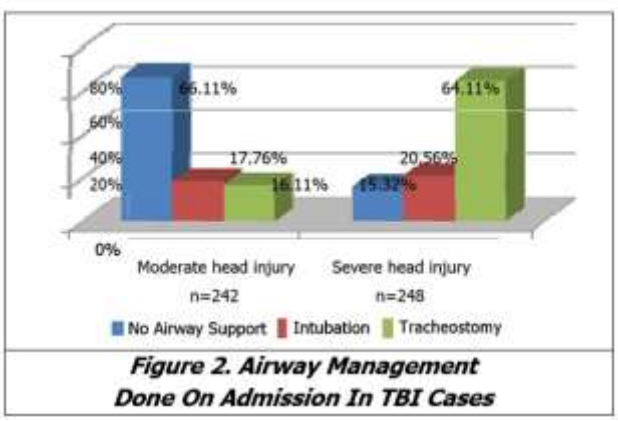

Figure 2. Airway Management Done On Admission In TBI Cases

	Moderate	Severe
Cases Directly Admitted	102	105
Cases Referred	140	143
% of Cases Reaching by Referral	57.85%	57.66%

Table 5. Distribution of Cases Admitted Directly or Referred from Other Hospitals According to Glasgow Coma Score

Alcohol Intake Prior to Trauma	Moderate (242)	Severe (248)
156(31.83%)	63(26.033)	93(37.5%)

Table 6. Presence of Alcohol in Head Injury Patients at The Time of Admission

	Moderate (242)	Severe (248)	Total (490)
Conservative	171(70.66%)	163(65.73%)	334(68.16%)
Surgery	71(29.34%)	85(34.27%)	156(31.83%)

Table 7. Relationship of GCS Score and Neurosurgical Intervention

Head Injury	Face	Spine	Chest	Abdomen	Upper Limb	Lower Limb	Polytrauma	Total
Moderate GCS 9-12	10	03	08	01	01	19	01	43
Severe GCS < 8	12	04	14	05	03	11	10	59
% of total 490	22(4.5%)	07(1.4%)	22(4.5%)	06(1.2%)	04(0.8%)	30(6.1%)	11(2.2%)	102(20.81%)

Table 8. Additional Injuries in Addition to Head Injuries

RESULTS

The mean value of hospital stay (Days) of moderate head injury patient was 7.37 days vs a mean stay of 9.2702 days for those who had severe head injury.

Moderate Head Injury				Severe Head injury		
n=242				n=248		
Outcome	No Airway Support	Intubation n=43	Tracheostomy n=39	No Airway Support	Intubation n=51	Tracheostomy n=159
n=160				n=38		
Good GCS than at Admission	88	22	27	11	30	123
	55%	51.16%	69.23%	28.94%	58.82%	77.35%
137/242= 56.61%				**164/248=66.12%**		
Poor GCS than at Admission	8	9	8	3	3	11
	5%	20.93%	20.51%	7.89%	5.88%	6.91%
25/242=10.33%				**17/248=6.85%**		
Mortality	64	12	4	24	18	25
	40%	27.90%	10.25%	63.15%	35.29%	15.72%
	80/242=33.05%			**67/248=27.01%**		

Table 9. Outcome (Morbidity and Mortality Data) According to GCS at The Time of Discharge

DISCUSSION

Traumatic brain injury is currently the leading cause of death and disability in high income countries and is predicted to be the major cause of death and disability worldwide by the year 2020[2] Road traffic accident is the single largest cause all over the world. At the global level, it is estimated that the annual incidence Traumatic Brain Injuries (TBIs) is 200 per 1,00,000 per year and mortality is 20 per 1,00,000 per year.[1] In India nearly 6 million individuals sustained TBI annually.[3]

It is estimated that the total cost of road traffic injuries alone is about 3% of GDP in India.[2] The epidemiological study undertaken in Bangalore has revealed that the incidence was 150/1, 00, 000, mortality rate was 20/1,00,000 and case fatality rate was 10%, respectively.[4,5,6]

Maharaja Yashwantrao Hospital, Indore (M.P.), is a multispecialty 1200 bedded hospital in public sector, established in 1955. It is a tertiary health centre which caters the population of most of the state but also the adjacent areas of states of Gujarat, Rajasthan and Maharashtra. The nearest similar public sector tertiary centres are located not less than 200 km radius. This hospital alone holds the burden of Indore region, including 8 districts of the surrounding area. Everyday approximately 2000 patients visit the hospital. There is always a scarcity of life saving equipment like ventilators as is the scenario in almost all government run hospitals. Between Jan 2011 to Dec 2013 a total number of 24477 cases were admitted in surgery department. Out of these 2822 were diagnosed as head injury cases.

The recent neurosurgery workload is reflected in the following study from (2011 to 2013) of this institute.

Sr. No.	Cases	Year 2011	Year 2012	Year 2013
	n=1291	**n=390**	**n=416**	**n=485**
1.	Mild Head injury	194	205	241
	GCS 13-15	(49.7%)	(49.3)	(49.7%)
2.	Moderate Head	122	135	154
	Injury	(31.3%)	(32.5%)	(31.8%)
	GCS 9-12			
3.	Severe Head Injury	74	76	90
	GCS <8	(19%)	(18.2%)	(18.6%)

Table 10. Severity of Head Injury Cases Based on Glasgow Coma Score[1]

The severity of head Injury was classified based on the GCS Scoring system as devised by Teasdale et al.[7] It is clear that approx. 50% of total head injury cases fell in the category of moderate or severe head injury.

All the consecutive patients of head injury with GCS score of less than 13/15 admitted in surgery department over a period of one year were studied. This criteria was assumed based on the observation that all these patients are serious and definitely seek hospitalization as early as possible.

A total of 490 consecutive cases were recorded from March 2015 - February 2016. 242 cases (49.38%) got classified as moderate head injury with GCS score of 9-12 and remaining 248 cases (50.61%) as severe head injury cases with GCS score of 8 or less. As compared to previous data from this institute, the cases of moderate head injury admitted at M.Y. Hospital is steadily increasing from 122 in 2011 to 242 in 2015-16. Similarly the cases of severe head injury admitted has increased from 74 in 2011 to 248 in 2015-16.

A mean of 37.7 cases per month was observed and no variation was seen on monthly basis or with change of seasons. This is because of a mostly moderate and favourable climate throughout the year and also because the occupational activates and transportation is more or less same throughout the year.

The overall male /female ratio was 3.9 with maximal difference in the 3rd decade being 10.9. This is reflection of the male female ratio of the society in general and also mostly males are driving the vehicle or busy with outdoor activities.

In all age groups, road accident was the most common mechanism of injury, followed by fall from height and assault respectively. 74.5% of all cases were victims of road accident. There were no event of mass causality or suicidal cases during this study period. Other rare causes were fall from train or bullock cart, hit by animals on road or fields and sports related injury or fall at home. The peak incidence of injury occurred in 3rd decade followed by 4th and 5th decades. 65.9% of all cases were from the age of 21-50 years.

More than 82% of victims could reach hospital within 12 hours of injury. More than 57% of patients had received treatment at some hospital before being referred to M.Y. Hospital for necessary care. The cause for referral was mostly lack of adequate facilities including availability of neurosurgeon. Poor Financial condition was the other cause for referral.

An alarming no of 31.82% of victims/ attendants confessed the consumption of alcohol intake shortly before injury. More than 37% of severe head injury patients had consumed alcohol shortly before event. This highlight the strong correlation of drunken driving with moderate /severe head injury.

Less than 32% of all cases required neurosurgical intervention and majority were optimally managed with aggressive medical management. There was no apparent difference in the moderate or severe head injury groups with regard to need for neurosurgical intervention.

20.81% of all cases had associated major trauma to other body parts as well. Lower limb fracture was the most common injury (6.1%), with upper limb injury the less likely (0.8%). Spine injury was present in less than 1.4% of patients were as 2.2% patient had polytrauma.

33.87% of patient with moderate head injury and 35.88% of those with severe head injury required endotracheal intubation or tracheostomy at admission itself. Early tracheostomy was adopted as standard practice when

recovery was expected prolonged or patient was at risk of respiratory insufficiency or whenever ventilator support was not available.

The mortality due to various causes was 33.05% in moderate head injury group and 27.01% in severe head injury group. However this mortality data is based only during hospital stay. Most of the time after understanding the prognosis, many patient family member took the patient LAMA and their final fate remained unclear. In 56.6% of moderate head injury group and 66.12% of severe head injury group, the GCS score improved favourably before discharge.

CONCLUSION

Based on this prospective study, the following conclusions are drawn:

1. The cases of head injury admitted at M.Y. hospital is rapidly increasing since past 5 years. The increase is seen in serious head injury cases with GCS < 13/15.
2. There is no variation in the incidence in different months of year and road accident remains the most common mode of injury in all ages.
3. Most vulnerable population is males in the age group of 21-50 yrs.
4. Orthopaedic injuries are the commonly associated injuries especially fracture of lower limbs.
5. Alcohol consumption prior to trauma is seen in >31% of victims.
6. Though more than 55% patients show improvement with adequate medical and surgical treatment, a mortality of more than 27% was observed.

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