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TO INVESTIGATE THE FUNCTIONAL AND CLINICAL RESULTS OF PATIENTS TREATED AT NEUROSURGERY WHO HAVE SUFFERED TRAUMATIC BRAIN INJURY

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ABSTRACT

BACKGROUND: People who have suffered brain injuries have very high rehabilitation needs, and these needs are growing yearly. In order to lessen the incidence of traumatic brain injuries, India and other developing nations must address the significant difficulties of prevention, pre-hospital treatment, and rehabilitation in their quickly changing surroundings. Early identification of clinical and functional outcome variables would facilitate the implementation of suitable interventions aimed at enhancing functional status. Injury severity, together with other clinical criteria, can predict both the functional and clinical outcome.

MATERIAL & METHODS: All traumatic brain injury patients who visit the Medical College Hospital's Department of Neurosurgery are included in the study's population. A sample is a little section of the population that has been chosen for examination and study. The process of choosing a subset of the population to represent the complete population is known as sampling. At the time of hospital discharge, patients who had undergone treatment for traumatic brain injury at the neurosurgery department of the Medical College Hospital were recruited for the study.

RESULTS: Comparison of mean GCS Score (overall score) at admission was 12.495 at discharge 14.340 and after one year 14.876. This difference in scores/rank was found significant as per Friedman Test. Mean GCS eye opening at admission (3.216), discharge (3.893) and score at one year (4.00), GCS verbal response at admission (3.631), at discharge (4.631) and score at one year (4.953) and GCS motor response at admission (5.491), at discharge 5.918 and at one year (5.976) was found to be statistically significant ($p<0.001$).

CONCLUSION: While a single burr hole craniectomy and craniotomy were associated with a clinically significant improvement in the GCS score, this was not statistically significant in this investigation. While there is no discernible primary brain trauma seen in single burr hole craniectomy instances, primary brain damage will be more common in surgical intervention cases. It was discovered that those who had decompressive craniectomy had lower mean scores for all outcome variables, and this difference was statistically significant.

KEY WORDS: Brain Injury, Traumatic Brain Injury, Rehabilitation and Neurosurgery.

INTRODUCTION

More people die and become disabled worldwide from traumatic brain injury (TBI), which is now recognized as a silent pandemic of the modern era. Its impacts on the body, mind, emotions, and society are significant. The treatment of individuals with serious head injuries necessitates the long-term commitment of costly but scarce critical care resources. Despite these initiatives, there is still a high rate of death and chronic illness.[1]

A traumatic brain injury is a brain injury brought on by an unexpected trauma. It causes a wide spectrum of disabilities and produces a variety of symptoms. It affects the patient, the family, and society at large profoundly. It poses a significant global social, economic, and health issue. It is the primary cause of coma, the main contributor to trauma-related disability, and the main cause of brain injury in children and young people. More years of impairment are caused by it in India than by any other factor.[2]

The majority of severe traumatic brain injury (TBI) patients are reportedly discharged without making a full recovery, having their need for rehabilitation evaluated, or receiving the proper referral. A large number of these patients are not available for follow-up, making it challenging to compile data regarding their outcomes.[3]

When it comes to the patients who receive care at outpatient and rehabilitation centers following a head injury, the physicians and other caregivers have low expectations for their recovery. This eventually influences the result and is reflected in the patient's and family members' counseling. The majority of individuals on the treating team for TBI survivors have the mistaken belief that healing from trauma is finished after 12 months, despite ample evidence suggesting that delayed rehabilitation can yield notable functional outcomes even up to 15–20 years later.[4]

People who have suffered brain injuries have very high rehabilitation needs, and these needs are growing yearly. In order to lessen the incidence of traumatic brain injuries, India and other developing nations must address the significant difficulties of prevention, pre-hospital treatment, and rehabilitation in their quickly changing surroundings. Early identification of clinical and functional outcome variables would facilitate the implementation of suitable interventions aimed at enhancing functional status. Injury severity, together with other clinical criteria, can predict both the functional and clinical outcome.[5]

Outcome prediction after a serious brain injury is very important from a clinical standpoint, particularly in developing nations like India where there is a need to target scarce healthcare resources more effectively. The purpose of this study was to assess the one-year outcome of traumatic brain injury and identify the clinical and functional components that best predict recovery from the injury.[6]

MATERIAL AND METHODS

The entire group of the cases in which a researcher is interested is referred to as the population. It refers to the full group of people or things that share certain traits. All traumatic brain injury patients who visit the Medical College Hospital's Department of Neurosurgery are included in the study's population. A sample is a little section of the population that has been chosen for examination and study. The process of choosing a subset of the population to represent the complete population is known as sampling. At the time of hospital discharge, patients who had undergone treatment for traumatic brain injury at the neurosurgery department of the Medical College Hospital were recruited for the study. They provided the follow-up information when they visited the head injury clinic.

Inclusion criteria

- Patients aged > 13 years admitted with diagnosis of TBI and were alive and discharged.
- Patients who were willing to participate in the study.

Exclusion Criteria- The patient who had

- Age related cognitive / mobility problems.
- History of previous head injury.
- Associated neurological /psychiatric problems/significant alcohol or substance abuse.
- Expired during the follow-up period

Statistical Analysis

The data obtained from the participants were grouped and analyzed using appropriate statistical tests (SPSS version 16). Appropriate descriptive and inferential statistics were used based on the nature of distribution of data. Mean (SD) with minimum and maximum scores were given for all numerical data, both quantitative and ordinal for better understanding of the data. Ordinal variables (for example GCS) were not categorized because the number in poor scores (for example, GCS < 8) were less and majority were having the highest possible scores (for GCS, a score of 15). However, as all the outcome variables of the study are ordinal in nature non-parametric tests were used to test the hypothesis, not sacrificing the ordinal nature and the true attributes of the variable.

RESULT

Nine out of the estimated sample size of 100 TBI patients expired during the follow-up period and were excluded from the final analysis. The sample size for the follow-up study was 91.

Table 1: Distribution of study participants with TBI according to Socio demographic and clinical profile

Age Group	Frequency	Percent
20 or below	15	16.48
21-40	26	28.58
41-60	32	35.16
Above 60	18	19.78
Total	**91**	**100**

The above table shows that 35.16 % of the participants belonged to 41 - 60 year old, 28.58% were 21-40 year old, 19.78% belongs >60 years and only 16.48 % were ≤20 years of age.

Table 2: Distribution based on Mode of Trauma

Mode of Trauma	Frequency	Percent
RTA	72	79.12
Fall	09	9.89
Assault	06	6.59
Others	04	4.40
Total	**91**	**100**

Table 2 shows that 79.10% of patients had injury because of RTA, 9.89% had fall, 6.59% had assault and 4.40% had other modes of trauma (due to penetrating injuries and fall of objects on head).

Table 3: Distribution based on comorbidities

Co-Morbidities	Frequency	Percent
Hypertension	09	9.89
Diabetes Mellitus	11	12.09
Cardio Vascular Disease	03	3.30
Seizure Disorders	03	3.30
Other diseases	05	5.49
No co-morbidities	60	65.93

Table 3 indicates that 9.88% participants were suffering from hypertension, 12.09% had diabetes mellitus, 3.30% had cardio vascular disease and only 3.30% had seizure disorders. 65.93% were not having any co-morbidities.

Table 4: Distribution Based on pupillary reaction

Reactions	Pupil - Right		Pupil - Left	
	Frequency	Percent	Frequency	Percent
Reactive	68	74.72	61	67.02
Sluggish reactive	13	14.29	18	19.78
Non-reactive	07	7.69	06	6.60
Not assessable	03	3.30	06	6.60
Total	**91**	**100**	**91**	**100**

The above table indicates that in 74.72% of patient right pupil and 67.02% of patients left pupil showed reaction to light. 14.29% right pupil and 19.78% left pupil showed sluggish reaction to light, 7.69% of right and 6.60% of left pupil were not reacting to light and 3.30% of right pupil and 6.60% of left pupil were not assessable.

Table 5: Comparison of Mean GCS score within the group at different time points

GCS	Mean	95% CI		*Chi square/ df	P value
		Lower	Upper		
Overall Score					
At Admission	12.495	12.20	12.79	379.359 / 2	<0.001
At Discharge	14.340	14.16	14.51		
After One Year	14.876	14.79	14.95		
Eye Opening					
At Admission	3.216	3.11	3.32	229.232 / 2	<0.001
At Discharge	3.893	3.84	3.95		
After One Year	4.000	4.00	4.00		
Verbal Response					
At Admission	3.631	3.50	3.76	325.642 / 2	<0.001
At Discharge	4.631	4.55	4.71		
After One Year	4.953	4.91	4.99		
Motor Response					
At Admission	5.491	5.40	5.57	172.482 / 2	<0.001
At Discharge	5.91	5.87	5.95		
After One Year	5.976	5.95	5.99		

Though the distribution is presented using mean and 95% CI for better comprehension, the hypotheses were tested using Friedman Test, as the outcome variable is ordinal/ skewed.

Comparison of mean GCS Score (overall score) at admission was 12.495 at discharge 14.340 and after one year 14.876. This difference in scores/rank was found significant as per Friedman Test. Mean GCS eye opening at admission (3.216), discharge (3.893) and score at one year (4.00), GCS verbal response at admission (3.631), at discharge (4.631) and score at one year (4.953) and GCS motor response at admission (5.491), at discharge 5.918 and at one year (5.976) was found to be statistically significant ($p<0.001$).

DISCUSSION

The distribution of TBIs as per age and sex is of vital importance to identify high-risk groups as well as in determining the association with outcome. 35.16 % of the participants belonged to 41 - 60 year old, 28.58% were 21-40 year old, 19.78% belongs >60 years and only 16.48 % were ≤20 years of age. As per the above study males were at a higher risk with a male to female ratio of 4:l. This finding was consistent with our study findings where majority (80.8%) of the participants were males and only 19.2% were females showing a ratio of 4:1.

The mode of trauma that occurred in more than half (79.10%) of patients had injury because of RTA, 9.89% had fall, 6.59% had assault and 4.40% had other modes of trauma (due to penetrating injuries and fall of objects on head). In the study conducted by Gururaj (2005)[7] among those injured, 59% of TBIs were due to road traffic injury, followed by falls (25.0%) and assaults (10.3%). Hit by or fall off an external object, work-related injuries and sports injuries accounted for 2.5%, 0.1%, and 0.2%, respectively. This observation indicates that road traffic injuries are the leading cause of TBIs all over India and some of the earlier Indian studies have shown similar distribution in various other parts of the country too.

Hyder et al (2007)[8] in their study on epidemiological characteristics of TBI had found that the reasons for injury were RTA (62%), fall (8%), violence (24%) and work and sports related injuries (4%). In a meta-analysis of clinical information in moderate and severe head injury, the IMPACT study groups found (Butcher I, 2007)[9] that the distribution of causes of TBI ranges from RTA 53-80%, fall 12-30%. These findings from studies all over the world is consistent with our inferences and support our observation on mode of trauma.

The TBI outcome indicators showed that 80 to 95% of the participants had favorable /good outcome at the end of one year. In 81.8% of the participants DRS score was found to be 0 (better outcome) and 88.7% had RLA LCFS score 8 at one year. One-year GOS score of 92.1% was 5 and CCS score of 94.8% of the participants was 15.

There was moderate correlation (r = 0.429) between lowest GCS score and GCS at one year. Correlation coefficient between lowest GCS and GOS score and RLA LCFS score was 0.391 and 0.229 respectively. Significant negative correlation (r = - 0.582) was also observed between lowest GCS to DRS at one year. All the correlations were found to be statistically significant. There was positive correlation between the lowest GCS score and outcome variables at one year. The study denominated that there is improvement in the outcome variables; GCS, GOS and RLA LCFS at one year based on the baseline score of the lowest GCS. While 10. considering the DRS score, an inverse relation was observed with lowest GCS score, which shows that when the lowest GCS score improves the DRS score decreases.[11]

CONCLUSION

While a single burr hole craniectomy and craniotomy were associated with a clinically significant improvement in the GCS score, this was not statistically significant in this investigation. While there is no discernible primary brain trauma seen in single burr hole craniectomy instances, primary brain damage will be more common in surgical intervention cases. It was discovered that those who had decompressive craniectomy had lower mean scores for all outcome variables, and this difference was statistically significant. This could be because, in the majority of cases, participants who had decompressive craniectomy had baseline scores for the outcome variables that were lower than those of those who had not had the procedure.

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