

Analysis of Outcomes in Traumatic Brain Injury: An Institutional Based Study

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ABSTRACT

Background: Head injuries can result in enduring cognitive and neurobehavioral impairments, challenges in intellectual and academic performance, difficulties in personality adjustment, and increased family stress. Hence; the present study was conducted for analyzing outcomes in patients with traumatic brain injury.

Materials and Methods: A total of 100 patients who were admitted to the emergency department with history of traumatic brain injury were enrolled. Complete demographic and clinical details of all the patients was obtained. The TBI severity was categorized using admission Glasgow Coma Scale scores: mild, moderate, or severe. Assessment of all the patients was done and need of surgery was assessed. Two study groups were formed; TBI surgery group and non-TBI surgery group. The outcome was evaluated. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Chi-square test and student t test were used for evaluation of level of significance.

Results: A total of 100 patients with evaluated in the present study. Among the, TBI surgery was carried out in 40 patients while in the remaining 60 patients, no TBI surgery was carried out. Mean age of the patients with and without TBI surgery was 53.9 years and 50.7 years respectively. Majority proportion of patients of both the study groups were males. Significant

higher proportion of patients of TBI surgery has road traffic accident as their etiologic agent. Significantly higher proportion of patients of the non-TBI group were of mild TBI. Significantly better prognosis was seen among patients of the TBI surgery group.

Conclusion: A comprehensive comprehension of the in-hospital outcomes associated with traumatic brain injury (TBI) in low-resource environments is essential to facilitate the judicious allocation of scarce, life-saving resources.

Keywords: Traumatic Brain Injury, Surgery.


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INTRODUCTION

Traumatic brain injury (TBI) is an important cause of morbidity and mortality in children and adolescents. It results in considerable health care cost and, for many survivors, permanent disability.¹ The underlying pathophysiology highlights the importance not only of the primary injury, but also of the secondary processes occurring after injury, that may lead to cerebral hypoxia and ischemia.² Secondary brain injury is the leading cause of in-hospital death after TBI.³

Secondary brain injury represents the primary cause of mortality within hospitals following TBI. Furthermore, the outcomes for children can differ significantly across medical centers, largely influenced by the presence of advanced neurosurgical and neuroradiological resources, as well as the availability of skilled professionals. For pediatric patients, head injuries can result in

enduring cognitive and neurobehavioral impairments, challenges in intellectual and academic performance, difficulties in personality adjustment, and increased family stress. The neuropsychiatric consequences often surpass physical impairments, such as ataxia or incontinence, as the predominant source of disability. Specifically, deficits in memory, attention, executive functioning, behavioral control, and mood regulation, particularly associated with injuries to the frontal and temporal lobes, pose significant challenges. Measuring outcomes is essential for the thorough evaluation of clinical management across various health conditions. In the context of head injury, which presents a vast spectrum of severity and is affected by numerous factors, the use of objective outcome measures is vital for assessing treatment strategies. The Glasgow Outcome Scale is the most prevalent tool

employed for evaluating outcomes following head injuries and is also applicable to a range of other neurosurgical conditions.³⁻⁶ Hence; the present study was conducted for analyzing outcomes in patients with traumatic brain injury.

MATERIALS AND METHODS

The present study was conducted for analyzing outcomes in patients with traumatic brain injury. A total of 100 patients who were admitted to the emergency department with history of traumatic brain injury were enrolled. Complete demographic and

clinical details of all the patients was obtained. The TBI severity was categorized using admission Glasgow Coma Scale scores: mild, moderate, or severe. Assessment of all the patients was done and need of surgery was assessed. Two study groups were formed; TBI surgery group and non-TBI surgery group. The outcome was evaluated.

All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Chi-square test and student t test were used for evaluation of level of significance.

Table 1: Descriptive analysis

| Variable | TBI surgery group | No TBI surgery group | p-value |
|-----------------------|-------------------|----------------------|--------------------|
| Mean age (years) | 53.9 | 50.7 | 0.16 |
| Males | 23 | 32 | 0.92 |
| Females | 17 | 28 | |
| Alcohol present | 12 | 26 | 0.71 |
| Road traffic accident | 21 | 20 | 0.00 (Significant) |

Table 2: TBI as assessed by GCS

| TBI | TBI surgery group | No TBI surgery group | p-value |
|----------|-------------------|----------------------|--------------------|
| Mild | 21 | 39 | 0.00 (Significant) |
| Moderate | 10 | 12 | |
| Severe | 9 | 9 | |

Table 3: Outcome

| Outcome | TBI surgery group | No TBI surgery group | p-value |
|---------|-------------------|----------------------|--------------------|
| Good | 33 | 50 | 0.00 (Significant) |
| Poor | 7 | 10 | |

RESULTS

A total of 100 patients with evaluated in the present study. Among the, TBI surgery was carried out in 40 patients while in the remaining 60 patients, no TBI surgery was carried out. Mean age of the patients with and without TBI surgery was 53.9 years and 50.7 years respectively. Majority proportion of patients of both the study groups were males. Significant higher proportion of patients of TBI surgery has road traffic accident as their etiologic agent. Significantly higher proportion of patients of the non-TBI group were of mild TBI. Significantly better prognosis was seen among patients of the TBI surgery group.

DISCUSSION

Traumatic brain injury (TBI) produces both acute and more chronic consequences that lead to permanent disabilities that increase long-term mortality and reduced life expectation.⁶⁻⁹ The direct consequences of a single TBI or repetitive insults can result in various secondary pathological conditions, including seizures, sleep disorders, neurodegenerative diseases, neuroendocrine dysregulation, and psychiatric problems.^{10,11} Changes initiated by TBI can persist for months or years after injury and significantly affect quality-of-life issues in these patients.

Our current understanding of the pathophysiology of TBI has emphasized the multi-factorial nature of injury events that are activated by TBI. Indeed, many pre-clinical, as well as some clinical, studies have evaluated various therapeutic interventions to target both the acute and more chronic consequences of TBI with some degree of success.^{12,13} In this regard, neuroprotective, as well as treatment, strategies that target abnormally sustained elevations in intracranial pressure have been attempted. However, currently, there are limited therapeutic interventions that have been shown to improve the long-term consequences of TBI.

A total of 100 patients with evaluated in the present study. Among the, TBI surgery was carried out in 40 patients while in the remaining 60 patients, no TBI surgery was carried out. Mean age of the patients with and without TBI surgery was 53.9 years and 50.7 years respectively. Majority proportion of patients of both the study groups were males. Significant higher proportion of patients of TBI surgery has road traffic accident as their etiologic agent. Significantly higher proportion of patients of the non-TBI group were of mild TBI. Significantly better prognosis was seen among patients of the TBI surgery group. Bahloul M et al¹⁴ determined factors associated with poor outcome in children suffering traumatic head injury (HI). A retrospective study over an 8-year

period including 454 children with traumatic HI. Basic demographic, clinical, biological and radiological data were recorded on admission and during the ICU stay. Prognosis was defined according to Glasgow outcome scale (GOS) performed after hospital discharge by ICU and pediatric physicians. There were 313 male (68.9%) and 141 female patients. Mean age was 7.2 years, the main cause of trauma was traffic accidents (69.4%). Mean Glasgow coma scale (GCS) score was 8, mean injury severity score (ISS) was 26.4, mean pediatric trauma score (PTS) was 4 and mean pediatric risk of mortality (PRISM) was 11.1. The GOS performed within a mean delay of 7 months after hospital discharge was as follow: 82 deaths (18.3%), 5 vegetative states (1.1%), 15 severe disabilities (3.3%), 71 moderate disabilities (15.6%) and 281 good recoveries (61.9%). Multivariate analysis showed that factors associated with poor outcome (death, vegetative state or severe disability) were: PRISM \geq 24; GCS \leq 8; Cerebral edema; lesion type VI according to Traumatic Coma Data Bank Classification; Hypoxemia and sodium level $>$ 145 mmol/l. A significant proportion of children admitted with HI were found to have moderate disability at follow-up. We think that improving prehospital care, establishing trauma centers and making efforts to prevent motor vehicle crashes should improve the prognosis of HI in children. Hawkins ML et al¹⁵ evaluated independent living, productivity, and social outcomes of patients with serious traumatic brain injury (TBI) after inpatient rehabilitation. Fifty-five adults with serious TBI (Abbreviated Injury Scale score \geq 3) were admitted to a Level I trauma center and subsequently transferred to a comprehensive inpatient rehabilitation hospital (Walton Rehabilitation Hospital). Functional Independence Measures were obtained at admission (Adm), discharge (D/C), and at 3- (n = 52) and 1-year (n = 51) follow-up. At 1 year, 90% of the patients were living at home. Eight (16%) required full-time supervision, while 41 (82%) were independent of supervision throughout most of the day. Thirteen (25%) patients had returned to work, eight full time and five with reduced responsibility and fewer hours than before injury. Nineteen shared household duties, while eight (16%) had primary responsibility. Fourteen (27%) patients demonstrated socially inappropriate or disruptive behavior at least weekly. Although cognitive skills were diminished for the majority of patients, many achieved a substantial reduction in disability within 18 months after TBI.¹⁵

CONCLUSION

A comprehensive comprehension of the in-hospital outcomes associated with traumatic brain injury (TBI) in low-resource environments is essential to facilitate the judicious allocation of scarce, life-saving resources.

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