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A Prospective Assessment Of Outcomes And Complications Of Decompressive Craniectomy In Traumatic Brain Injury

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INTRODUCTION

Traumatic brain injury (TBI) is defined as an acute injury to the head caused by blunt or penetrating trauma or from acceleration/deceleration forces excluding degenerative, congenital problems. (1,2) India carries the highest number of traumatic brain injuries when compared to the rest of the world. With scant research from the West and India, it was determined that these head injuries result in substantial pain and loss for patients, households, and societies. (3) Brain injury healing takes years, based on the extent of pathological trauma and physiological causes. At the global level, the annual occurrence and mortality rate from Traumatic Brain Injuries are estimated to be 200 & 20 per 100,000, respectively. (4) As is the case in many developing countries, India lacks national-level statistics on traumatic brain injury. The authors' single epidemiological analysis in Bangalore revealed rates of prevalence, death, and case fatality of 150/1,00,000, 20/1,00,000, and 10%, respectively. (5,6) Per year, almost 2 million people suffer brain damage, 0.2 million die, and almost a million need physiotherapy and rehabilitation as an outpatient every year. Numerous intracranial pathologies such as an intraparenchymal contusion, subdural hematoma, extradural hematoma, and diffuse cerebral edema may occur as a result of traumatic brain injury. These pathologies may result in elevated intracranial pressure, disturbed cerebral blood flow, and cerebral perfusion pressure, both of which may result in secondary brain damage

and cerebral edema. The primary goal of therapy is to interrupt the vicious loop of cerebral edema development by monitoring initial swelling and ensuring a sufficient flow of blood, oxygen & metabolites to the affected brain tissue. Following primary care and initial resuscitation, definitive and advanced therapy is initiated to minimize and monitor secondary insults that could exacerbate brain edema and damage. Although most patients can be successfully managed by medical measures alone, some of the patients with moderate to severe TBI will continue to deteriorate due to poorly controlled progressive edema. In these patients, urgent reduction of intracranial pressure by surgical decompression of the brain is a potential lifesaving option.

MATERIAL AND METHODS

This prospective study was conducted at the Department of Neurosurgery, Jawaharlal Nehru Medical College, K.L.E. Academy of Higher Education & Research, Belgaum for a period of 1 year. Patients were assessed at discharge and 3-month follow-up.

Inclusion Criteria:

All patients with traumatic brain injury undergoing decompressive craniectomy

Exclusion Criteria:

1. Associated polytrauma with hemodynamic instability.
2. Declined consent.
3. Pediatric age group – less than 18 years of age.
4. Patients with co-morbidities like hypertension, diabetes mellitus, chronic kidney disease, or any past or present history of cancers, on anti-coagulation medications.
5. Patients with GCS of 3 and absent brainstem reflexes
6. Patients who defaulted for planned follow-up or cannot be reached through telephonic communications.

METHODOLOGY:

The following variables were obtained at the time of admission for each patient:

• Age, gender, and primary cause of trauma.

• Glasgow Coma Score (GCS) at admission, vitals like blood pressure, respiratory rate, and pulse rate.

Each patient underwent a thorough clinical and radiological examination according to the trauma guidelines of the hospital to rule out any other potentially life-threatening injuries. All routine investigations for traumatic brain injury and its management including complete blood counts, liver and renal function tests, coagulation profile, blood glucose level, blood grouping and cross matching, and CT scan of the brain were done.

Each patient was categorized according to the GCS at presentation to the hospital into-

• Mild – GCS between 14-15. • Moderate – GCS between 8-13. • Severe – GCS less than 8.

SURGICAL DECISION MAKING:

Patients who have sustained a traumatic brain injury and have elevated intracranial pressure, clinical signs of cerebral herniation, and a radiographically validated mass effect of >= 5 mm underwent decompressive craniectomy.

DATA ANALYSIS:

The collected data will be compiled and analyzed. Descriptive and graphical statistical analysis will be carried out. Statistical analyses will be carried out using proforma data collected. The values in data were measured as a mean, median, and standard deviation (SD), calculated in percentages and represented graphically as pie and bar charts.

RESULTS

In our study of 40 cases, 38 were males, and 2 were females, indicating a significant predominance of males affected by traumatic brain injury. The mean age studied was 47.3 years with a standard deviation of 12.3 (Range – 23 to 80), indicating the common affection of middle-aged group people by traumatic brain injury. 8 cases with a GCS of 14-15 indicating mild brain injury, 23 cases with a GCS between 8-13 indicating moderate brain injury, and 9 cases with a GCS of less than 8 indicating severe brain injury. Out of the total 40 cases studied, 62.5% cases (25 out of 40) demonstrated pupillary changes pre-operatively. 60% of cases underwent decompressive craniectomy within 24 hours of the trauma incident. 30% of patients were operated on within 24 to 48 hours of the trauma, while 10% were operated on after 48 hours. This reflects that most of the cases in our study underwent early decompressive craniectomy post-trauma, hence there still exists a scope for improving the transportation facilities to our trauma care center. CT brain of 72.5% of the cases showed a mixed hematoma (SDH with contusions/ parenchymal hematoma), 15% of the cases showed pure subdural hematoma (SDH), 10% showed pure contusions or parenchymal hematoma and only 2.5% (1 case) showed a massive extradural hematoma. None of the patients in the mild brain injury group died, the highest mortality rate was observed in cases with severe brain injury.

GOS-E	Score	Mild	Moderate	Severe	Total
Good outcome	7-8	7	10	0	17
Moderate disability	5-6	1	4	0	5
Severe disability	3-4	0	2	1	3
Vegetative state	2	0	1	2	3
Death	1	0	6	6	12
Total		8	23	9	40

CONCLUSION

There is a benefit of mortality by performing a Decompressive Craniectomy in patients with moderate head injury with refractory intracranial pressure. Patients who had sustained a severe head injury and had radiologically presented with Extradural hematoma, acute Subdural hematoma, and isolated single lobar contusions with mass effect are associated with a more favorable prognosis than compared patients who also had associated diffuse axonal injury and multiple lobar contusions.

Conflict of interest: None

ABBREVIATIONS

TBI - Traumatic brain injury.
GCS - Glasgow coma scale
ASDH - Acute subdural hematoma
EDH - Extra dural hematoma
CT - Computer tomogram

GOS-E - Extended Glasgow Outcome Scale

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