

ORIGINAL RESEARCH

ASSESSMENT OF QUALITY OF LIFE AMONG PATIENTS UNDERGOING DECOMPRESSIVE CRANIECTOMY IN A TERTIARY CARE HOSPITAL OF EASTERN INDIA

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ABSTRACT:

Introduction: Traumatic Brain injury is defined as an acute injury to the head caused by blunt or penetrating trauma or from acceleration/deceleration forces excluding degenerative, congenital problems. Decompressive craniectomy is being used as an effective measure in the management of TBI with prognosis being measured in terms of Glassgow outcome scale. However, the quality of life of such patients is often not assessed. Quality of life is a long term outcome phenomenon which must be effectively evaluated.

Objectives: To assess the quality of life of the patients undergoing decompressive craniectomy using EQ5D scoring scale.

Materials and Methods: This was an observational study conducted for 1.5 years in a Trauma care centre of Eastern India. The study included 100 study subjects. Informed consent was obtained from every participant and approval to conduct the study was obtained from Institutional ethics Committee. All post trauma patients who survived after decompressive craniectomy were followed up at 6 months post discharge to assess their quality of life using a pre-designed and pre-tested proforma containing information on the clinical profile. Quality of life was analyzed using the EQ5D scoring system at six months of discharge.

Results: The mean \pm SD age of the study subject was calculated to be 51.5 \pm 23.3 years. The commonest mode of injury was road traffic accident seen in 62% study participants. Almost 3/4th of the study subjects underwent surgery for non-diffuse traumatic brain injury within the first 24 hours of hospital admission. Among the 72 study participants that survived, EQ5D Index score to assess the quality of life was found good/ favorable in 86.1% patients and only 13.9% subjects had a poor/ unfavorable EQ5D Index score.

Conclusion: Majority of survivors after decompressive craniectomy showed a good functional outcome as analyzed by EQ5D. Improving patient selection and optimizing timing

of the procedure may lead to favorable long term functional outcome in these very severely brain injured patients.

Keywords: Decompressive Craniectomy, EQ5D index score, Glasgow Outcome Scale, Traumatic Brain Injury, quality of life.

INTRODUCTION:

Head injury has emerged out as one of the major global public health problems in recent years. The incidence of head injury has shown an increasing trend across the globe. More than 90% of the burden is shared by low and middle income countries like India, taking a heavy toll in especially the younger and more productive age group with grave financial implications.^[1]

According to World Health Organization, annual mortality rate of 1.2 million people which equates to nearly 3500 lives every day shows the significance of Traumatic brain injury (TBI) accounted for the major cause of mortality.^[2]

TBI remains a major public health problem around the world. 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.^[3]

This is often referred to as the “silent epidemic” remains a growing public health concern and represents the greatest contribution to death and disability globally among all trauma related injuries.^[4]

Glasgow Coma Scale (GCS) score is used in grading TBI; mild TBI (GCS 13-15) is in cases of alert and drowsy mentality and most recovers well without neurologic deficit, moderate TBI (GCS 9-13) lethargic or stuporous patients are categorized and in severe injury, severe TBI (GCS 3-8) the patients are in comatose, unresponsiveness to external stimulation.^[3]

Intracranial pressure (ICP) following TBI may be elevated due to increasing mass effect from hematoma and contusions, diffuse brain swelling or hydrocephalus. This leads to ischemia due to reduction of the cerebral perfusion pressure (CPP).^[5] Decompressive craniectomy (DC) is being used as an effective measure to reduce ICP following TBI. The main role of DC in TBI is reduction of ICP and prevention of herniation, aggravated by hematoma and brain swelling.^[3]

In terms of outcome from DC, one of recurrent limitations is the sensitivity of outcome measures. Generally, the Glasgow Outcome Score is being used, which while effective at classifying patients into broad groups (good recovery, moderate disability, severe disability, vegetative state, death), does not portray outcome in terms of quality of life and neuropsychology.^[6] The management of severe head injury is a major challenge to neurosurgeon as the consequent mortality and morbidity is very high. There is a need for an extensive multidimensional effort to improve the prognosis of head-injured patients and provide them a better quality of life.^[7]

Hence, there is a need for in-depth exploration of the quality of life of such individuals and formulate research outcomes. Thus, the present study is planned with the objective to assess the quality of life of those undergoing DC using EuroQol (EQ5D) scoring system.

OBJECTIVES:

1. To assess the quality of life of the patients undergoing decompressive craniectomy using EQ5D scaling score.
2. To find any association between the quality of life and various contributing factors.

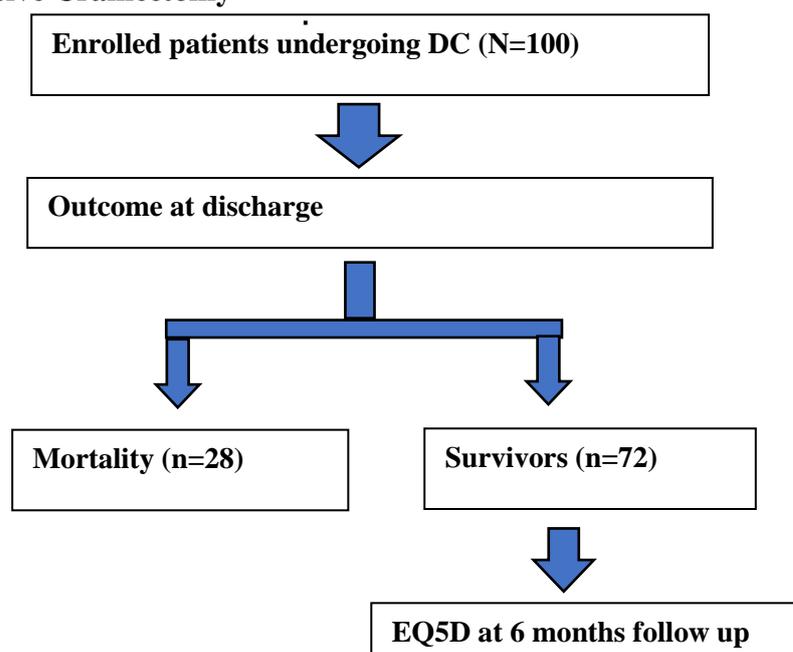
MATERIALS AND METHODS:

This is a longitudinal study carried out for a period of 1.5 years between April 2020 – August 2021 in the Department of Neurosurgery, Level 1 Trauma Care Centre, SSKM HOSPITAL, IPGME & R, Kolkata A total of 100 study participants were enrolled into the study. Written informed consent was taken from each participant. In all steps of the study, anonymity was maintained and participants were demarcated by serial numbers. Institutional Ethics Committee on Human Subjects Research (dated 10.08.2020, Memo No. IPGME&R/IEC/2020/569) approved the study. All post trauma patients who survived after decompressive craniectomy were followed up at 6 months post discharge to assess their quality of life using a pre-designed and pre-tested proforma containing information on the clinical profile. Quality of life was analyzed using the EQ5D scoring system at six months of discharge. (Figure 1)

STATISTICAL ANALYSIS:

The data obtained were entered into Microsoft Excel and analyzed using trial version of IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). The results were tabulated and expressed as averages and percentages. Association between variables was analyzed using Chi square test and other non-parametric test like Mann Whitney U test and Kruskal Wallis test with a p value of < 0.05 being considered as statistically significant.

Figure 1: Flowchart to depict the outcome of the study participants after undergoing decompressive craniectomy

DC - Decompressive Craniectomy

RESULTS:

In this study, **Table 1** shows that out of 100 study participants 44 (44%) belonged to the age group of 21-40 years, followed by 27 (27%) participants belonging to 41-60 years, 17 patients (17%) aged > 60 years and only 12 (12%) belonging to 0-20 years age group. The mean \pm SD age of the study subject was calculated to be 51.5 \pm 23.3 years. It was noted that 2/3rd of the study subjects (67%) in the study were males as compared to females that comprised of 33%. The commonest mode of injury was road traffic accident seen in 62% study participants followed by assault that comprised of 17% study participants, fall among 13 (13%) participants and penetrating injury in 8 (8%) cases. Maximum number of patients (62%) had moderate pre-Op GCS. Almost 3/4th of the study subjects underwent surgery for non-diffuse traumatic brain injury within the first 24 hours of hospital admission. It was observed that only 32 (32%) patients required ventilator support.

Table 1: Socio-clinical profile of the study participants (N=100)

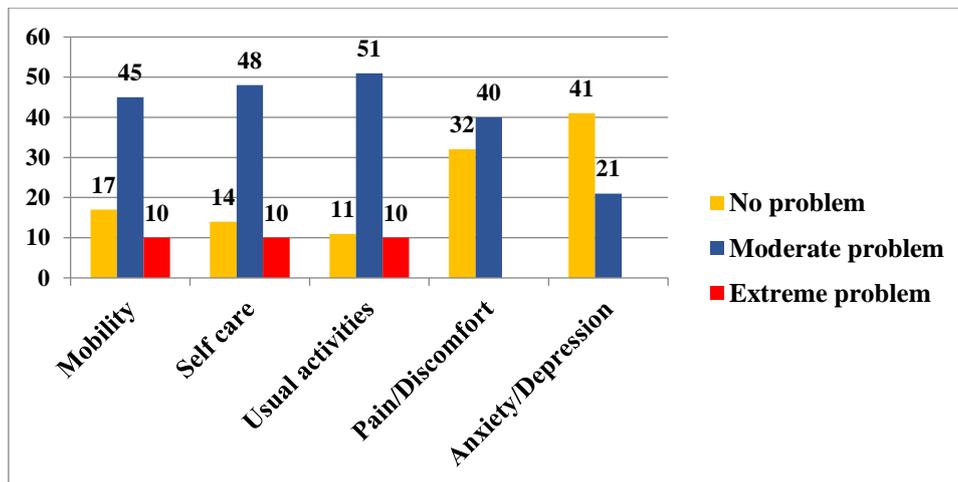
Variable	Category	Frequency (N=100)	Percentage (%)
Age (in years)	0-20	12	12
	21-40	44	44
	41-60	27	27
	>60	17	17
Gender	Male	67	67
	Female	33	33
Mode of injury	Road traffic accident	62	62
	Assault	17	17
	Fall	13	13
	Penetrating injury	8	8
GCS at arrival	Mild (≥ 13)	16	16
	Moderate (9-12)	61	61
	Severe (3-8)	22	22
FOUR score	0-8	22	22
	9-16	78	78
Time of surgery	≤ 24 hours	74	74
	> 24 hours	26	26
Need for ventilator	Yes	32	32
	No	68	68

Among the 72 study participants that survived, EQ5D Index score to assess the quality of life was found good/ favorable in 62 (86.1%) patients and only 10 (13.9%) subjects had a poor/ unfavorable EQ5D Index score (**Table 2**).

Table 2: Distribution of the study participants according to EQ5D Index score at 6 months follow up (n=72)

EQ5D Index score	Frequency	Percentage
Good	62	86.1
Poor	10	13.9
Total	72	100.0

Figure 2 suggests the quality of life of the survivors assessed after 6 months of discharge using the EQ5D scoring system. Moderate problem was observed among majority of the study subjects with respect to the various indicators of EQ5D health status. It was noted that about 2/3rd of the study subjects (62.5%) had moderate problem in mobility, 66.7% had in self-care, 70.8% in usual activities and 55.6% in pain/ discomfort. However, anxiety/ depression was not observed among more than half (56.9%) of the survivors.

Figure 2: Distribution of the study participants according to EQ5D health status of the survivor

On further analysis using different statistical tests as shown in **Table 3**, it was noted that there was a statistically significant association between pre-operative GCS and QOL ($p < 0.001$) suggesting that the patients with mild GCS showed better quality of life compared to severe GCS at the time of presentation. Similarly, there was a statistically significant association ($p < 0.05$) between FOUR score and QOL (Index score). Patients with improved FOUR score

Figure 2: EQ5D health status at 6 months post discharge

($p < 0.05$).

Table 3: Association between QOL (Index score) and different variables

Variables	Number n (%)	Mean rank	Statistical test applied	p value
Pre operative GCS		Mean rank		
Mild	20 (27.8%)	55.0	Kruskall Wallis test = 25.925	< 0.001
Moderate	49 (68.0%)	30.8		
Severe	3 (4.2%)	6.1		
Time of surgery		Mean rank		
≤ 24 hours	51 (70.8%)	35.91	Mann Whitney U test =	0.708

> 24 hours	21 (29.2%)	37.93	505.5 Z statistics = - 0.374	
Ventilator support		Mean rank		
Yes	4 (5.5%)	7.0	Mann Whitney U test = 18.0 Z statistics = -2.922	0.003
No	68 (94.5%)	38.2		
FOUR score		Index score		
		Good	Poor	Chi Square $\chi^2 = 19.409$
0-8	3 (4.2%)	0	3	
9-16	69 (95.8%)	62	7	

DISCUSSION:

This study was planned in a Trauma care centre of Eastern India to study the quality of life of the survivors undergoing DC for non-diffuse TBI. Among 100 study participants, there were 72 survivals at the time of discharge. There was male predominance of 67.0% in this study. Our study finding was similar to studies conducted in Japan and Southern Taiwan where male comprised of 67.3%.^[8] Most common mode of injury noted in our study was road traffic accidents (62.0%), followed by assault (17.0%) and fall from height (13.0%). This is similar to a study done in Thailand by Limpastan K. which observed 76.1% cases due to road traffic accident followed by fall in 7.5% study subjects.^[9] More than half (58.0%) of the patients presenting to the Level 1 Trauma Care Centre following TBI that underwent DC had a pre-operative moderate GCS (9-12), followed by severe GCS (3-8) in 22.0% participants. A statistically significant association ($p < 0.05$) was found in the present study between pre-operative GCS and favorable treatment outcome after DC. This was similar to a research by Aarabi et al. that showed that patients with admission GCS scores of 6 to 15 were 10 times more likely to experience a favorable treatment outcome when compared with those patients with lower GCS.^[10] Another study in consistence with the current study was by Williams and Wilkins et al. that reflected a statistically significant relationship between pre-operative GCS with favorable treatment outcome.^[11] In our study, surgery was performed within 24 hours of admission among 2/3rd of the patients. The patients that were operated within 24 hours had better treatment outcome and it was found to be statistically significant ($p < 0.05$). The findings in our study was similar to the Thailand study that noted about 2/3rd (76.7%) study participants being operated within 24 hours with a statistically significant association between favorable treatment outcome and surgery conducted in the first 24 hours of admission ($p < 0.05$).^[9] The present study assessed the Quality of Life (QOL) of the 72 survivors using EQ5D Index score at 6 months of discharge. It was found that a good EQ5D score was noted in majority (86.1%) of the study participants. The mean EQ5D index score calculated in the present study was 0.669 ± 0.332 and the median EQ5D index score was 0.786. A study by Tunthanathip et al. noted mean EQ5D index score as 0.91558 and median EQ-5D index score of 0.9320.^[12] Median EQ5D index score was observed as 0.85 according to a study done in Finland.^[13] The current study noted a significant association between QOL and pre-

operative GCS ($p < 0.05$) suggesting that patients presenting with mild GCS had better Index score (QOL). The research by Tunthanathip et al. also studied the relationship between EQ5D and GCS. The findings were consistent with our study with a significant relationship between quality of life and GCS ($p < 0.05$). [12]

CONCLUSION:

To conclude, Decompressive Craniectomy has been one of the commonly implied treatment options in patients with Traumatic Brain Injury. It has showed better outcome if performed early after the injury. The quality of life measured using the EQ5D scale showed an improved prognosis over a period of time after the surgery. Improving patient selection and optimizing timing of the procedure may lead to favorable long term functional outcome in these very severely brain injured patients.

CONFLICT OF INTEREST:

None

FUNDING SOURCE AND SPONSORSHIP

Nil

ACKNOWLEDGEMENT:

The authors would like to thank all the patients for their active participation and kind cooperation while conducting the study.

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