Role of Decompressive Craniectomy in Acute Subdural Haematoma

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Abstract:

Background: Our aim in the present study was to assess the value of Decompressive Craniectonyin acute SDH. We sought to assess whether the surgical procedure conferred any increase in short-term survival rates. We included all patients who underwent an operation in our unit for evacuation of an AcSDH sustained as a result of trauma, It is still not clear whether early decompression can improve the outcome in severe head injury (GCS 8 or <8)

Aim & Objectives: - The study was conducted to assess the value of decompressive craniectomy in acute SDH and to evaluate the outcome / prognostic factors and complications of decompressivecraniectomy.

Methods: - From Jan 2020 toDec 2022, 276 patients with Acute SDH due to trauma under went for Decompressive Craniectomy. The clinical status (GCS), imaging C.T. Scan/ MRI and outcome were analyzed at Neurosurgery unit of Surgery Dept. of Hamidia Hospital which is affiliated with Gandhi Medical College, Bhopal (India).Qi square independent test and Fishers test were used to evaluate the prognostic factor.

Result: - Total numbers of 276 patients were treated surgically. The study group consisted of 276 male & female, with the mean age being 48.9±29.4 years, ranging between 2 and 75 years. The mechanisms of injury were traffic accidents in 76 (27%); fall in 24 (26%) and blunt injury due to occupational accidents in 6 (7%) patients. Left hemispheric injury was found in 38 (41%); right hemispheric injury in 16 (17%); and bilateral hemispheric injury in 16 (17%) patients. Acute SDH was the only injury in 28 (31%) patients, while the remaining 64 (69%) had accompanying extracranial injuries.

Conclusion: Craniotomy can have favorable outcome in few cases of Acute SDH with unfavorable pre operative status, although craniectomy remain the standard surgical modality with pre operative poor clinical status. Early decompression in Acute SDH may be of particular benefit. The age of the patients, pupillary size and reaction at the time of admission was statistically significant predictor of outcome.Though, the indications of Decompressive Craniectony versus Craniotomyremain a matter of debate; the Brain Trauma Foundation has identified the question of craniotomy versus decompressivecraniectomy for primary evacuation of AcSDH as an vital area for further research.

Keywords: Traumatic Brain Injury, DecompressiveCraniectomy, Acute subdural heamatoma, Outcome, Glasgow coma scale.

DOINumber:10.48047/nq.2022.20.22.NQ10352 **NeuroQuantology2022;20(22):3522-3527**

1. Introduction

Traumatic Acute Subdural Haematoma (SDH) continues to have high morbidity and mortality rates despite theadvent of rapid transportation, computed tomography (CT) scanning, intracranial pressure monitoring and intensive care management[1,2]. Outcome for these patients may be influenced mainly by the underlying brain injury than the SDH itself[3.]decompressivecraniectomy was first described by Kocher[4] and Cushing[5].

The general surgical procedure for AcSDH is craniotomy with removal of hematoma and Decompressive Craniectomy(DC) if necessary. The decision of the surgical techniquedepends on individual surgeon's experience in preoperativeneurologic status, preoperative CT findings, andintraoperative findings. In some studies, more craniotomiesthan decompressivecraniectomies were performed as asurgical treatment of choice for AcSDH. Even though decompressivecraniectomyhas its own complications and requires a subsequent cranioplasty,preemptive decompressivecraniectomycan provide more effective controlof intracranial pressure (ICP) and aggressive brain edema.Some patients who underwent craniotomy for removalof hematoma suffered refractory intracranial hypertensionand brain edema, as a result required reoperation with decompressivecraniectomy. The decompressivecraniectomy showed better global outcome The indication for decompressivecraniectomy was based on clinical and radiological grounds rather than refractory intracranial pressure[5,6.]

Surgical indications for AcSDH ;-

- Lesion causing raised ICP
- Midline shift < 75mm
- Brain stem compression
- Thickness of AcSDH<5mm with midline shift.

Surgery not needed:-

- Patients with good GCS with small AcSDH.
- Patients with absent brainstem reflexes after resuscitation.

To avoid reoperation, we investigated predictable values that could indicate decompressivecraniectomy.As a surgical treatment of choice bycomparing groups that did and did not require reoperation using decompressivecraniectomy.After craniotomy in AcSDH patients

2. Material & Method

In this observational study patients were analysed who had undergone decompressivecraniectomy foracute SDH with 276 patients fromJan 2020 to Dec 2022 at theNeurosurgery unit of Surgery department of Hamidia Hospital&Gandhi Medical College, Bhopal. Following the establishment ofairway patency and appropriate fluid resuscitation,patients having significant acute SDH in CT wereimmediately operated for decompression.Data about the demographical characteristics such asage and gender, the history and clinical findings such asmechanism of injury, the time duration from thetraumatic event until surgical decompression, thehemispherical location of the haematoma, the presence of extracranial injury, systolic and diastolic bloodpressure, the pupillary reactivity and the signs ofherniation (unilateral or bilateral pupil dilatation) wererecorded.Laboratory data such as the presence of midline shift atthe level of septum pellucidum in CT, complete bloodcount, full biochemistry and arterial blood gasmeasurements were also recorded at admission to theemergency department.

Inclusion Criteria:

1. Patients age included 02 to 75.

2. Arterial blood gas measurements included pH (normal value 7.35-7.45), partial arterial pressure of carbondioxide (PaCO2) (normal value 35-45 mmHg), partial arterial pressure of oxygen (PaO2) (normal value 80-100 mmHg), and arterial oxygen saturation (SO2) (normal value >90%).

Complete blood count tests included haemoglobin(normal value 12-18 mg/dl), white blood cell count(normal value 4800-

10800/mm3) and platelet (PLT)count (normal value 130.000-400.000/mm3).Full biochemistry included blood glucose level (GLU)(normal value 70-110 mg/dl), blood urea nitrogen (BUN)(normal value 10-50 mg/dl), creatinine (CRE) (normalvalue 0.5-1.2 mg/dl), sodium (Na) (normal value 135-157mEq/lt), potassium (K) (normal value 3.5-5.5 mEq/lt),calcium (Ca) (normal value 8.4-10.2 mEq/lt), chlorine (Cl)(normal value 98-110 mEq/lt), aspartateaminotransferase (AST) (normal value <40 IU.L-1),alanine aminotransferase (ALT) (normal value <40 IU.L-1), alkaline phosphatase (ALP) (Normal value 40-129IU.L-1), gamma glutamiltransferase (GGT) (Normalvalue <73 IU.L-1 in males; <38 IU.L-1 in females), lactatedehydrogenase (LDH) (normal value 120-146 U.L-1),creatine kinase (CK) (normal value 32-294 U.L-1 inmales; 33-211 U.L-1 in females), creatine kinase-MB(CKMB) (normal value 0.6-6.3 ng/ml), total protein(Normal value 6.4-8.3 gr/dl), and albumin (normal value3.2-4.8 gr/dl).

Statistical Analysis

Statistics calculated in this study, all results were calculated on SPSS 20.0& MS Office Excel.

3. Results

Table 01: Demographical and clinical parametres between the survivors and the non-survivors at the 30th day of the operation.

		Survivors (n = 184)	**Nonsurvivors (n = 92)**	**P value**
Age		30.6±27.3	49.1±29.4	0.028
Gender	Male	134 (73%)	76(82 %)	0.076
	Female	50 (27%)	16 (18 %)	

82% males were non-survivors where as 18 % females with mean age of 49.1 in non-survivors.

Table 02: Clinical parametres between the survivors and the non-survivors at the 30th day of the operation.

		Survivors (n = 184)	**Nonsurvivors (n = 92)**	**P value**
Mechanism of injury	Fall	52 (28%)	24 (26%)	0.659
	TA	52 (28%)	46 (50%)	
	Occupatinal	18 (10%)	06 (7%)	
Time duration until surgery (hours)		5.3±2.4	5.7±2.5	0.701
Localisation of injury	Left hemispheric	62 (34%)	38(41%)	0.413
	Right hemispheric	44 (24%)	16 (17%)	
	Bilateral	12 (6 %)	16(17%)	
Extracranial injury	Present	34 (18%)	12(14%)	0.823
	Absent	84 (45%)	64 (69%)	
SAP**		112.4±30.1	89.1±54.7	0.075
DAP**		66.8±22.6	52.8±36.4	0.092
Pupillary reactivity		14 (3-13)	10 (3-12)	0.193

RTS* **		16 (4-12)	14 (1-11)	0.042
CCIS* **		06 (0-12)	10 (0-12)x	0.002
PLT (total/mm3 X103)		276.3±97.5	198.5±102.0	0.022
GLU (mg.dl-1)		144.2±51.4	267.3±106.7	<0.001
BUN		28.3±9.7	38.8±6.5	0.005
PaO2		158.7±60.5	72.6±16.6	<0.001
SO2		96.3±4.4	92.1±4.5	0.005

The study group consisted of276 male & female, with the mean age being 48.9±29.4 years, ranging between 02 and 75 years. The mechanisms of injury were traffic accidents in 52 (27%); fall in 24 (26%) and blunt injury due to occupational accidents in 06 (7%) patients. Left hemispheric injury was found in 38 (41%); right hemispheric injury in 16 (17%); and bilateral hemispheric injury in 16 (17%) patients. Acute SDH was the only injury in 28 (31%) patients, while the remaining 64 (69%) had accompanying extracranial injuries.

4. Discussion

This review, breaking down results following horrendous clearing in a solitary neurosciences place, shows that both CR and decompressivecraniectomy are ordinarily utilized as the essential departure method. We determined the Accident CT dangers of mortality at 14 days and troublesome result at a half year and found that the populace who went through essential clearing by decompressivecraniectomy is all the more seriously harmed. In any case, the noticed results were not essentially unique between the two gatherings.

Bone fold size is probably going to assume a significant part in the adequacy of decompressivecraniectomy methods. The EBIC study examiners detailed a wide variety in the components of the craniectomies performed for intra-dural posttraumatic sores. In the EBIC study, despite the fact that the mean size of decompressivecraniectomy was 67 cm2, 50 % of the patients who went through crisis decompressivecraniectomy for an intra-dural sore had a bone fold size under 60 cm2. In the current review, the typical size of the bone folds in the decompressivecraniectomy.group was 74.5 cm2 and just 11 % of the decompressivecraniectomy bone folds were under 60 cm2 in size. Moreover, the mean most extreme measurement of the bone folds in the decompressivecraniectomy bunch was 11.6 cm.7

In any case, the significant issue is that there is presently just class III proof with review concentrates on examining the job of decompressivecraniectomy.

Our review showed more unfortunate result in decompressivecraniectomy bunch com¬pared with Craniotomy bunch (unfortunate mRS 77%, 20 of 26 patients in decompressivecraniectomy bunch versus 40%, 8 of 20 patients in Craniotomy bunch; p=0.004). This results are might be because of additional patients with low GCS score (GCS＜ 8), lethargic student, and comorbid CT le¬sion in decompressivecraniectomy bunch. Our outcomes convey comparable determination inclination that neurosurgeons will quite often perform decompressivecraniectomy. At the point when patient's preoperative clinical status is poor. To explain this point, we relied on number of negative elements for every patient that might impact on unfortunate result. By and large, decompressivecraniectomy decompressivecraniectomy bunch had more antagonistic elements than Craniotomy gathering, and hence unfortunate result for decompressivecraniectomy gathering can be explained.8,9

Moreover, different potential entanglements of decompressivecraniectomy. need attention to neurosurgeons. Subgaleal discharge, her¬niation through the cranial imperfection, subdural radiation, syn¬drome of the

trephined (sinking skin fold disorder), and hydrocephalus were accounted for complexities of decompressive craniectomy.10 In our series, 1 patient went through reoperation due to subgale¬al hematoma and 2 patients had serious sinking of skin fold where trouble was in cranioplasty brought about complica¬tion. decompressivecraniectomy.
decompressivecraniectomy likewise have drawback of requiring ensuing cranioplasty which harbor extra gamble of complica¬tion. Gooch et al.11 detailed that prompt post-oper¬ative difficulty pace of cranioplasty after decompressivecraniectomy was essentially as high as 34% which were disease, wound breakdown, intracra¬nial discharge, and bone resorption. We likewise experienced complexities of cranioplasty in our patients (4 of 12; epi¬dural hematoma 2, contamination 1, cerebrospinal liquid spillage 1) which intruded on persistent's recuperation. In this specific circumstance, there might be some benefit of Craniotomy in departure of AcSDH.

Notwithstanding, this study is a review single focus study with little quiet populace. Impediments of choice predisposition obstruct any end on job of Craniotomy or decompressivecraniectomy for AcSDH. We think further examination with bigger patient populace and painstakingly chose models is expected to explain the opti¬mal careful methodology for patient with AcSDH.

5.Conclusion:-

Craniotomy can have favorable outcome in few cases of Acute SDH with unfavorable pre operative status, although craniectomy remain the standard surgical modality with pre operative poor clinical status. Early decompression in Acute SDH may be of particular benefit. The age of the patients, pupillary size and reaction at the time of admission was statistically significant predictor of outcome. Though, the indications of Decompressive Craniectony versus Craniotomy remain a matter of debate; the Brain Trauma Foundation has identified the question of craniotomy versus decompressivecraniectomy for primary evacuation of AcSDH as an vital area for further research.The concept of performing Decompressive Craniectomy in Traumatic Acute Subdural Haematoma patients seems to be attractive.

6. References

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