ORIGINAL RESEARCH PAPER

Medical Science

# ROLE OF DECOMPRESSIVE CRANIECTOMY IN MIDDLE CEREBRAL ARTERY INFARCT – AN INSTITUTIONAL STUDY

KEY WORDS:

**Dr. A. Kiran Kumar** Senior Resident Neurosurgery Thanjavur Medical College Thanjavur ,tamilnadu

**Dr A .Mathyash Arthur*** Mch Professor, Thanjavur medical college, Thanjavur ,TamilNadu *Corresponding Author

## INTRODUCTION

The role of decompressive craniectomy in stroke victims is gaining popularity, as it is found to be beneficial in malignant infarction of middle cerebral artery (MCA) territory which results in massive edema and brain swelling.

This procedure not only reduces mortality but also improves the functional outcome.

In large hemispheric strokes, development of 'malignant edema' is a well-known phenomenon.

This is seen in 15 to 20% cases and usually begins on day 2 to 3 following the onset of stroke and mortality in these cases with conservative treatment approaches 80%.

Failure of medical treatment in this condition has lead to search for alternate methods of treatment to counter the increased intracranial pressure

We report 33 such cases who have underwent decompressive craniectomy.

## MATERIALS AND METHODS

This retrospective study included a total of 33 patients who underwent decompressive craniectomy after malignant MCA infarction between Sept 2020 to June 2021 at Thanjavur Medical College,Thanjavur

Stroke was diagnosed based on history, clinical examination, CT scan and MRI imaging.

The time delay from the onset of symptoms to surgery and preoperative signs of herniation and their relation to the final outcome was analyzed.

The final outcome was assessed in terms of mortality and scores such as modified Rankin scale (mRS). Functional outcome was divided into two groups: favourable outcome (mRS score 0–3) versus poor outcome (mRS score 4–6)

**Inclusion Criteria:**

- Deteriorating sensorium to GCS 12 or below
- Evidence of mass effect
- Midline shift on neuroimaging

**Exclusion Criteria:**

- Poorly controlled risk factors
- Infarct other than MCA territory

Patients with Glasgow coma scale (GCS) <4, coma with two dilated pupil and absent brainstem reflexes were excluded from the study.

Each patient was fully resuscitated, investigated, and treated in Intensive Care Unit after first admission.

Basic monitoring, frequent blood gas analyses, and all basic blood biochemistry parameters were followed twice daily.

Neurologic monitoring included repeated monitoring of pupil size and its reactivity to light and periodic recording of the GCS score .

Decompressions were performed using wide Fronto-Temporo-Parietal skin flap.The burr holes are made and were connected using an electrical drill, with subsequent removal of a 12 cm × 15 cm free bone flap on affected side.

Dura was opened with curvilinear incision with radial extensions. Lax Duroplasty was performed with the temporalis fascia .

Scalp flap was closed in two layers with suction drain.

All patients were transferred to the neurological intensive care unit for the post operative care.

Broad-spectrum antibiotics and post operative anti- edema measures with intravenous Mannitol (1- 1.5g/kg/D) were continued for 5 days. Patients were followed up regularly on outpatient basis after discharge from hospital.

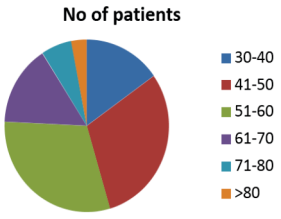
## RESULTS

33 patients underwent decompressive craniectomy

Male:female-2:1
Age range : 30 to 85 years
Mean age: 52.9 years

**Age:**

| S. No | Age group | No. of patients |
|---|---|---|
| 1 | 30 -40 | 5 |
| 2 | 41-50 | 10 |
| 3 | 51-60 | 10 |
| 4 | 61-70 | 5 |
| 5 | 71-80 | 2 |
| 6 | >80 | 1 |



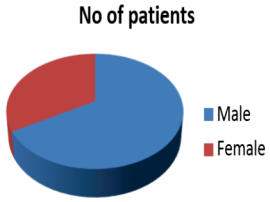

Mean age is 52.9 years

Youngest patient is 30 year old, while the oldest is 85 year old

Maximum no of patients are in the age group of 41 to 60 years

**Sex:**

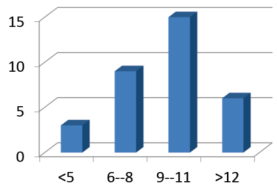
| S. No | Sex | No. of patients |
|---|---|---|
| 1 | Male | 22 |
| 2 | Female | 11 |



Male : Female – 2:1

### Gcs:

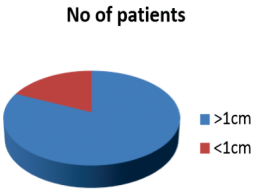
| S.No | GCS | No. of patients |
|---|---|---|
| 1 | ≤5 | 3 |
| 2 | 6-8 | 9 |
| 3 | 9 – 11 | 15 |
| 4 | ≥12 | 6 |




- 15 patients have GCS of 9 to 11 (45.5%)
- 9 patients have GCS of 6 to 8 (27%)
- 6 patients have GCS of >12 (18%)
- 3 patients have GCS of ≤ 5 (9%)

### Midline Shift:

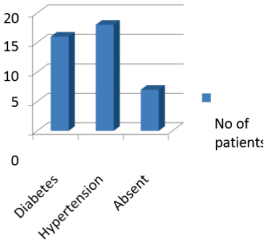
| S.No | Midline shift | No. of patients |
|---|---|---|
| 1 | >1 cm | 27 |
| 2 | <1 cm | 6 |




- 27 patients have midline shift of >1cm (81.8 %)
- 6 patients have midline shift of <1cm (18.2%)

### Comorbidities:

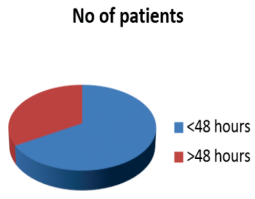
| S.No | Comorbidities | No. of patients |
|---|---|---|
| 1 | Diabetes mellitus | 16 |
| 2 | Hypertension | 18 |
| 3 | Absent | 7 |




- 8 patients have diabetes mellitus (24%)
- 10 patients have hypertension (30%)
- 8 patients have both diabetes mellitus and hypertension (24%)
- 7 patients have no associated comorbidities(21%)

### Timing Of Surgery

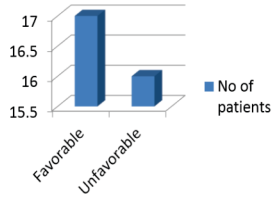
| S.No | Timing of surgery | No. of patients |
|---|---|---|
| 1 | <48 hours | 22 |
| 2 | >48 hours | 11 |




- 22 patients have been operated within 48 hours (66.6%)
- 11 patients have been operated after 48 hours (33.3%).

### Outcome

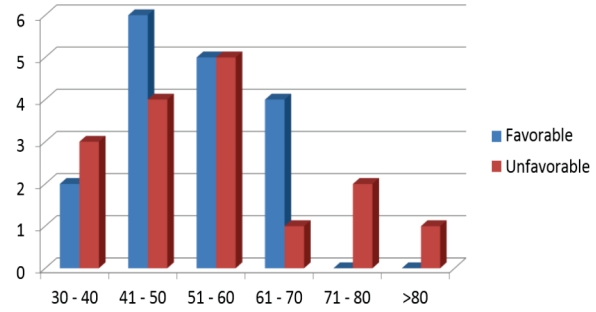
| S.No | Outcome | No. of patients |
|---|---|---|
| 1 | favourable | 17 |
| 2 | Unfavourable | 16 |




- 17 patients have favourable outcome (51.5%)
- 16 patients have unfavourable outcome (48.4%)

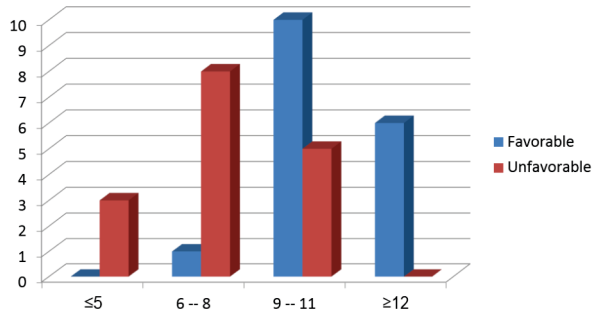
Out of 33, 2 patients were dead, due to uncontrolled comorbidities after 6 month follow up

### Outcome and age



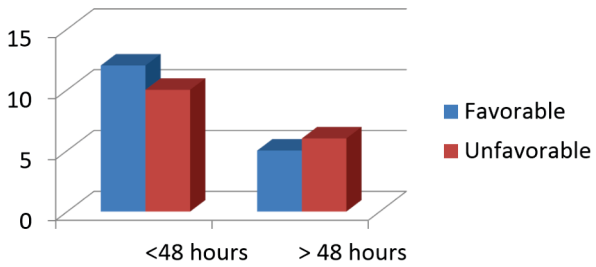

- Outcome is favourable in age groups 41 – 50 years (30.3%) and 51 – 60 age group (30.3%)
- Outcome is unfavourable in patients above 70 years of age

### Outcome and gcs




- Favourable outcome is seen in patients with GCS between 9 and 12
- 66.6% had favourable outcome with GCS 9 to 11
- 100% had favourable outcome with GCS Greater than or equal to 12
- p' value is 0.001.
- So, there is significant correlation between GCS and outcome and the null hypothesis is rejected.

### Outcome and timing of surgery



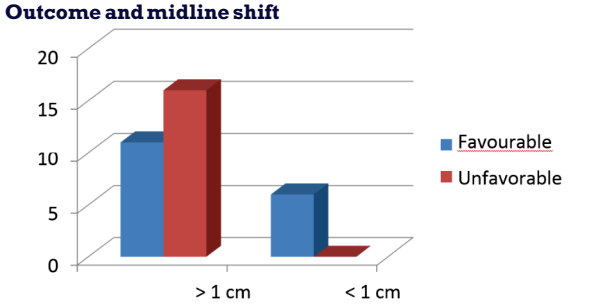

- Among the patients with favourable outcome ,70.5% were operated within 48 hours
- Among the patients with unfavourable outcome 62.5% were

### operated within 48 hours

p' value is 0.62 and the result is not significant

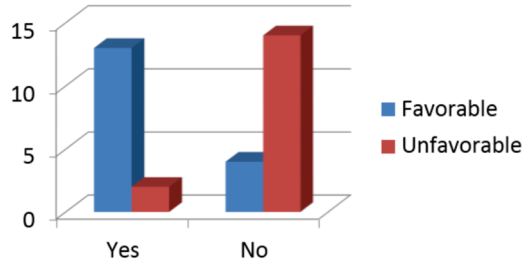
Therefore, in this study timing of surgery has no effect on outcome of the patient.

### Outcome and midline shift



- 100% favourable outcome is seen in patients with midline shift < 1cms
- 40.7% favourable outcome is seen in patients with midline shift > 1cms
- p' value is 0.008, significant
- Therefore , in this study outcome is favourable in patients with midline shift < 1cms

**Outcome and cisternostomy**




- 86.6% of patients who had undergone cisternostomy has favourable outcome
- Only 25% of patients had favourable outcome among patients not undergone cisternostomy
- p' value is 0.002, significant
- Therefore, in this study patients who underwent cisternostomy had favourable outcome.

## DISCUSSION

It has been estimated that 15- 20% patients of MCA infarction experience the phenomenon of malignant brain swelling.

Conventional anti-edema measures are not effective in controlling this phenomenon, besides causing dyselectrolytemia, rebound intracerebral hypertension, fluid overload, hypotension, cardiac depression and paradoxical intracranial pressure elevation (seen in hyperventilation).

Decompressive surgery can reduce mortality to less than 50%.

In one series of 153 consecutive patients of transtentorial herniation secondary to trauma, who underwent aggressive decompressive surgery, the chance of functional recovery was 30% if done early, but was almost zero in patients with bilateral dilated fixed pupils.

Early intervention was shown to produce better outcome

The management of patients with malignant MCA infarction remains a challenge

Decompressive hemicraniectomy can relieve the mas effect resulting from infarcted brain tissue, preventin brain herniation and death.

Several studies have shown that decompressive surgery can reduce mortality from 80% to 30%.

There are reports of poor functional outcome and increased mortality in older patients who have undergone hemicraniectomy.

Furthermore, it is well known that the potential for recovery of function after strokes generally declines steeply after the age of 60 years.

we suggest that decompressive hemicraniectomy be carried out within 48 h of ictus, before the clinical signs of herniation appear, in patients with malignant MCA infarction.

For early treatment, early detection of malignant MCA infarction prior to clinical deterioration is crucial. Imaging modalities, including MRI with diffusion weighted image (DWI) sequences, CT and clinical evaluation are adequate for early detection.

## CONCLUSION

Decompressive craniectomy in the setting of acute brain swelling from massive MCA infarct is a life saving procedure.

Radiographic signs such as hypodensity greater than 50% of MCA territory midline shift > 1cm attenuation of cortico medullary junction may predict which patient develop malignant edema .

Clinical signs such as early clinical deterioration pre operative GCS < 5 may also predict which patient develop malignant edema or poor out come .

We did not observe in any difference in outcome between the patients submitted to surgery before or after 48 hrs .

Young patients with higher GCS on presentation and radiological features suggesting MCA infarct have favourable outcome .

**Limitation Of Study**

Since our hospital is peripheral referral centre patients most often have delayed presentation and not elgible for thrombolysis.