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DECOMPRESSIVE CRANIECTOMY WITH EVACUATION OF BLOOD IN HYPERTENSIVE BLOOD SURGICAL OUTCOME

Dr. Jahanzeb Kakar, Dr. Nusrullah Lango, Dr. Asghar Baber, Prof. Naqibuallah Achakzai, Dr. Ibrahim Sheikh, Dr. Irfan Adil, Mir Zaman Kasi

Bolan Medical College Quetta, Balochistan Pakistan.

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ABSTRACT

Objective: Decompressive hemicraniectomy with hematoma evacuation is life-saving and improves unfavorable outcomes. **INTRODUCTION:** Decompressive hemicraniectomy in enormous hemispheric areas of localized necrosis has been accounted for to bring down mortality and improve the ominous results. Hematoma volume is an amazing indicator of 30-day mortality in patients with intracerebral discharge (ICH). Hematoma volume adds to intracranial volume and may prompt unsafe rise of intracranial pressure. **METHODS:** This study was conducted at BMC/SPH, Quetta from Mar 2018 – Feb 2019. The 24 continual patients with hypertensive ICH treated with decompressive hemicraniectomy were evaluated. The information gathered included Glasgow Coma Scale (GCS) score at confirmation and before surgical procedure, ICH volume, ICH score and a clinical evaluating scale for ICH that precisely hazard stratifies patients in regards to 30-day mortality. **RESULTS:** Of the 42 patients with decompressive hemicraniectomy, 20(83.3%) survived to discharge; of those 20, 12 (60%) had good functional outcome, defined as a mRS of 0 to 3. The mean age was 49.8 years. 20 patients with an ICH score of 6, 18 (90%) survived to discharge, 8 (44%) had good functional outcome. Hematoma volume was 60 cm³ or greater 8 (50%) patients of whom had good functional outcome. **CONCLUSION:** Decompressive hemicraniectomy with hematoma evacuation is life-saving and improves unfavorable outcomes in a select group of young patients with large right hemispherical ICH.

Corresponding author

Dr Jahanzeb Kakar

Bolan Medical College Quetta,
Balochistan Pakistan.

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INTRODUCTION

Literature states that the intracerebral haemorrhage result in 10 -20 % cases due to the strokes associated with various reasons while hypertension due to stress and coronary issues accounts for 60% of cases.(1, 2) This procedure is performed mostly in cases of major ischemic stroke, cerebral sinus venous thrombosis (CSVT), aneurysmal subarachnoid haemorrhage, and traumatic brain injury(1, 3).

The intracerebral hemorrhage (SICH) occurs spontaneous that is the formation of the blood clot in the parenchyma of the brain without previous history of trauma or surgery(4). From a population of the million people 10 – 20 people are at risk for SICH(5, 6). The cause can be primary or secondary that includes aneurysms, vascular malformations, vasculitis, etc. certain sites present with a common presentation of internal bleeding that includes basal ganglia and internal capsule (35%–70%), brainstem (5%–10%), and cerebellum (5%–10%)(3, 7).

Decompressive craniectomy is a surgical procedure that is performed to remove any space-occupying lesion, which causes the rise in intracranial pressure(8). This procedure is used for the treatment of severe (TBI), high grade aneurysmal subarachnoid haemorrhage, and hemispheric cerebral infarction(9).

Logically, removal of the lesion leads to elimination of the mass effect, which lowers the oedema and intracranial pressure (ICP); hence, limiting the ischemia(3, 9). Takeuchi et al (7), suggested that surgical trauma in an already traumatised situation and continuous leakage could hinder in postoperative outcome. Nevertheless, another theory suggested is the axonal injury, which could be after the bleeding. Hence, it is necessary to incorporate the confounding variables in the study to avoid any misinterpretation(10).

Although the data collected displayed that the 30 day mortality rate was 35% to 52% whereas only 150 of the people survived and returned back to their normal lifestyle after 6 months (4, 7). The total seven clinical trials that assessed the advantage of the surgical procedure and additional therapies used adjacently.(11)

It was observed that when the decompressive hemicraniectomy in large hemispheric infarctions was performed it reduced the unfavourable outcomes and lowered mortality rates(12).

Our study focused on evaluating the efficiency of the treatment involving the decompressive craniectomy together with hematoma evacuation. To prove the beneficial outcome our study observed the effect of the procedure in total 24 patients recruited from the Bolan medical college hospital.

MATERIAL AND METHODS

The study was conducted at the Bolan Medical College, SPH, Quetta. Total 24 patient's who were admitted for the treatment of hypertensive ICH with decompressive hemicraniectomy. The initial step taken was recording the Glasgow Coma Scale score before the procedure and consecutively after the procedure, neurological signs and symptoms ICH volume, ICH score for the clinical status, and a clinical evaluating scale for ICH that precisely hazard stratify the patient's in regards to 30-day mortality.

ICH score is the sum of individual points assigned as follows: GCS score 3 to 4 (2 points), 5 to 12 (1 point), 13 to 15 (0 points); age greater than 80 years (yes = 1 point; no = 0 points); infratentorial origin (yes = 1 point; no = 0 points); ICH volume (>30 cm³ = 1 point; < 30cm³ = 0 point) and intraventricular hemorrhage (IVH; yes = 1 point; no = 0 points)(13).

The ICH hematoma is measure through the CT scan through the use of the ABC/2 technique. This method proceeds by measuring A, the greatest diameter on the largest hemorrhage slice followed by estimating B, the diameter perpendicular to A, and C is the estimated number of axial slices with hemorrhage multiplied by thickness of the slice (20). The results at the end of the study demonstrated immediate mortality and modified Rankin score (mRS).

The inclusion ventilation, saline drip, blood sugar level and blood pressure control. Our inclusion criteria for the decompressive surgery was (1) symptom onset duration should be less than 24 hours; (2) preoperative GCS score noted should be more than 5 and less than 8; however, there was two exceptions one with 7 and other with 4 score; (c) ICH hematoma volume should be greater than 40 cm³; and (d) CT evidence of midline shift should be greater than 10 mm at the septum pellucidum level.

DC surgery was performed using the technique extended Floconer' incision (fronto temporo parietal craniectomy), in which 13 – 14 cm incision (anterior to posterior) was made through while the diameter measured from the temporal base to the area of the sagittal sinus was about 9 to 10 cm. The dura flap was raised, evacuating the hematoma through transylvian approach in all patients, and duroplasty was performed using homologous tissue (galea periost flap).

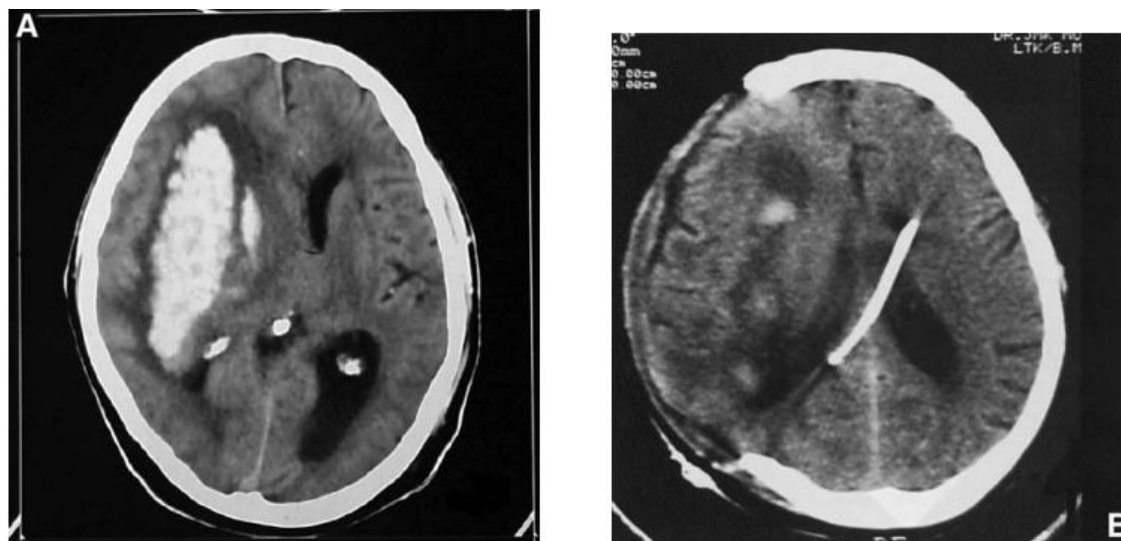


Figure 1 (A), Plain CT scan brain showing large right basal ganglion hemorrhage with midline shift and contralateral ventricular dilatation.(B), CT scan brain on the second postoperative day, showing evidence of residual hemorrhage and perihematomal edema.

RESULT

After analysing the collected database, the results displayed that 20 (83.3%) patient's were successfully treated and discharged from total 24. The average follow up was for over a period of 16 months (range 2 – 40 months). The mean age in our study was 49.8 years (range: 19-76 years). At the end of the follows, out of the total patients enrolled in the study, 12 (60%) displayed a good recovery in the functional outcome. This was easily defined through the modified Rankin score (0 – 6).

On the basis of the simple categorisation, mRS was divided into two groups 0-3 and 4–6. There were 15 patients who lied in the first category while the rest in the second category. The further division was seen based on the pupillary reaction. Out of the 14 who suffered from pupillary abnormality 6 patients displayed good recovery outcomes. Further, there were about 17 patients suffering from intraventricular extension, 14 patients from this presented with good recovery.

Patient who displayed the mRS score more than 4 and had abnormal occulo-cephalic reflex did not display a quick recovery. Furthermore, it was observed that 18 out of 20 patients whose ICH score was around 6 were discharged, out which 8 presented with good recovery in the functional outcome(mRS: 1-3). Hematoma volume was 60 cm³ or greater in eight patients, eight (50%) of whom had good functional outcome (mRS: 0-3).

Age	Initial arterial pressure	Pre operative GCS	Pupil reflex	ICH score	CT scan findings	Hematoma volume	Length of surgery	mRS
48	130	8	Right pupil slightly dilated, sluggish reaction, light, OCR-normal	6	Right ganglionic with to lobar extension IVE Ipsilateral PMCE +	48	5	0
34	133	5	Right pupil slightly dilated, sluggish reaction, light, OCR-normal	6	Right ganglionic lobar extension, IVE	87.5	8	2
56	160	6	Right pupil slightly dilated, sluggish reaction, light, OCR-normal	6	Right ganglionic with lobar extension, IVE, MCE +	60	10.3	3
76	123	7	Normal pupil reaction, with OCR-normal	6	Right ganglionic lobar extension, IVE	49	6	3
19	180	4	Normal pupil reaction, with OCR-normal	4	Right ganglionic lobar extension, IVE	71	7	2
23	70	5	Normal pupil reaction, with OCR-normal	6	Right ganglionic lobar extension, IVE	75	6	1
45	160	8	Normal pupil reaction, with OCR-normal	6	Right ganglionic with lobar extension, IVE, MCE +	77	6.5	3
65	140	6	Normal pupil reaction,	6	Right ganglionic with	80	7	0

45	135	5	with OCR-normal Bilateral pupil dilated, sluggish light reaction, , OCR-abnormal	6	lobar extension Right ganglionic with lobar extension IVE, MCE +	55	14	5
54	138	4	Normal pupil reaction, with OCR-normal	5	Right ganglionic with lobar extension, IVE, MCE +	99	24	4
42	124	8	Right pupil dilated fixed (VS) OCR- abnormal	6	Right ganglionic with to lobar extension IVE Ipsilateral PMCE +	82	16	3
34	130	6	Normal pupil reaction, with OCR-normal	6	Left ganglionic with lobar extension, IVE, MCE +	60	18	5
75	160	3	Right pupil dilated fixed (VS) OCR- abnormal	6	Right ganglionic with to lobar extension IVE Ipsilateral PMCE +	60	20	6
66	140	7	Normal pupil reaction, with OCR-normal	4	Right ganglionic lobar extension, IVE	90	12	5
46	142	8	Right pupil slightly dilated, sluggish reaction, light, OCR- normal	6	Right ganglionic with lobar extension	80	13	4
55	124	8	Right pupil dilated fixed (VS) OCR- abnormal	4	Right ganglionic with lobar extension, IVE, MCE +	90	5	3
60	127	7	Normal pupil reaction, with OCR-normal	6	Right ganglionic with lobar extension	60	15	1
70	133	6	Bilateral pupil dilated, sluggish light reaction, , OCR-abnormal	4	Right ganglionic with to lobar extension IVE Ipsilateral PMCE +	50	16	2
45	160	7	Left pupil dilated and fixed, OCR-abnormal	6	Left ganglionic with lobar extension, IVE, MCE +	54	23	6
58	180	8	Right pupil slightly dilated, sluggish reaction, light, OCR- normal	6		65	20	2
34	162	3	Pupil dilated fixed, OCR-abnormal	6	Right ganglionic lobar extension, IVE	73	19	6
53	124	6	Left pupil dilated and fixed, OCR-abnormal	6	Left ganglionic with lobar extension, IVE, MCE +	49	18	0
48	134	7	Pupil dilated fixed, OCR-abnormal	5	Right ganglionic with lobar extension, IVE, ipsilateral MCS	47	24	0
69	170	5	Normal pupil reaction, with OCR-normal	6	Right ganglionic with lobar extension	100	20	6

DISCUSSION

Many studies have proven that the DC and duroplasty with or without the hematoma evacuation successfully treated the patient's strokes, intracerebral hemorrhage, and aneurysm(14, 15). The level of consciousness and volume of hematoma was one of those factors which were seen as a key predictor of the treatment prognosis(14). According to wang et al (13), the DC is mainly performed in those patients who have hematoma volume more than 60 ml and GCS score 8 or less than.

Nevertheless, several postoperative complications were noted such as hydrocephalus, one of the common complications(2, 16). The literature points out that 20% of people suffered from hydrocephalus who had undergone the DC procedure with evacuation of the clot while only 3% of people were detected for suffering from infectious complications(16).

A study by Ding, Guo & Tian, demonstrated that hematoma evacuation in 16% of the patients with GCS scores of 8 or less and hematoma volume greater than 60 ml resulted in a mortality rate of 91%. In previous studies, that good functional outcome was observed in only 5% of patients with GCS scores of 8 or less and 7% of patients with hematoma volumes of 80 ml or greater(17). However, with latest studies, the rates for the functional outcome increased to 41% with mortality rate decreased to 28% due to combined use of the Decompressive craniectomy with hematoma evacuation(18, 19).

In our study was able to produce consistent findings, 60% patients presented with good recovery in functional outcomes with mortality rates 8%. Among this 60% of patients, half of the patients had hematoma volume above 60 cm³. The resulted in low mortality rate in comparison to previous methods; nevertheless, still, the efforts are being made to attain maximum good functional outcomes.

The hematoma evacuation was performed in 42% of patients suffering from intraventricular hemorrhage that did not demonstrate a good recovery status(3). However, when the 53% patient associated with IVH were treated with DC and evacuation a better outcome was achieved(1, 8).

ICH score is a valid grading scale to analyse the patient clinical status for risk assessment. In our study of the 20 patients with an ICH score of 6, 20 patients (83.3%) survived to discharge. From this 18 had a score of 6 while only 8 (44%) of the patient displayed a good functional outcome. Our study was able to display the benefit of the treatment in a specific selected group.

Previous studies have demonstrated that abnormal oculoccephalic reflex in addition to hemispherical ICH when present in patients is associated with poor prognosis even after the surgical evacuation(2, 20). There is always a chance for good recovery in a condition where the pupils are no reactive and mid position.

Limitations

There are certain limitations in this study that needs to be acknowledged. This procedure has only limited value as it can be only performed in certain cases. Patients who have a severe form of brain injury and less chance of survival through basic procedures such as hematoma evacuation undergo DC with hematoma evacuation for a better chance of recovery. However, if there is brain stem compression then good outcomes cannot be guaranteed. Nevertheless, our study was successful to prove that using a Decompressive craniectomy with hematoma evacuation reduces the mortality rate and increased the chances of recovery from the severe brain damage.

CONCLUSION

The Decompressive craniectomy with hematoma evacuation is reliable procedure to be performed in a life threatening condition where the GCS score is below 8 and volume of the hematoma is above 60 cm³. It was clearly demonstrated that this procedure is favourable in certain groups such as right hemispherical ICH.

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All Authors

Abbreviations list

ICH : intracerebral discharge Hematoma
GCS : Glasgow Coma Scale
CSVT : cerebral sinus venous thrombosis (),

Conflict of interests:

No

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