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A prospective study of surgical management of spontaneous basal ganglia hematomas at a superspeciality hospital

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ABSTRACT

Background: Surgical evacuation of intrcerebral hematomas is one of the known method of management of intracerebral haemorrhage. Decompressive craniectomy is one of the surgical procedures used of management of intracerebral haemorrhage. Present study was aimed to analysed the role of surgical management in the management of basal ganglia hematoma. **Material and Methods:** Present study was prospective, observational study, conducted in patients with spontaneous basal ganglia hematoma underwent surgical management either craniotomy and evacuation of hematoma or by decompressive craniectomy and evacuation of hematoma under general anaesthesia. **Results:** Among 50 patients majority were form 41-60 years age group (50 %), were male (54 5), left side affected (62 %), had history of hypertension (74 %) & diabetes mellites (44 %). Hematoma volume was 61- 90 ml (46 %) in majority cases followed by >90 ml (30 %) & ≤ 60 ml (24 %). Midline shift of 1.1 cm noted in 18 % patients, 1.2 cm noted in 26 % patients & 1.3 cm noted in 20 % patients. Other findings were intraventricular Hemorrhage (62 %) & hydrocephalus (8 %). No post-operative hematoma noted in 46 % cases, while in other 46 % cases hematoma was < 30 ml. In majority of cases duration of surgery was 3- 3. 5 hours (50 %) & blood loss was 151-200 ml (30 %). 30 patients (60 %) required 2 procedures.. At 6 months mortality was noted among 20 patients (40 %). GCS score & GOS score improvement was noted at 6 months follow-up as compared to GCS at discharge, at 1 week & at 1 month. **Conclusion:** Prognosis and mortality associated with surgical management of spontaneous basal ganglia hematomas are affected by patient age, hematoma location and volume, intraventricular hemorrhage, and patient's initial neurologic status.

Keywords: Outcome; Decompressive craniectomy; Surgery for ICH; Capsuloganglionic bleed; Basal ganglia bleed

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INTRODUCTION

Nontraumatic spontaneous intracranial haemorrhage (SICH) represents 10%–15% of all strokes and often carries a poor prognosis.[1] Basal ganglia hematomas comprise around 50 % of these patients. Hypertensive ICH accounts for 10%–15 % of Strokes.[2] Intracerebral hemorrhage can be devastating; mortality rates are high, ranging from 30% to 50% at 30 days, and many survivors remain severely disabled.[3,4]

Surgical evacuation of intrcerebral hematomas is one of the known methods of management of intracerebral haemorrhage. Decompressive craniectomy is one of the surgical procedures used of management of intracerebral haemorrhage. Aggressive surgical intervention is recommended for patients with large or symptomatic hypertensive cerebellar hemorrhages.[5]

The most widely cited and relevant study to date is the STICH (Surgical Trial in Intracerebral Haemorrhage), which failed to show benefit from surgical evacuation for patients with SICH, whose treating physicians were unsure whether surgery would be beneficial.[6] However, the design of the STICH suggest that some patients with SICH should undergo surgery. Several clinical studies have demonstrated such procedure is

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useful for large hemispheric intracerebral haemorrhage.[7,8] Present study was aimed to analysed the role of surgical management in the management of basal ganglia hematoma

MATERIAL AND METHODS

Present study was prospective, observational study, conducted in Department of Neurosurgery, at MGM Medical College & Hospital, Aurangabad, India. Study duration was from Jan 2014 to March 2015. Study approval was obtained from institutional ethical committee.

Inclusion criteria

- All patients with spontaneous basal ganglia hematoma admitted in Medicine and Neurosurgery department who will undergo surgical management for the hematoma.

Exclusion criteria

- Clear evidence that the hematoma is due to an aneurysm or angiographically proven arteriovenous malformation or secondary to tumour or trauma.
- Intracerebral, thalamic, Cerebellar or brainstem haemorrhage.
- All patients with basal ganglia hematoma not causing any mass effect.
- All paediatric age group patients.

Study was explained to patients and relatives in local language, benefits of the surgical procedure and potential side effects and complications in detail & written consent was taken for participation & study. All patients were evaluated by history, clinical examination, laboratory and radiological investigations. After clinical & anaesthetic evaluation, patients underwent either craniotomy and evacuation of hematoma or by decompressive craniectomy and evacuation of hematoma under general anaesthesia. The decision about the operative procedure will be made pre and intraoperatively depending on radiological assessment and intraop findings.

Frontotemporal craniotomy done under general anaesthesia in supine position, question - mark skin incision was taken starting from anterior to tragus and up to just posterior to hairline. After elevating the skin flap. Burr holes were made & connected with craniotome . Then corticotomy was done in middle frontal gyrus. Hematoma was evacuated by suction. After hemostasis, duraplasty done, followed by reposition of bone flap. A subgaleal suction drain was placed and fixed. Incision closed in layers with deep layers with vicryl & skin with nylon.

Decompressive craniectomy done under general anaesthesia in supine position, a large reverse question mark incision was taken starting at the level of zygoma and curving posteriorly above the ear, over the parieto-occipital region, then superiorly and anteriorly , approximately 2 cm lateral to midline and stopping just behind the hairline. Dural opening made. Corticotomy was done over the hematoma location sparing the eloquent area and then hematoma was evacuated with suction. After hemostasis, duraplasty done with temporalis fascia or pericranium or G patch. Bone was kept in the anterior abdominal wall parietal layer. A subgaleal suction drain was placed and fixed. Incision closed in layers with deep layers with vicryl and skin with nylon.

Postoperatively all patients received standard care, antibiotics, antiedema and antiepileptic drugs. Postop NCCT head done in all patients after 24 hrs of operation or earlier in case of deterioration. Drain removed after 24 hrs of the procedure. Sutures removed after 8 days of the procedure. Patient were followed after discharge on 7^{th} day ,1 month and 3 months.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics..

RESULTS

In present study, 50 patients underwent surgical management for spontaneous basal ganglia hematomas. Majority were form 41-60 years age group (50 %), were male (54 5), left side affected (62 %), had history of hypertension (74 %) & diabetes mellites (44 %). GCS on admission in majority cases was E2V2M5 (34 %), followed by E1V1M3 (30 %) & E1V1M2 (26 %). ICH score was 3 (38 %) followed by 2 (34 %) & 4 (28 %) in present study.

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Table 1: General characteristics

Characteristics	**No. of patients**	**Percentage**
Age groups (in years)		
≤40	7	14 %
41-60	25	50 %
61-80	17	34 %
>80	1	2 %
Gender		
Male	27	54 %
Female	23	46 %
Side involved		
LEFT	31	62 %
RIGHT	19	38 %
Medical history		
H/O HT	37	74 %
H/O DM	22	44 %
GCS on admission		
E1V1M2	13	26 %
E1V1M3	15	30 %
E1V1M4	2	4 %
E1V1M5	1	2 %
E2V2M5	17	34 %
E3V4M6	2	4 %
ICH score		
2	17	34 %
3	19	38 %
4	14	28 %

Hematoma volume was 61- 90 ml (46 %) in majority cases followed by >90 ml (30 %) & ≤ 60 ml (24 %). Midline shift of 1.1 cm noted in 18 % patients, 1.2 cm noted in 26 % patients & 1.3 cm noted in 20 % patients. Other findings were intraventricular Hemorrhage (62 %) & hydrocephalus (8 %).

Table 2: Radiological findings

Findings	**No. of patients**	**Percentage**
Hematoma volume (ml)		
≤ 60	12	24 %
61- 90	23	46 %
>90	15	30 %
Midline shift (cm)		
0.8-1	18	36 %
1.1	9	18 %
1.2	13	26 %
1.3	10	20 %
Other findings		
Intraventricular Hemorrhage	31	62 %
Hydrocephalus	4	8 %

In present study, no post-operative hematoma noted in 46 % cases, while in other 46 % cases hematoma was < 30 ml. In majority of cases duration of surgery was 3- 3. 5 hours (50 %) followed by <2.5 hours (30 %). Blood loss was 151-200 ml (30 %) in majority of cases followed by 100-150 ml (28 %). 30 patients (60 %) required 2 procedures, while reoperation was required in 4 patients (8 %). Mean duration of hospital stay was 11.57 ± 3.78 days. At 6 months mortality was noted among 20 patients (40 %).

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Table 3: Post-operative characteristics

Characteristics	No. of patients	Percentage
Post-operative hematoma (ml)		
10	5	10 %
20	11	22 %
30	7	14 %
50	3	6 %
60	1	2 %
No	23	46 %
Duration of surgery (hours)		
<2.5	15	30 %
2.5 - 3	6	12 %
3- 3. 5	25	50 %
>3.5	4	8 %
Blood loss		
≥100 ML	12	24 %
100-150	14	28 %
151-200	15	30 %
>200	9	18 %
PROCEDURE		
1	20	40 %
2	30	60 %
REOPERATION	4	8 %
Mean duration of hospital stay (days)	11.57 ± 3.78	
Outcome		
Discharge	30	60 %
Death	20	40 %

GCS score improvement was noted at 6 months follow-up as compared to GCS at discharge, at 1 week & at 1 month.

Table 4: GCS score

GCS	At discharge	At 1 week	At 1 month	At 6 months
E1VTM3	2	2	2	
E2VTM3	2	2		
E1VTM4				2
E4V1M5	7	7	7	11
E4V5M6	12	11	12	12
E4VTM3	3	3	5	3
E4VTM4	2	0		2
E4VTM5	2	5	4	

GOS score improvement was noted at 6 months follow-up as compared to GCS at 1 week & at 1 month.

Table 5 GOS score

GOS	At 1 week	At 1 month	At 6 months
2	18	18	18
4	12	12	10
5			2

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DISCUSSION

Clinical and laboratory research has demonstrated that SICH is followed by injury to the surrounding brain; this secondary injury might result from various mechanisms including excitotoxicity, direct toxicity of the hematoma, and inflammation. These various forms of secondary injury cause cytotoxic edema, which can cause increased mass effect and tissue damage.

Conservative treatment is indicated when the ICH volume is usually <30 ml, regardless of the Glasgow Coma Scale (GCS) score, whereas surgery may be recommended as a life-saving measure when the ICH volume is 30 ml or more.[9,10] The main goal of surgery is hematoma evacuation with relieving the mass effect to prevent brain damage that would result from the compression and herniation as well as from the ischemia and the toxic effects of blood degradation products on the brain.[11]

Craniotomy and evacuation of hematoma is also a treatment modality for management of ICH. Seth B. et al.,[12] noted that decompressive craniectomy combined with hematoma evacuation improves outcome in puaminergic hematomas than craniotomy and evacuation of hematoma.

Singh J et al.,[13] noted that early surgery (within 6 hours) along with multi-modality medical management has definite positive role in the outcome of patients with spontaneous basal ganglionic haemorrhage. Patients ≥ 50 years, signs of brain herniation, volume of haematoma ≥ 60ml, hydrocephalic dilatation due the intraventricular haemorrhage, midline shift > 5 mm, and GCS ≤ 8 at presentation had poor prognosis.

Mohamed K,[14] studied 66 patients underwent surgical intervention consisting of 47 (71.2%) men and 19 (28.8%) women. Their age varies from 15 to 60 with mean age ± SD (range) 46.53 ± 13.24 (18.0–60.0). According to GCS, patients were categorized into three groups: GCS 5–8, 21 (31.8%) patients; GCS 9–12, 30 (45.5%) patients; and GCS 13–15, 15 (22.7%) patients. The favorable outcome group was slightly younger (p value 0.050*). Also, the volume and extension of hematoma into the ventricular system, hydrocephalic dilatation, and midline shift greater than 5 mm had a significantly worse outcome with statistically significant difference.

Thotakura AK et al.,[15] studied 27 patients, mean age was 51 years and mean GCS was 7.55 (range 5-11). The mean volume of the bleed was 68.51 ml. Mortality was noted in 17 out of 27 patients (63%) in 30 days. Thirteen of the 16 patients with intraventricular extension of BG bleed had mortality. The factors that showed statistically significant correlation with one month mortality were age, GCS at admission, volume of the bleed and the intraventricular extension.

A meta-analysis published by Prasad et al.[16] after the STICH 1 trail concluded that surgery added to medical management reduces the odds of being dead or dependent compared with medical management alone.[16] In a study done by Suthar et al.,[17] most important factors that predicted final outcome were IVH, size of haematoma, midline shift, GCS score and ICH score. Hegde et al.,[18] showed elderly age, poor GCS on admission, haematoma volume greater 30 ml and IVH as main negative predictors in South Indian population.

In large hematomas with mass effect and midline shift leading to altered levels of consciousness or when delayed neurological deterioration occurs through hematoma expansion as an important lifesaving measure, craniotomy and hematoma drainage are recommended.[19] Early evacuation of ICH along with multi-modality medical management has definite positive role in the treatment of patients with spontaneous basal ganglionic haematoma.

CONCLUSION

Prognosis and mortality associated with surgical management of spontaneous basal ganglia hematomas are affected by patient age, hematoma location and volume, intraventricular hemorrhage, and patient's initial neurologic status. Improved surgical techniques, neuroimaging, neuroanesthesia, and perioperative monitoring and care have all led to improved outcomes from surgery. Ideal patient selection criteria for hematoma evacuation needs further determination.

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