

## EXPLORING THE ORIGINS & SURGICAL OUTCOMES FOR SPONTANEOUS INTRACEREBRAL HAEMORRHAGE

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### **ABSTARCT:**

**Background:** Spontaneous intracerebral hemorrhage (ICH) is defined as non traumatic bleeding into the brain parenchyma which can extend into the ventricles and into the subarachnoid space. It is the second most common subtype of stroke, accounting for 10–50 % of all cases, depending on the population, race, and region.

**Materials and Methods:** This is a prospective study conducted for 24 Months, from November 2017 to November 2019 in Mamata Medical College & Super Specialty Hospital, Khammam. A total of 60 patients are included in this study and each patient was resuscitated, investigated, and treated in ICU after admission.

**Results:** In the present study, out of 60 patients 42 males and 18 females, the most common age group is seen in 61-70 yrs which is 55% followed by 51-60 yrs which is 25%. In the present study Hypertention is the most common risk factor in about 37% cases followed by Smoking in

35% cases. The mean Preop GCS in Decompressive craniectomy is  $10.84 \pm 2.42$  where as in Decompressive craniectomy and Evacuation of hematoma group is  $10.21 \pm 3.32$  and in Endoscopic Evacuation of hematoma group  $2.96 \pm 0.74$  and the P value is 0.773 which is not significant. Post op GCS was improved in all the 3 groups but this is not statistically significant with a P value is 0.225, the mean duration of icu stay in Endoscopic evacuation of hematoma group is  $4.04 \pm 1.01$  compared to other two groups which is  $11.16 \pm 4.81$  and  $10.63 \pm 4.87$  and the P value is 0.001 which is statistically significant.

**Conclusion:** The mortality rate is higher in decompressive craniectomy group compared to other two groups, Pre op GCS has a major role for outcome of the patient Patient with superficial and lobar bleeds had significant GOS and mRS outcome compared to deep seated bleeds.

**Keywords:** Spontaneous intracerebral hemorrhage Glassgow outcome scale, Decompressive craniectomy Modified Rankins scale.

#### **INTRODUCTION:**

Spontaneous intracerebral hemorrhage (ICH) is defined as non traumatic bleeding into the brain parenchyma <sup>1,2</sup>, which can extend into the ventricles and into the subarachnoid space <sup>3</sup>. ICH is the second most common subtype of stroke <sup>3</sup>, accounting for 10–50 % of all cases <sup>4,5</sup>, depending on the population, race, and region studied <sup>6</sup> According to the “Global Burden of Diseases, Injuries, and Risk Factors” report, there were 5.3 million cases and over 3.0 million deaths secondary to ICH worldwide in 2010 <sup>6,7</sup>. The case-fatality rate ranges from 35 % at 7 days to 59 % at 1 year <sup>8,9,10</sup>. Half of fatal cases occur in the first 48 hours after presentation <sup>11,12</sup>. Survivors are often left with severe disability <sup>9</sup>, with less than 40 % of patients regaining functional independence <sup>3</sup>. A pro-active approach must, therefore, be maintained in the management of these patients to salvage as much of this brain as possible. Alert patients with small (3 cm and moribund patients with extensive haemorrhage may not require surgical evacuation Indications for clot removal in patients between these extremes are controversial.

Despite improvement in medical facilities the mortality remains high and only 38% of the patients survive in the 1st year. The dismal outcome of patients with intracerebral haemorrhage results from structural loss of essential deep nuclei and from white matter tract disruption caused

by direct injury resulting from hematoma, loss of cerebral auto regulation and delayed brain swelling.

**METHODOLOGY:**

This is a prospective control study, to evaluate the various etiological factors & outcome of various surgical modalities in patients with spontaneous intracerebral hemorrhage and the study was conducted in the department of neurosurgery, Mamata medical college & super specialty hospital, khammam for 24 months, from November 2017 to November 2019. a series of 60 cases was compiled for this study during this period and each patient was resuscitated, investigated, and treated in icu after admission.

**Inclusion criteria:**

- All patients admitted with Spontaneous supratentorial intracerebral hemorrhage
- Study of various surgical modalities including Decompressive craniotomy, Craniotomy and evacuation of hematoma, Endoscopic evacuation of hematoma
- Patient given valid consent for the study.

**Exclusion criteria:**

- Patients with traumatic intracerebral hemorrhage.
- Patients with malignancy
- Patient who refused to give valid consent for study
- Patients with pure intraventricular hemorrhage.

**RESULTS:**

The present study was conducted in Department of Neurosurgery, Mamata Medical College & Super Specialty Hospital, Khammam and the findings are tabulated below. During the study year from **November 2017 to November 2019** A series of 60 cases was compiled for this study during this period and each patient was resuscitated, investigated, and treated in ICU after admission.

In our study, 55% of the patients were in the age group between 61-70 years followed by 25% in the age group of 51-60 yrs.

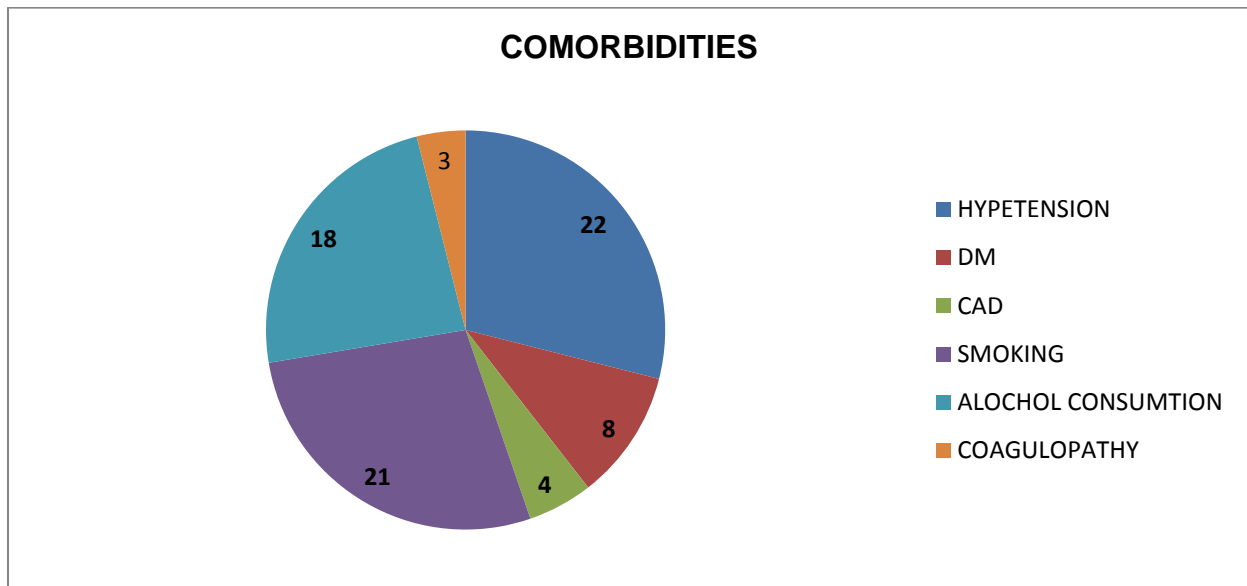
**TABLE: 1 INCIDENCE IN AGE GROUP**

Age (Yrs)	Frequency	Percentage %
Below 40	3	5.0
41-50	2	3.3
51-60	15	25.0
61-70	33	55.0
Above 70	7	11.7
Total	60	100

In the present study 42 cases were (70%) were males and 18 cases were (30%) were females.

**Comorbidities:**

In our study, patients with comorbidities are 22 patients with Hypertention, 8 with DM, 4 with CAD, 21 patients with Smoking, 18 patients with Alcohol Consumption history, 3 patients have coagulopathy, and 8 patients have Hypercholestremia.



**FIG: 1 COMORBIDITIES**

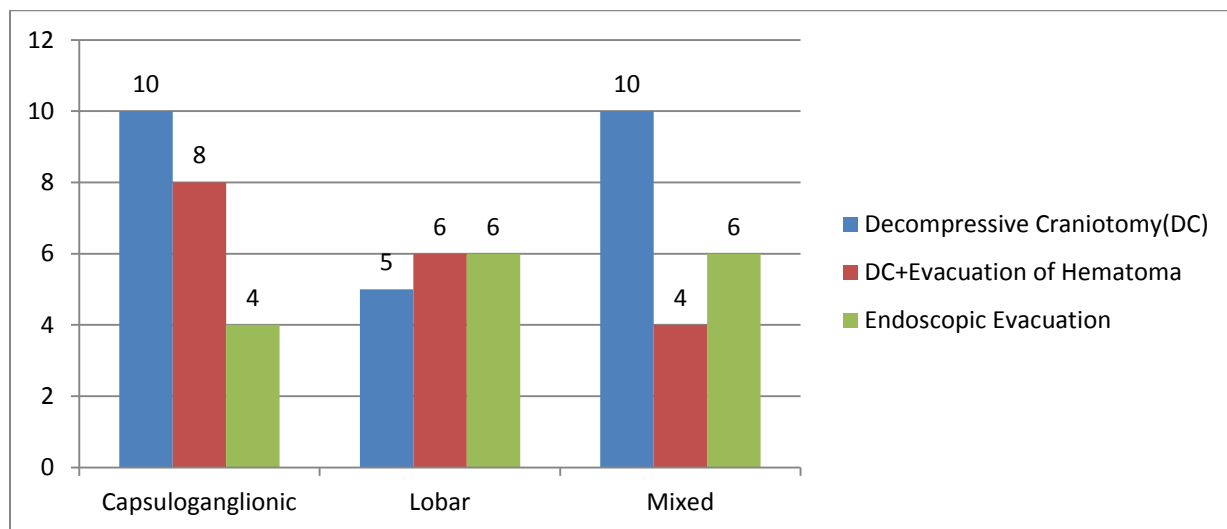
In the present study, 23 (38.4%) patients presented with Weakness and Hemiplegia, 18 patients (30%) presented with Loss of consciousness (LOC), 10 patients (16.6%) presented with

Seizures, 6 patients (10%) presented with isolated headache, 3(5%) patients presented with Aphasia

Clinical Features	Frequency	Percentage%
Weakness,Hemiplegia	23	38.4
LOC	18	30
Seizures	10	16.6
Isolated headache	06	10
Aphasia	03	05
Total	60	100

**TABLE 2: INCIDENCE OF VARIOUS CLINICAL PRESENTATIONS**

In our study, Decompressive Craniotomy (DC) was done in 10 Capsuloganglionic bleed, 5 lobar bleed and 10 capsuloganglionic bleed with lobar extension. DC+Evacuation of Hematoma was done in 8 Capsuloganglionic bleed, 6 Lobar bleed and 4 capsuloganglionic bleed with lobar extension. Endoscopic Evacuation of Hematoma was done in 4 Capsuloganglionic bleed, 6 lobar bleed and 6 capsuloganglionic bleed with lobar extension.



**FIG: 2 SURGERY PERFORMED DEPENDING ON LOCATION OF HEMATOMA**

In our study, based on the hematoma volume 30-60 ml was seen in 12 patients, 60-90 ml was seen in 32 patients and >90 ml in 16 patients.

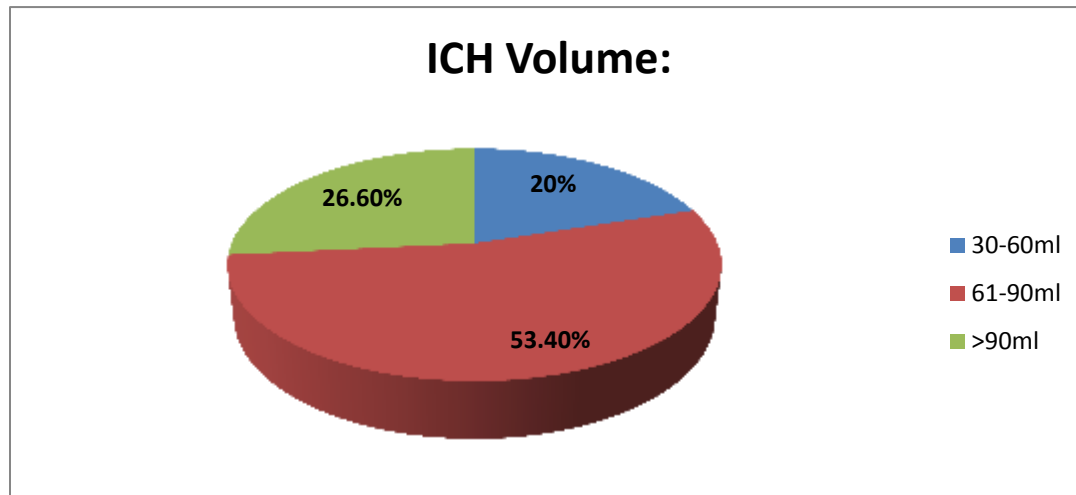


FIGURE 3: ICH VOLUME

ICH volume	Decompressive Craniotomy(DC)	DC+Evacuation	Endoscopic Evacuation
30-60	3	5	4
60-90	15	9	8
>90	7	5	4
Total	25	19	16
Mean±SD	77.68±17.71	76.89±24.44	74.06±21.14
P	0.86, not significant		

Table: 3 Surgeries Performed Based On Volume Of Hematoma

In our study, the mean ICH volume for Decompressive Craniotomy (DC) was 77.68±17.71, DC + Evacuation 76.89±24.44 volume, & For Endoscopic Evacuation was 74.06±21.14 with a P value 0.86 which was statistically not significant.

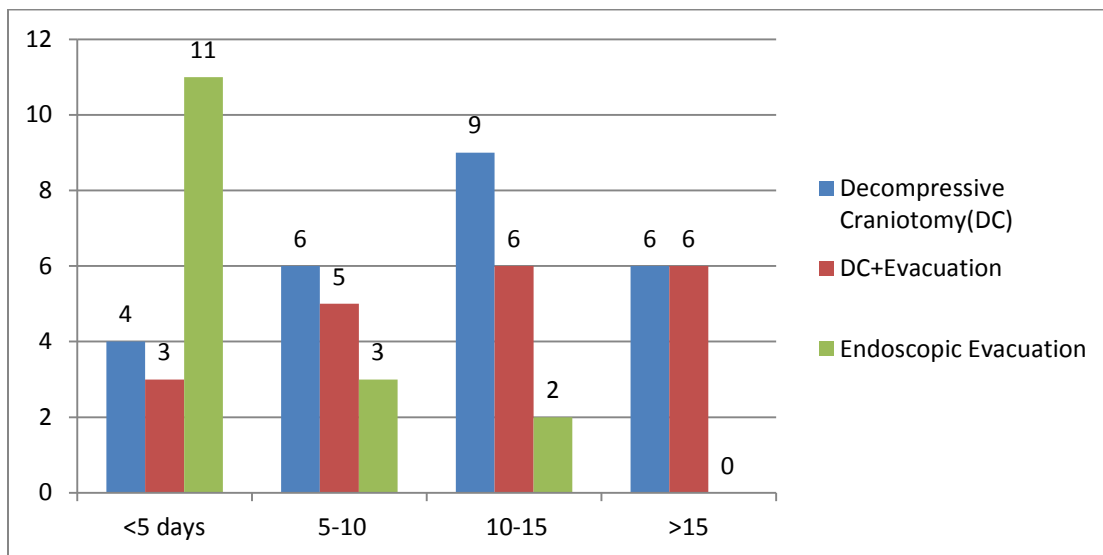
Pre op GCS	Decompressive Craniotomy(DC)	DC+Evacuation	Endoscopic Evacuation
6-8	5	8	6
9-11	12	6	5

12-15	8	5	5
Total	25	19	16
Mean±SD	10.84±2.42	10.21±3.32	2.96±0.74
P	0.773, not significant (using One-Way ANOVA)		

**Table: 4 Surgeries Performed Depending On Pre Op Gcs**

In our study, 19 patients presented with Preop GCS 6-8, 23 patients presented with Preop GCS 9-11, 18 patients presented with Preop GCS 12-15.

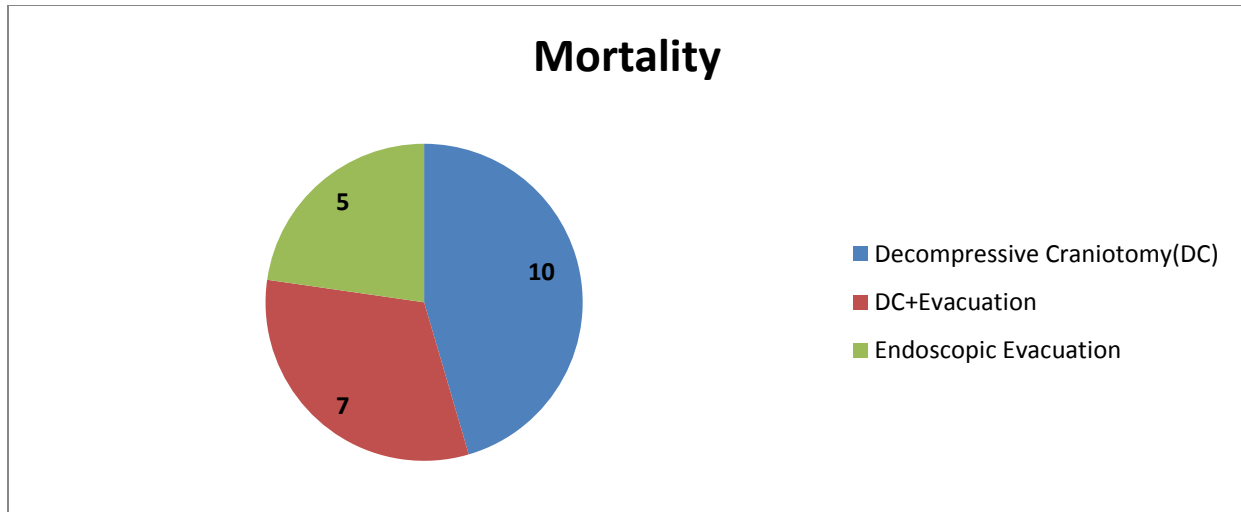
In the present study, the mean duration of ICU STAY for Decompressive Craniotomy (DC) was 11.16±4.81, DC + Evacuation 10.63±4.87, & For Endoscopic Evacuation was 4.04±1.01 with a P value 0.001, which was statistically significant.



**Fig: 4 DURATION OF ICU STAY**

**Mortality:**

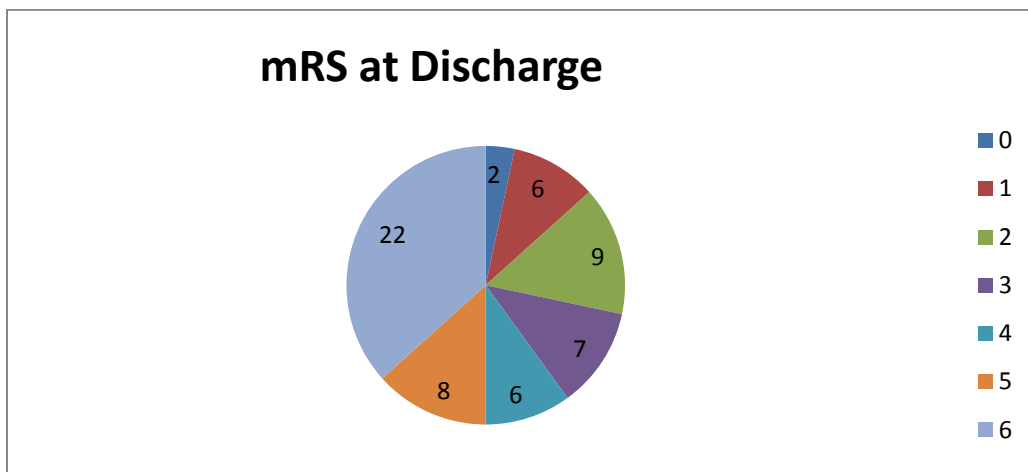
In the present study, the Mortality rate in Decompressive craniectomy was 10 cases and in patients with Decompressive craniectomy with Evacuation of hematoma was 7 cases and in Endoscopic evacuation of hematoma was 5 cases.



**FIG: 5 MORTALITY**

**mRS at Discharge**

In our study mRS score is 6 in 22 patients, mRS 5 in 8 patients, mRS 4 in 6 patients, mRS 3 in 7 patients, mRS 2 in 9 patients, mRS 1 in 6 patients, mRS 0 in 2 patients at the time of discharge.



**FIG: 6 mRS at discharge**

**Complications:**

In the present study 7 patients in Decompressive craniectomy developed wound infection in 2 patients, 2 patients with rebleeding, 2 patients with pneumonia & 1 patient with CSF leak. In patients with Decompressive craniectomy with Evacuation of hematoma 11 patients develop



complications with wound infection in 1 patient , 4 patients with rebleeding, 3 patients with pneumonia & 3 patient with CSF leak. In patients with Endoscopic Evacuation of hematoma 6 patients presented with complications with 0 patient presented with wound infection, 3 patients with rebleeding, 1 patients with pneumonia 2 patient with CSF leak.

<b>Complications</b>	<b>Decompressive Craniectomy(DC)</b>	<b>DC+Evacuation</b>	<b>Endoscopic Evacuation</b>
Wound infection	2	1	0
Rebleeding	2	4	3
Pneumonia	2	3	1
CSF leak	1	3	2
<b>Total</b>	7	11	6

**Table: 6 COMPLICATIONS**

The outcomes will be recorded and analysed at the end of the study using statistical package for social science (SPSS).

**Discussion:**

Spontaneous intracerebral hemorrhage is devastating with 40 day mortality of upto 37%. The aim of the present study is to study the various risk factors and to compare the efficacy and outcome different surgical modalities in the intracranial hemorrhage i.e, Decompressive craniectomy, Decompressive craniectomy with evacuation of hematoma and Endoscopic evacuation of hematoma.

In the present study, the most common incidence is seen in 61-70 age group which is 55% followed by 51-60 years which is 25% which is increasing with advancing age similar to study done by Broderick J .et.al,<sup>13</sup> 42% and 28%.Ariesen MJ.et.al<sup>14</sup>,32% and 26% Meretoja A.et.al,<sup>15</sup> 52% and 24% which is correlating with the present study.

In the present study, the most common incidence is seen in males 70% which is similar to study done by Meretoja A.et.al<sup>15</sup>, which is 53%, Ariesen MJ.et.al<sup>14</sup> which is around 62%, Zhenj W.et.al<sup>16</sup>, which is around 64%.

In the present study, Hypertension is the most common modifiable risk factor in 37% cases which is most commonly associated with deep seated capsulo ganglionic bleed compared to lobar bleed. Hypertension causes high pressure within the Circle of Willis resulting in smooth cell proliferation followed by smooth muscle cell death. This may explain why hypertension related ICH are frequently located deep within the basal ganglia, thalamus, cerebellum, pons and rarely the neocortex. It is similar to other studies done by Narayan.et.al<sup>17</sup> 47%, Meretoja.et.al, was 63%. This reveals that ICH is more common in patients with poor BP control i.e, irregular treatment. This can be supported by a study conducted by Daniel Woo, Mary Harenbusch (stroke 2004; 35:1703-1708) concludes that 'Untreated hypertension is highly prevalent and important risk factor for Hemorrhagic strokes.

In the present study, Smoking is also a significant risk factor for intracerebral hemorrhage of which 35% of people is having as an individual risk factor or may be associated with some other risk factor. Here it included both smokers and exsmokers who is having past history of smoking. The present study is similar to other studies done by Bell.et.al<sup>18</sup> having an incidence of 58.4% which is significant, woo.et.al<sup>19</sup> having an incidence of 38.5% and is contradictory to the study done by Ariesen.et.al which says that smoking is a weak risk factor or may not be the risk factor.

In the present study, the most common clinical presentation is weakness and hemiplegia in 38.4% followed by loss of consciousness seen in 30% of cases and the study is comparable to other study done by Narayan.et.al in which the most common presentation is hemiplegia seen in 42% of cases. In 2012, a small clinical study conducted by Adria Arboix et al. concluded that 66.7% of patients presented with motor deficit which is hemiplegia. Most of the symptoms due to intracerebral bleed is due to increase in intracranial pressure within the skull. Rarely the manifestations in intracerebral bleed may pose a difficulty in diagnosis due to myriad of clinical manifestations. So it is always advisable to have an neuroimaging done at the earliest. This would be crucial in identification as well as prognostications with respect to the complication based on various parameters in imaging<sup>20</sup>.

In our study, most of the patients presented with the volume of clot around 61-90ml with 53.4% similar to other studies done by Narayan.et.al which was 59.8%.patient having less volume of clot with good Pre op GCS had good outcome compared to patient with poor Pre op GCS with

large volume of clot. Pre op GCS also plays a very important role compared to the volume of clot.

In the present study the mean Preop GCS was not statistically significant among the 3 groups. In Decompressive craniectomy the mean Preop GCS is  $10.84 \pm 2.42$ . In Decompressive craniectomy and Evacuation of hematoma group the mean Preop GCS is  $10.21 \pm 3.32$  and in Endoscopic Evacuation of hematoma group the mean Preop GCS is  $2.96 \pm 0.74$  and the P value is 0.773 which is not significant

In the current study the Post op GCS was improved in all the 3 groups but this is not statistically significant and the P value is 0.225, which is similar to other study done by Cai.et.al where there is improvement in Post op GCS but not statistically significant P value is 0.735.

The mean ICU stay in the present study is significantly less in Endoscopic evacuation of hematoma group compared to Decompressive craniectomy and Decompressive craniectomy and evacuation of hematoma group which is statistically significant and the mean value in Endoscopic evacuation of hematoma group  $4.04 \pm 1.01$  compared to Decompressive craniectomy and Decompressive craniectomy and evacuation of hematoma group which is  $11.16 \pm 4.81$  and  $10.63 \pm 4.87$  and the P value is 0.001 which is statistically significant which is similar to other study done by cho.et.al<sup>21</sup> where the ICU stay is less compared to conventional craniotomy group. In the other study done by Wang.et.al where the endoscopic group was  $6.02 \pm 1.28$  and the craniectomy group was  $11.82 \pm 4.46$  which is similar to the present study. In the other study done by Fung.et.al the mean value in Endoscopic evacuation of hematoma group  $5.75 \pm 1.82$  and craniectomy group is  $9.82 \pm 1.28$ .

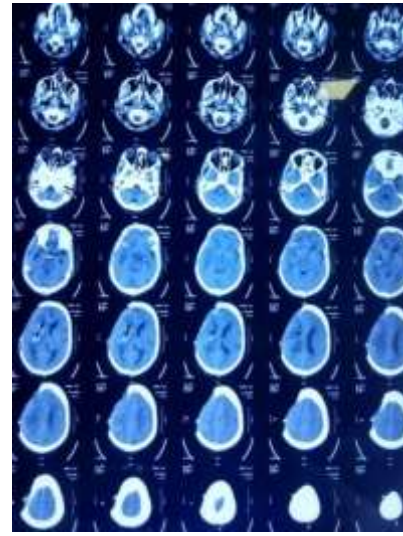
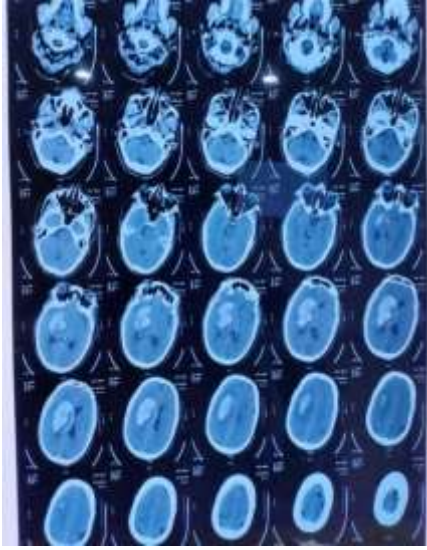
In the present study, the patients with lethal outcome of mRS 6 is 36.7% i.e is 22 patients of which decompressive craniectomy were 45.4% i.e 10 patients and decompressive craniectomy with Evacuation of hematoma were 31.8% i.e 7 patients and Endoscopic evacuation were 22.7% i.e, 5 patients which is comparable to other study done by Wang.et.al, where the mRS was calculated at 3 months 9.4% in endoscopic group and 0.4% in craniectomy group which is similar to present study. In the other study done by Fung.et.al in craniectomy group it was 25% with mRS 6. In the present study the Patients with large bleed and poor pre op GCS and with

midline shift of >5mm show lethal outcome. Among the patients with outcome of severe disability mRS 5 is 13.3% i.e, 8 patients Among them 3 underwent decompressive craniectomy which were 12%. 4 patients were decompressive craniectomy with Evacuation of hematoma i.e, 6.6% and 1 patients is from Endoscopic evacuation were 1.6%.

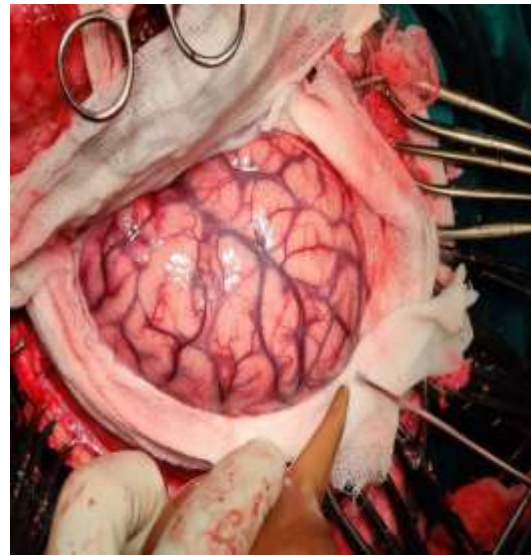
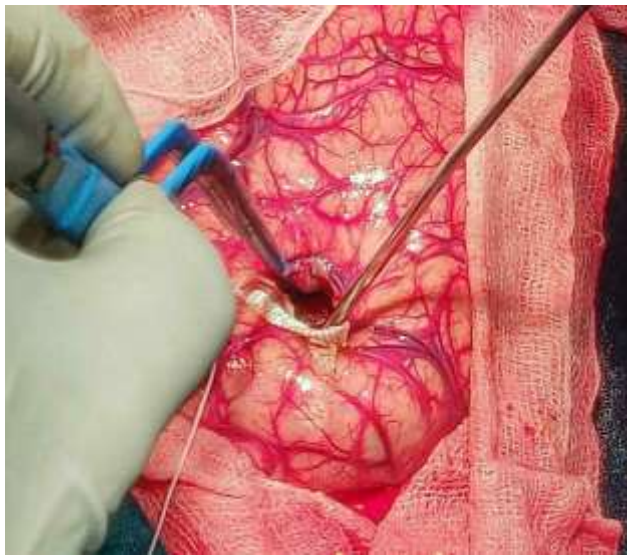
<b>mRS 6</b>	<b>OUTCOME</b>	<b>Decompressive craniectomy</b>	<b>DC+Evacuation Of Hematoma</b>	<b>EndoscopicEvacuation of hematoma</b>
Present study	Lethal	45.4	31.8	22.7
Wang.et.al	Lethal	0.4	–	9.4
Fung.et.al	Poor	25	–	–

In the present study, the Mortality rate in Decompressive craniectomy was 40% and in patients with Decompressive craniectomy with Evacuation of hematoma was 36.8% and in Endoscopic evacuation of hematoma was 31.2% which is similar to other study done by Cai.et.al in which Decompressive craniectomy was 14.3% and in Endoscopic evacuation of hematoma was 5%. In the other study done by Hayes.et.al Decompressive craniectomy showed 27% mortality and in Decompressive craniectomy with Evacuation of hematoma showed 33% of mortality.

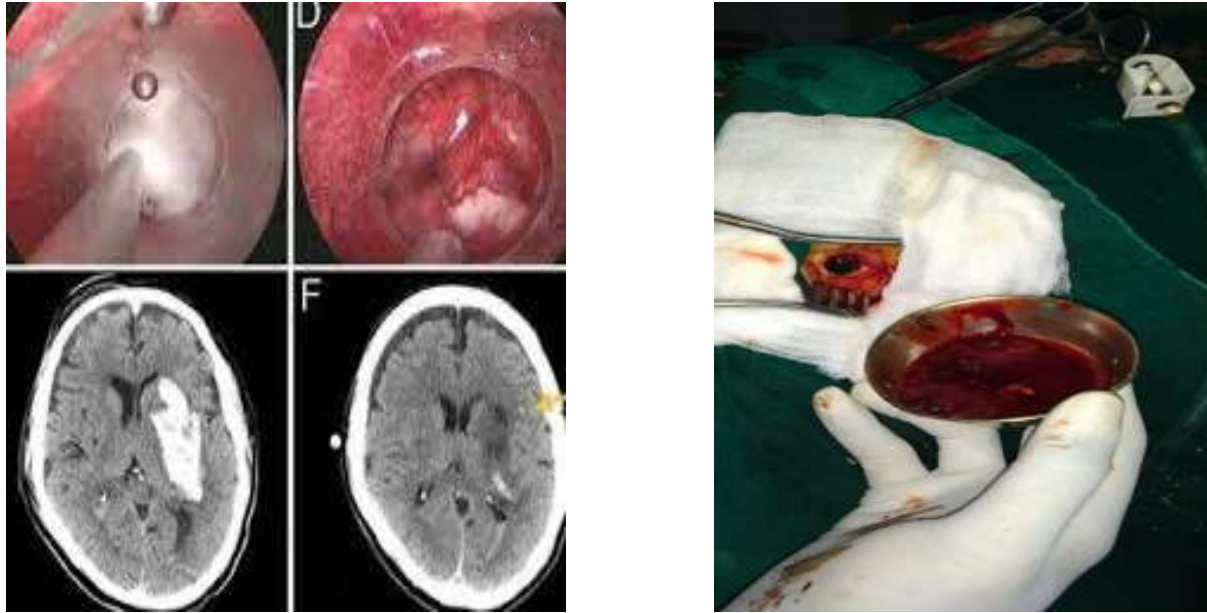
<b>Mortality</b>	<b>Decompressive Craniectomy</b>	<b>DC+Evacuation of hematoma</b>	<b>EndoscopicEvacuation of hematoma</b>
Present study	40	36.8	31.2
Cai.et.al	14.3	–	5
Hayes.et.al	27	33	–



**Fig: 7 Pre op & Post op CT scan of RIGHT SIDED INTRACEREBRAL BLEED**



**Fig: 8 Intra Op Picture Of Evacuation of Ic Bleed & Right Decompressive Craniectomy**



**Fig: 9 ENDOSCOPIC EVACUATION OF HEMATOMA**

**Limitations:**

The major limitations of our study are short follow up and the fact that the outcome assessment is restricted to mRS. Other important parameters, including cognitive disability etc. have not been assessed. Biomarkers and other novel predictors like neutrophil—lymphocyte ratio was not evaluated.

**CONCLUSION:**

- Pre op GCS has a major role for outcome of the patient. & the mortality rate is more in decompressive craniectomy group compared to other two groups. Patient with superficial and lobar bleeds had significant GOS and mRS outcome compared to deep seated bleeds, ICU stay and Ventilatory stay is significantly low in endoscopic evacuation group compared to other two groups.
- Decompressive craniectomy and evacuation of hematoma had good GOS and mRS outcome at discharge compared to other two groups in patients with >60ml volume and deep seated location bleeds.& Endoscopic evacuation of hematoma showed good outcome in patients with lobar bleeds with hematoma volume <60 ml.

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