

## A 2 Year Observation of Surgically Clipped Intracranial Aneurysms with Focus on Outcomes and Prognostic Factors; An Institutional Study

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### Abstract

All cases of intracerebral aneurysms admitted in Department of Neurosurgery, Osmania General Hospital, Hyderabad from December 2017 - December 2019 were analyzed based on factors like age, sex, co morbidities, aneurysm characteristics such as size, location, WFNS grading and Hess and Hunt scale and by Fisher's grade, day of ictus at the time of surgery etc. End point of study was recovery/discharge from hospital to death.

**Observation and Results:** 51 patients underwent clipping of cerebral aneurysms. Age ranged from 25 to 80 years, 2/3rds being female and age preponderance seen in 41-60 yr age group. 18 patients were hypertensive. Day of ictus at time of surgery ranged from 4 to 32 days. Anterior circulation aneurysms were in maximum number. Half of patients were admitted in WFNS grade I. 4 patients needed pre operative CSF diversion. 12 patients expired post operatively, out of which 7 patients were in age group 30 to 50 yrs. 5 out of 10 patients were hypertensive, 9 were in WFNS grade 4, 7 patients in higher Fisher's grade, 7 were operated in 2<sup>nd</sup> post ictal week and 4 patients had pre operative EVD.

**Conclusion:** Age, poor clinical grade, poor radiological grade, hypertension, pre operative hydrocephalus were found to be adversely affecting outcome.

**Keywords:** Neurosurgery; WFNS Grade; Fisher's Grade

### Introduction

Aneurysmal subarachnoid hemorrhage (SAH) is a common and frequently devastating condition, accounting for 5% of all strokes. Considerable advances have been made in endovascular techniques, diagnostic methods, and surgical and perioperative management paradigms. Nevertheless, outcome for patients with SAH remains poor, with population-based mortality rates as high as 45% and significant morbidity among survivors. No of factors have been shown to influence the operative results like sex, age, systemic hypertension, aneurysm characteristics, operative techniques, vasospasm, nature of intracerebral bleed, duration between presentation and surgery. So evaluation of treatment of aneurysm SAH in patients admitted in single institute and analysis of events post-operatively, which can provide information about prognostic factors, is needed. This study is one such attempt to evaluate the cases of cerebral aneurysm undergoing surgical clipping.

### Aims and Objectives

- To analyse the clinical data of all the patients who were admitted for intracerebral aneurysm clipping.
- To analyse the outcome of surgery and to assess the factors involved in favourable or unfavourable outcomes.

### Materials and Methods

Demographic data, detailed history of symptoms and other morbidities were recorded. All patients underwent a detailed systemic and neurological assessment.

### Investigations

- Routine hematological and biochemical investigations.
- Clinical grading - Hunt and Hess scale and with WFNS scale.

- CT scan, CT angiogram or conventional angiogram
- Fisher grading
- Operative details
- Post operative course
- Outcome - GOS
- Favourable outcome - as good recovery to moderate disability GOS 4-5.
- Unfavourable outcome was death/vegetative/severe disability 1-3.

## Results

### Age and sex distribution

S. No	Age group	Male	Female	Total
1	21-30	2	0	2 (3.9%)
2	31-40	4	3	7 (13.7%)
3	41-50	7	13	20 (39.2%)
4	51-60	5	6	11 (21.5%)
5	61-70	0	7	7 (13.7%)
6	71-80	1	3	4(7.8%)

**Table 1**

Age ranged from 25 to 80 years [mean being 48.3 years standard deviation being 12.6.]. Days from hemorrhage to admission varied from 0 to 7 days among 49 patients, 2 patients were admitted after 8<sup>th</sup> post ictal day.

### Co-morbid illness

S. No	Co-morbid illness	No. of patients
1	Hypertension	18
2	Diabetes	7
3	Coronary artery disease	2
4	Hypothyroid	1

**Table 2**

Headache was most common symptom, followed by loss of consciousness. 24 patients had GCS 15 without any neurological deficits. 38 patients had GCS from 11 to 15. None of the patients were GCS less than 7. 14 patients had neurological deficits including cranial nerve palsies or motor deficit. 22 patients were in Hess and Hunt grade I indicating good neurological status pre operatively. 27 patients amounting to 52.9% were WFNS grade I.

HESS AND HUNT SCALE

WFNS GRADE

**Figure 1**

### Fisher grading

2/3 of our patients were in good grade, 45% of our patients were in Fisher Grade 2, and 30% of them in Fisher's grade 3.

Sl. no	Grade	No. of patients	Percentage
1	I	7	13.7%
2	II	23	45%
3	III	15	29.4%
4	IV	6	11.7%

**Table 3**

Size of aneurysms smaller < 10 mm were 41, 9 were > 10mm and one was a giant aneurysm

**Figure 2**

Pre op CSF diversion

S. No		No. of patients
1	EVD	4
2	A Com	18
3	MCA	12
4	ICA	9
5	PCom	3
6	ACA	4
7	Ophthalmic	1
8	PCA	1
9	Basilar	3

Table 4

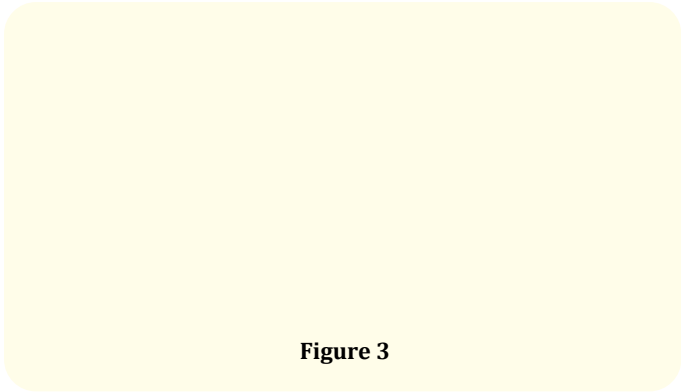


Figure 3

Mortality statistics

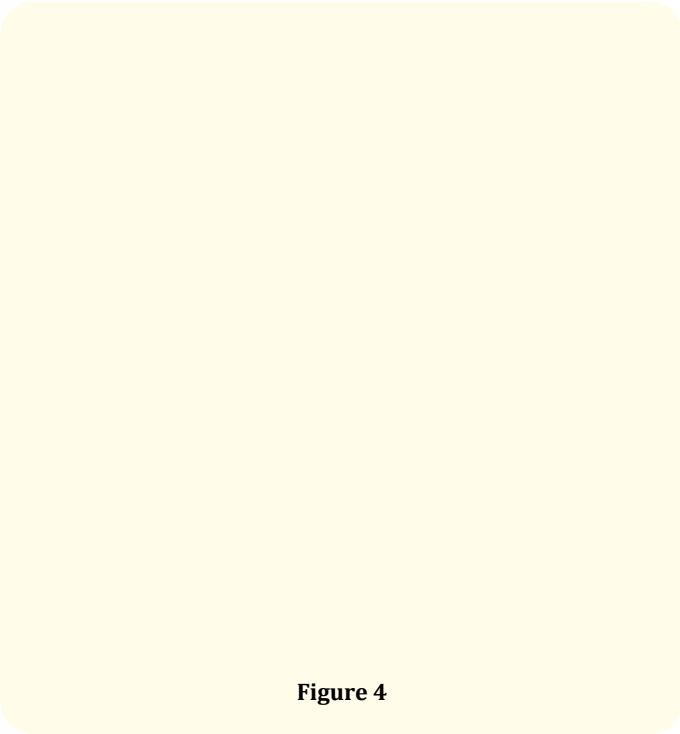


Figure 4

Basilar tip aneurysm

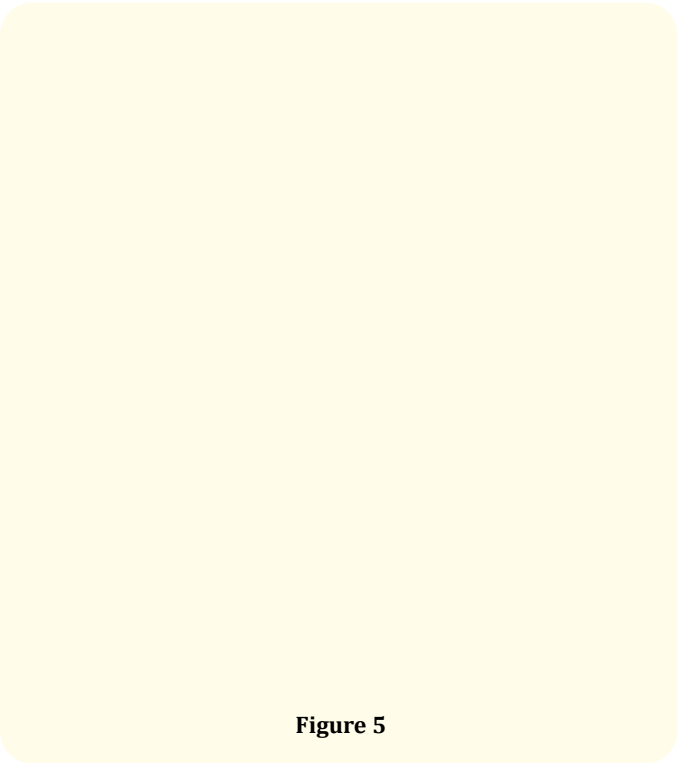


Figure 5

Post operative complications

S. No	Post-op	No. of patients
1	Ischemic deficits	14
2	Chest infection	2
3	Wound infection	2
4	Meningitis	1
5	DVT	1
6	Metabolic	2

Table 5

Glasgow outcome scale

GOS	No. of patients	Percentage
1	12	23.5%
2	1	1.9%
3	5	9.8%
4	4	7.8%
5	29	56.8%

Table 6

## Discussion

This Discussion reflects on the results and observations of 51 patients operated for intra cranial aneurysms. Of 51 patients 2/3 were females, male to female ratio being 1:2.38. Study from university of Bloemfontein, South Africa also reported female preponderance, male to female ratio being 1:1.6 (1). Studies from 90 Newcastle group also show female preponderance. Data from Rio De Janeiro and another study from Egypt [1] showed comparable to this data.

Age preponderance was seen mainly in age 41-60 yr accounting for 62.7%. Ranganadhan., *et al.* reported 72% in 4-6 the decade [2], Banerji reported 67% [3], while Fox -74% and Stabbert 60%.

Bloemfontein study shows 61.4% in > 40 years affected [4]. Brazil study age group ranged from 5 to 77 years (median age 45.4 years).

Hypertension was one of poor prognostic factor. Sites of aneurysms - common site was ACOM 35.2%, followed by MCA 23.5% and ICA 17.6%. Findings are comparable to Pakarinen [5]/Banerji [3] studies.

In our study 43% patients were in Hess and Hunt grade 1. Grade 2 and grade 3 had 21.5% and 23.5% patients respectively. More than 50% patients were in World Federation of neurology Surgeon's Grade 1.

Most of our patients were operated in period of 8 - 14<sup>th</sup> post ictal day amounting to 50% of the patients and 5 patients could be operated in the 1<sup>st</sup> week. As contrast to Inagawa, Lunggren, international coop study where most patients were operated early [6].

Four patients developed preoperative IVH and hydrocephalus and needed preoperative external ventricular drain placement. All of the 4 patients expired. This was found to be statistically significant. Rosengart., *et al.* also found IVH with hydrocephalus to be poor prognostic factor [7].

## Post op complications

Post operative ischemic deficits were seen in 14 patients out of which 7 had poor gcs and 7 had focal neurological deficits. 2 patients each developed chest infections, wound infection and hyponatremia. One patient developed meningitis and one developed DVT both of them expired.

Out of 51 patients operated, 33 patients amounting to 65% were discharged without any neurological deficits. 6 patients were

discharged with deficits and 12 patients expired making 23% of the patient population.

Madhukar., *et al.* found comparable results in their study with good outcome in 74.3% and mortality of 20% [8].

## Conclusion

Aneurysms were seen mostly in 4<sup>th</sup> to 6<sup>th</sup> decade of life with female preponderance. 70% of patients reached the hospital at 7 -10 days after ictus. Majority of patients were in WFNS Gr 1-3. Most of patients operated in late phase. Unfavourable outcome was seen in patients with poor grade, poor gcs, hypertension, patient with hydrocephalus, post op ventilator support. Favorable outcome was seen in 65% at time of discharge and mortality was 23.5%.

Limitations of this study are small number of patients, imaging modalities like angiogram suite, TCD studies not available and follow up not possible due poor patient compliance, 15 patients out of 33 discharge turned up for follow up.

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