

Assessment of Comparison between Outcomes of Endovascular and Surgical Treatments of Ruptured Anterior Communicating Artery Aneurysms

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ABSTRACT

Background: Aim: To assess outcomes of endovascular and surgical treatments of ruptured anterior communicating artery aneurysms. **Methods:** Ninety- two anterior communicating artery (Acom) aneurysm were divided into 2 groups. Group I were treated with clipping and group II with coiling. Each group comprised of 46 patients. Incidence of short- and long-term complications were assessed. Outcomes were assessed using the Glasgow Outcome Scale (GOS). **Results:** Mean age was 56.4 years in group I and 57.2 years in group II. Male: Female ratio was 20:26 in group I and 14:32 in group II. WFNS grade I was seen in 18 in group I and 25 in group II and II in 5 and 2, III in 1, IV in 14 and 12 and V in 3 and 2 in group I and II respectively. Fisher grade 1 was seen in 1 and 6, 2 in 2 and 8, 3 in 9 and 10 and 4 in 30 and 18 in group I and II respectively. Time of treat was 1 day in group I and 2 days in group II. Residual aneurysm was 2 in group I and 7 in group II. Glasgow outcome score (GOS) was 5 seen in 16 and 11, 4 in 15 and 8, 3 in 6 and 10, 2 in 3 and 7 and 1 in 2 and 6. Length of stay was 23.2 days in group I and 13.6 days in group II. Recurrence was seen in 2 in group I and 8 in group II. A significant difference was observed ($P < 0.05$). **Conclusion:** There was increased risk of residual and recurrent ACOM aneurysms in patients treated with coiling than treated with surgical clipping.

Keywords: Anterior communicating artery, Aneurysm, Glasgow outcome score.

INTRODUCTION

Anterior communicating artery (Acom) aneurysm has a higher risk of rupture than the other aneurysms. Therefore, treatment of Acom aneurysm is essential and critical for prevention of aneurysmal subarachnoid hemorrhage.^[1-3] However, surgical treatment of Acom aneurysm is still challenging due to anatomic complexity. Acom aneurysm shows a variety of anomalies and complex anatomy like fenestrated, triplicated, and azygous anterior cerebral artery.^[4-6]

Intracranial aneurysm rupture causing subarachnoid haemorrhage (SAH) occurs with a frequency of 6–8/100,000 in the developed world.^[7] Anterior communicating artery aneurysms are the most common and account for approximately 30% of aneurysmal SAH in adults.^[8] Aneurysms in this location can be technically challenging from a surgical perspective. Since the introduction of Guglielmi Detachable Coils in 1991, the inherently less invasive endovascular approach has become a feasible treatment option.^[9]

Since endovascular treatment has emerged as a feasible and acceptable option for aneurysm treatment, Alshekhlee et al,^[10] reported that hospital mortality was higher in patients who had surgical clipping than in those who had endovascular coiling (1.6% versus 0.57%). However, retreatment after initial treatment was performed in 17.4% of patients

in the endovascular treatment (EVT) group and in 3.8% of patients in the surgical clipping group in an International Subarachnoid Aneurysm Trial (ISAT) study. The present study compared outcomes of endovascular and surgical treatments of ruptured anterior communicating artery aneurysms.

MATERIALS AND METHODS

A total of ninety- two anterior communicating artery (Acom) aneurysm reporting to neurosurgery department of both genders were included in the study. Institutional review board regarding approval of the study was obtained.

Patient demographics was recorded. Patients were divided into 2 groups. Group I were treated with clipping and group II with coiling. Each group comprised of 46 patients. World Federation of Neurological Surgeons (WFNS) grade, Fischer grade, aneurysm characteristics. Incidence of short- and long-term complications were assessed. Outcomes were assessed using the Glasgow Outcome Scale (GOS). Cognitive and memory deficits were recorded at discharge and formally assessed on neuropsychology follow-up. Results of the present study after recording all relevant data were subjected for statistical inferences using chi- square test. The level of significance was significant if p value is below 0.05 and highly significant if it is less than 0.01.

RESULTS

Mean age was 56.4 years in group I and 57.2 years in group II. Male: Female ratio was 20:26 in group I and 14:32 in group II. WFNS grade I was seen in 18 in group I and 25 in group II and II in 5 and 2, III in 1, IV in 14 and 12 and V in 3 and 2 in group I and II

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respectively. Fisher grade 1 was seen in 1 and 6, 2 in 2 and 8, 3 in 9 and 10 and 4 in 30 and 18 in group I and II respectively. A significant difference was observed ($P < 0.05$) [Table 1].

Table 1: Baseline characteristics

Parameters	Group I	Group II	P value
Mean age (years)	56.4	57.2	>0.05
Male: Female	20:26	14:32	>0.05
WFNS grade I	18	25	<0.05
II	5	2	
III	0	1	
IV	14	12	
V	3	2	
Fisher grade 1	1	6	<0.05
2	2	8	
3	9	10	
4	30	18	

Table 2: Aneurysm characteristics

Parameters	Group I	Group II	P value
Neck (mm)	1.8	1.6	>0.05
Dome (mm)	3.7	4.0	>0.05
Neck: Dome ratio	2.4	2.5	>0.05
Diameter (mm)	3.1	3.3	>0.05
Size (mm)	4	4	>0.05
Parent vessel diameter (mm)	2	1.7	>0.05
Incorporating ACOM artery	9.2	26.5	<0.05

The mean neck (mm) size was 1.8 and 1.6, dome (mm) size was 3.7 and 4.0, neck: dome ratio was 2.4 and 2.5, diameter (mm) was 3.1 and 3.3, size (mm) was 4 and 4, parent vessel diameter (mm) was 2 and 1.7 and incorporating ACOM artery was 9.2 and 26.5 in group I and II respectively. A non-significant difference was observed ($P > 0.05$) [Table 2, Figure 1].

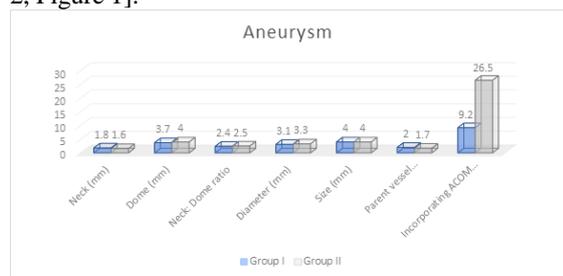


Figure 1:

Table 3: Outcomes of treatment

Parameters	Group I	Group II	P value
Time of treat (Days)	1	2	<0.05
Residual aneurysm	2	7	<0.05
Glasgow outcome score (GOS)			
5	16	11	<0.05
4	15	8	
3	6	10	
2	3	7	
1	2	6	
Length of stay (days)	23.2	13.6	<0.05
Recurrence	2	8	<0.05

[Table 3] shows that time of treat was 1 day in group I and 2 days in group II. Residual aneurysm was 2 in group I and 7 in group II. Glasgow outcome score (GOS) was 5 seen in 16 and 11, 4 in 15 and 8, 3 in 6 and 10, 2 in 3 and 7 and 1 in 2 and 6. Length of stay was 23.2 days in group I and 13.6 days in group II. Recurrence was seen in 2 in group I and 8 in group II. A significant difference was observed ($P < 0.05$).

DISCUSSION

The present study compared outcomes of endovascular and surgical treatments of ruptured anterior communicating artery aneurysms. We enrolled 92 cases in which group I were treated with clipping and group II with coiling. Each group comprised of 46 patients. Ramos et al,^[11] reported that gyrus rectus resection could cause cognitive and psychiatric dysfunction caused by orbital prefrontal cortex lesion or a disconnection in the ventromedial circuits. Another key problem of surgery of Acom aneurysm is an olfactory nerve injury. In some cases of Acom aneurysms, especially superior or posterior direction, the frontal base is retracted to some degree in order to access the aneurysm. During the frontal lobe retraction, the olfactory nerve can be easily detached from the cribriform plate.^[12]

In our study, mean age was 56.4 years in group I and 57.2 years in group II. Male: Female ratio was 20:26 in group I and 14:32 in group II. WFNS grade I was seen in 18 in group I and 25 in group II and II in 5 and 2, III in 1, IV in 14 and 12 and V in 3 and 2 in group I and II respectively. Fisher grade 1 was seen in 1 and 6, 2 in 2 and 8, 3 in 9 and 10 and 4 in 30 and 18 in group I and II respectively. Harris et al,^[13] in their study 137 patients were included in the study. 113 aneurysms were coiled and 19 were clipped. Management decisions were taken by the multidisciplinary team based on aneurysm morphology or the presence of a haematoma exerting mass effect. There were 187.5 patient-years of follow-up, with a median of 3 years (range 0–73 months). Rates of vasospasm, infarction, CSF diversion, rebleed, length of stay, and functional outcome were not significantly different in the two cohorts. There was a statistically significant increase in the risk of ACOM recurrence in the coiled group when compared to the clipped group at one year. 15 patients required further treatment at a median time of 16 months. In a subgroup group analysis of coiled aneurysms, there was no statistical differences in rates of rebleeding or the functional outcome in those that had aneurysm recurrence and those that did not. We observed that the mean neck (mm) size was 1.8 and 1.6, dome (mm) size was 3.7 and 4.0, neck: dome ratio was 2.4 and 2.5, diameter (mm) was 3.1 and 3.3, size (mm) was 4 and 4, parent vessel diameter (mm) was 2 and 1.7 and incorporating ACOM artery was 9.2 and 26.5 in group I and II respectively. A study by Jang et al,^[14] comprised of 260 patients of Acom

aneurysms. Recurrence of Acom aneurysms occurred in 38 (14.6%) patients. Mean follow-up duration was 27 months (range 1–110). Multivariate logistic regression indicated that ruptured aneurysm, dome direction (anterior), maximal diameter, and mean age were independent risk factors for aneurysm recurrence. Of 38 cases of recurrence, 10 (3.8%) patients underwent retreatment. Ruptured aneurysm, maximal diameter, inflow angle and Raymond-Roy classes II and III showed significant relation to retreatment in multivariate logistic regression analysis.

Time of treat was 1 day in group I and 2 days in group II. Residual aneurysm was 2 in group I and 7 in group II. Glasgow outcome score (GOS) was 5 seen in 16 and 11, 4 in 15 and 8, 3 in 6 and 10, 2 in 3 and 7 and 1 in 2 and 6. Length of stay was 23.2 days in group I and 13.6 days in group II. Recurrence was seen in 2 in group I and 8 in group II. The International Subarachnoid Aneurysm Trial (ISAT) and other studies have shown patients with ruptured aneurysms may have significant advantages in disability independent survival and functional outcomes when treated endovascularly versus surgically. Reported disadvantages of endovascular treatment include rebleeding and recurrence, and questions remain about the durability of coils over time.^[15]

CONCLUSION

It was observed that there was increased risk of residual and recurrent ACOM aneurysms in patients treated with coiling than treated with surgical clipping.

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