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Research Article

### ENDOVASCULAR TREATMENT OF POSTERIOR CIRCULATION ANEURYSMS: A SINGLE CENTER'S EXPERIENCE OF 111 CASES

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**Abstract:**

**Objective:** Endovascular treatment is considered as the cure at initial level treatment modality for posterior circulation aneurysms. In this work, we analyze the treatment patterns and complication rates of treatment of endovascular system for the circulation in the posterior aneurysms treated in our center.

**Methods:** This is a cross-sectional examination. Amid the underlying treatment, the angiographic projections in the aneurysm were utilized. The speeds of the aneurysm impediment were resolved. The condition of the clinical at introduction was dictated by the Hunt-Hess reviewing framework. Pre-procedural and post procedural clinical information were acquired from examinations directed by neurosurgeons of the stroke unit.

**Results:** 44.1% of patients were between 40 and 50 years with 52.3% of patients being females. Vertebral artery aneurysms were the most commonly encountered with a percentage of 30.6%. Coiling was performed in 46.8% of patients, and stent-assisted coiling was performed in 32.4% patients. Clinical deterioration was the most common posttreatment complication (18%). Nutritional deficit was the second most common posttreatment complication (15.3%). The in-hospital mortality was 5.4%. The mean follow-up was 9.59 months (range 2–48 months). There was no mortality during the follow-up period.

**Conclusion:** All the results of these outcomes propose that multimodality of the board ought to be recommended for a good outcome in the cure of back dissemination aneurysms. Neurosurgeons and Interventional neuroradiologists ought to consider the area of back flow aneurysms before the treatment.

**Keywords:** Posterior circulation aneurysms; coiling; clipping; flow diversion.

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## INTRODUCTION:

Surgical treatment of posterior circulation aneurysm (PCA) is a good competition to the neurosurgeons [6] and may lead to severe postoperative neurological deficits [12]. Microsurgery for PCA has been linked with many of the issues that may involve different fields of operation between anatomical types of structures that show complexity. The endovascular treatment (EVT) of posterior circulation of aneurysms has formed reasonable success during the past years. This was possible due to the emergence of new techniques and devices like self-expandable stents and remodeling balloons [1,5,8].

A microsurgical treatment of PCA is, therefore, becoming less frequently utilized in comparison to endovascular treatment modalities [2,10]. This is clearly explained by the high morbidity in microsurgical series in contrast to the better neurological outcomes with EVT.

The current knowledge was initiated to observe the treatment pattern and complication rates of endovascular treatment of PCA in our center.

## MATERIALS AND METHODS:

This was a counter study conducted in the Department of Neurosurgery, the first linked healthcare center of Xinjiang Medical University during the period 2010–2018. The research was accepted by the Ethical Committee of the Institute and permission was granted by each one of the person involved in the study.

Amid the underlying treatment, the angiographic estimates of the aneurysm were utilized. The speeds of aneurysm impediment were resolved. The condition of clinic at introduction was dictated by the Hunt-Hess reviewing framework [7]. Information of clinic were acquired from examinations directed by stroke unit neurosurgeons when the system.

### Methods:

For diagnosis, all the patients underwent Head CTA and DSA. In nonemergency patients with fusiform aneurysms, MRI brain was additionally performed. In patients with subarachnoid hemorrhage (SAH) or intraventricular hemorrhage (IVH), nimodipine is pumped with micropump (pump volume is adjusted according to the patient's blood pressure) to relieve vasospasm.

For patients with under consideration of treatment with stent-assisted embolization or stent insertion only, oral clopidogrel (75 mg qd), Aspirin (100 mg qd) administered three days before the endovascular

therapeutic procedure.

Patients in crisis circumstance who were considered for stent-helped embolization or stent addition just, stacking oral portion of antiplatelet operators (clopidogrel 225 mg, Aspirin Enteric covered tablets 300 mg) was regulated 2 hours before the technique. Each and every medicinal methodology was conducted in the normal conditions of anesthesia. A 6F vein layer was utilized in the correct ordinary femoral corridor. Trademark angiography was conducted utilizing a 5F catheter to review the aneurysm and dimension of vaso-spasm comparatively as other vascular anomalies of cerebral region. Right after when person got treatment of endovascular, indisputable sorts of treatment of endovascular was performed relying upon sort and area of aneurysms. The treatment of reconstruction was performed utilizing 1–2 covering stents with or without winding. The treatment system was picked by the patient's introduction, aneurysm shape, and life structures of the vertebrobasilar lobby. Whole body was heparinized during the procedure (intravenous injection of 50–70 nU/kg, and then ½ of the first dose per hour); guided catheter and micro catheter have continuous perfusion of heparinized NS (heparin concentration 4,000 U/1 L).

Echelon-10 (EV3 company, US) or SL-10 (BOSTON company, US) microcatheters were used for coil insertion. Trexcesse microguidewire was usually used. For patients with stent-assisted embolization or stent only, solitary AB stent or LVIS stent was used. Rebar18 micro catheter is used for solitary AB stent insertion. Headway21 microcatheter is used for LVIS stent insertion. For the aneurysm in parent artery, the distal end of the stent was at least over 4 mm of the aneurysm neck.

For patients with stent placement or stent-assisted embolization, heparin sodium having less weight in molecular form or heparin calcium having less weight in molecular form (0.4 ml/12 hours) was given via subcutaneous injection for 3 days as oral clopidogrel 75 mg qd and Aspirin 100 mg qd, and after procedure, aspirin 100 mg qd was given continuously for 3–6 months.

According to the CT results before and after the operation, the patients with SAH (large amount of SAH and patients with IVH) after the operation, the lumbar puncture or the continuous drainage with the lumbar drain insertion for 3–5 days was considered.

### Statistical analysis

The descriptive statistics such frequencies and

percentages are presented. The 95% confidence interval of mean follow-up was calculated. All these experiments were conducted on SPSS 16.0 version (Chicago, Inc., USA).

### RESULTS:

More than half of patients were between 40 and 50 years (44.1%) followed by >60 (22.5%), 51–60 (20.7%), and <40 (12.6%) years. Most of the patients were females (52.3%) (Table 1).

**Table 1.** Age and gender distribution of patients.

| Age and gender          | No.<br>(n = 111)          | %    |
|-------------------------|---------------------------|------|
| <40                     | 14                        | 12.6 |
| 40–50                   | 49                        | 44.1 |
| 51–60                   | 23                        | 20.7 |
| >60                     | 25                        | 22.5 |
| Mean±SD, Median (Range) | 50.33 ± 12.58, 49 (10–79) |      |
| Gender                  |                           |      |
| Male                    | 53                        | 47.7 |
| Female                  | 58                        | 52.3 |

Vertebral artery (VA) was the most usual circulation of posterior aneurysm cured (30.6%). Tip of BA was found to be the second most common posterior circulation aneurysm (25.2%). BA was the third most common posterior circulation aneurysm (16.2%). PCOM and VBA both were the least common posterior circulation aneurysms, each constituting 0.9% (Table 2).

**Table 2.** Distribution of posterior circulation aneurysms.

| Location*                                   | No.<br>(n = 111) | %    |
|---|------------------|------|
| Posterior communicating artery (PCOM)       | 1                | 0.9  |
| Basilar artery (BA)                         | 18               | 16.2 |
| Vertebral artery (VA)                       | 34               | 30.6 |
| Vertebro-basilar aneurysms (VBA)            | 1                | 0.9  |
| Posterior cerebral artery (PCA) P1 segment  | 8                | 7.2  |
| Posterior cerebral artery (PCA) P2 segment  | 2                | 1.8  |
| Posterior inferior cerebellar artery (PICA) | 14               | 12.6 |
| Superior cerebellar artery (SCA)            | 10               | 9.0  |
| Tip of BA                                   | 28               | 25.2 |

\*Multiple responses.

Coiling treatment was performed in 46.8% patients, and stent assisted coiling was done among 32.4% patients. However, clipping was performed in 14.4% patients. The percentage of other treatment modality performed was less than 5% (Table 3).

**Table 3.** Distribution of treatment of posterior circulation aneurysms.

| Treatment              | No.<br>(n = 111) | %    |
|------------------------|------------------|------|
| Clipping               | 16               | 14.4 |
| Coiling                | 52               | 46.8 |
| Stent assisted coiling | 36               | 32.4 |
| Flow diversion         | 3                | 2.7  |
| Stent only             | 3                | 2.7  |
| PVO                    | 1                | 0.9  |

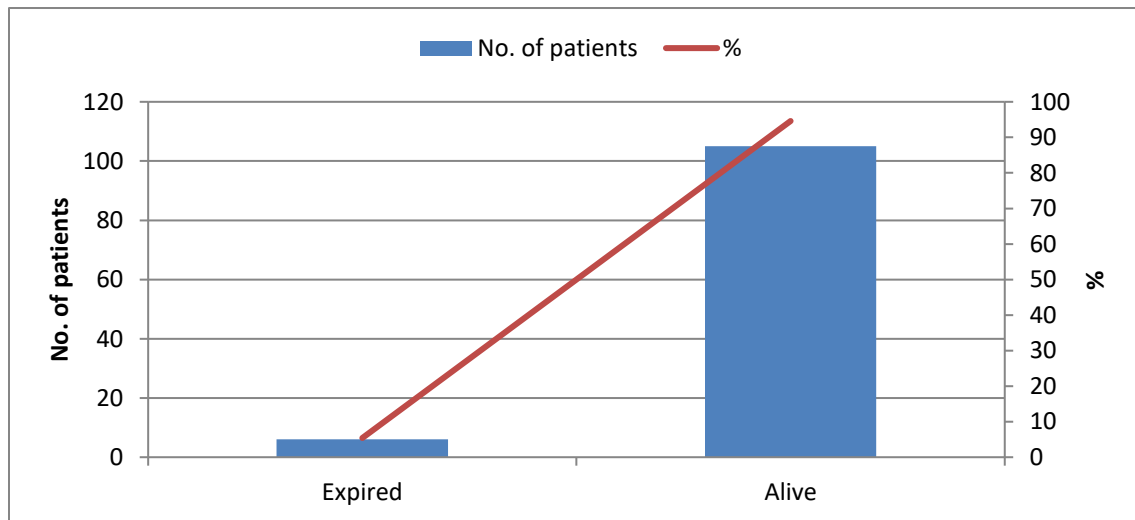
Deterioration was found to be the most common posttreatment complication (18%). Nutritional deficit was the second usual problems after the treatment (15.3%). Infarction was the third most usual problems after the treatment (7.2%). Parent vessel occlusion (PVO) stenosis was found to be the least common complication (1.8%) (Table 4).

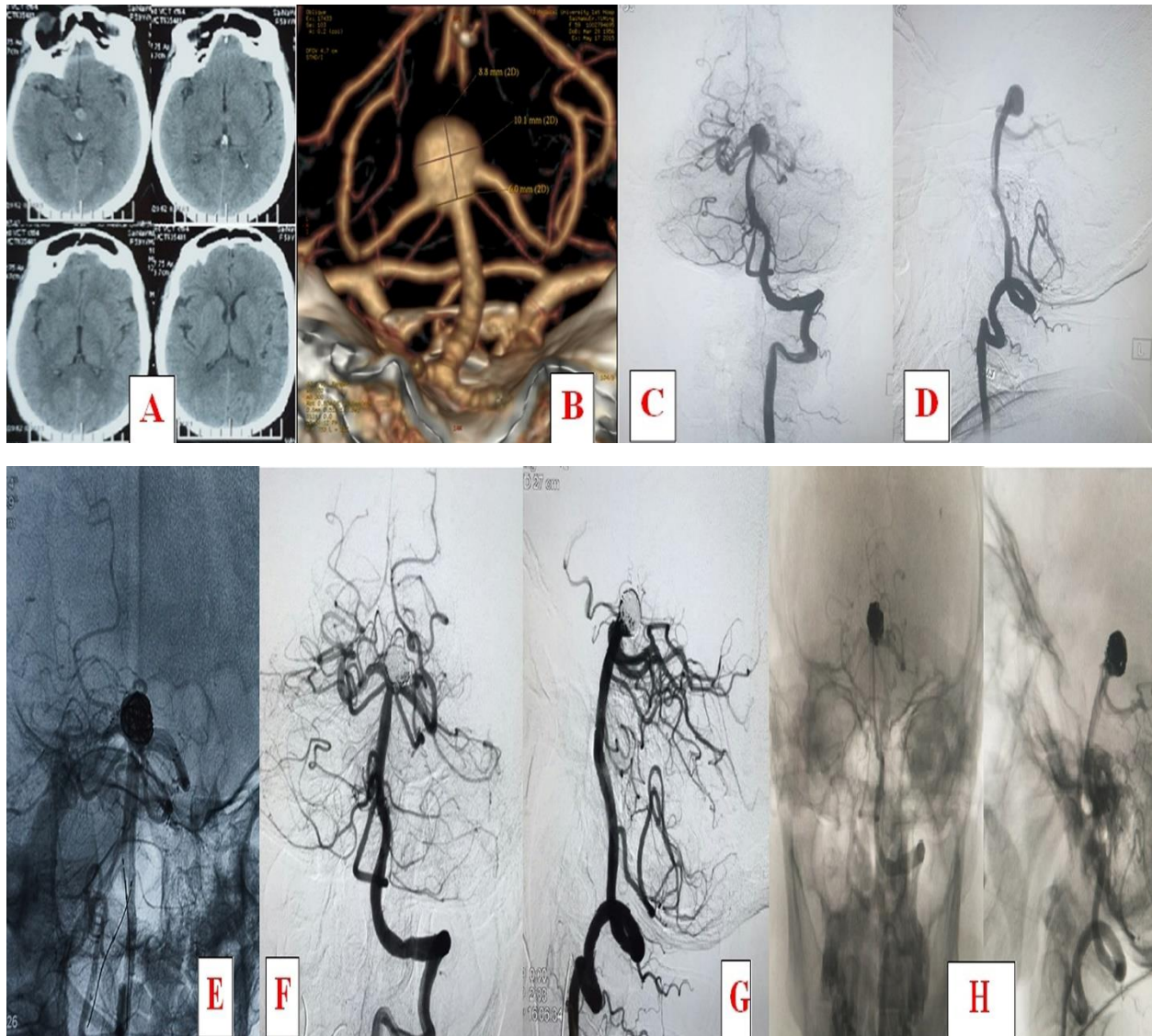
**Table 4.** Distribution of complications in post treatment of posterior circulation aneurysms.

| Complications*         | No.<br>(n = 111) | %    |
|------------------------|------------------|------|
| Aneurysmal re-bleeding | 3                | 2.3  |
| Infarction             | 8                | 7.2  |
| Deteriorated           | 20               | 18.0 |
| Nutritional deficit    | 17               | 15.3 |
| PVO stenosis           | 2                | 1.8  |

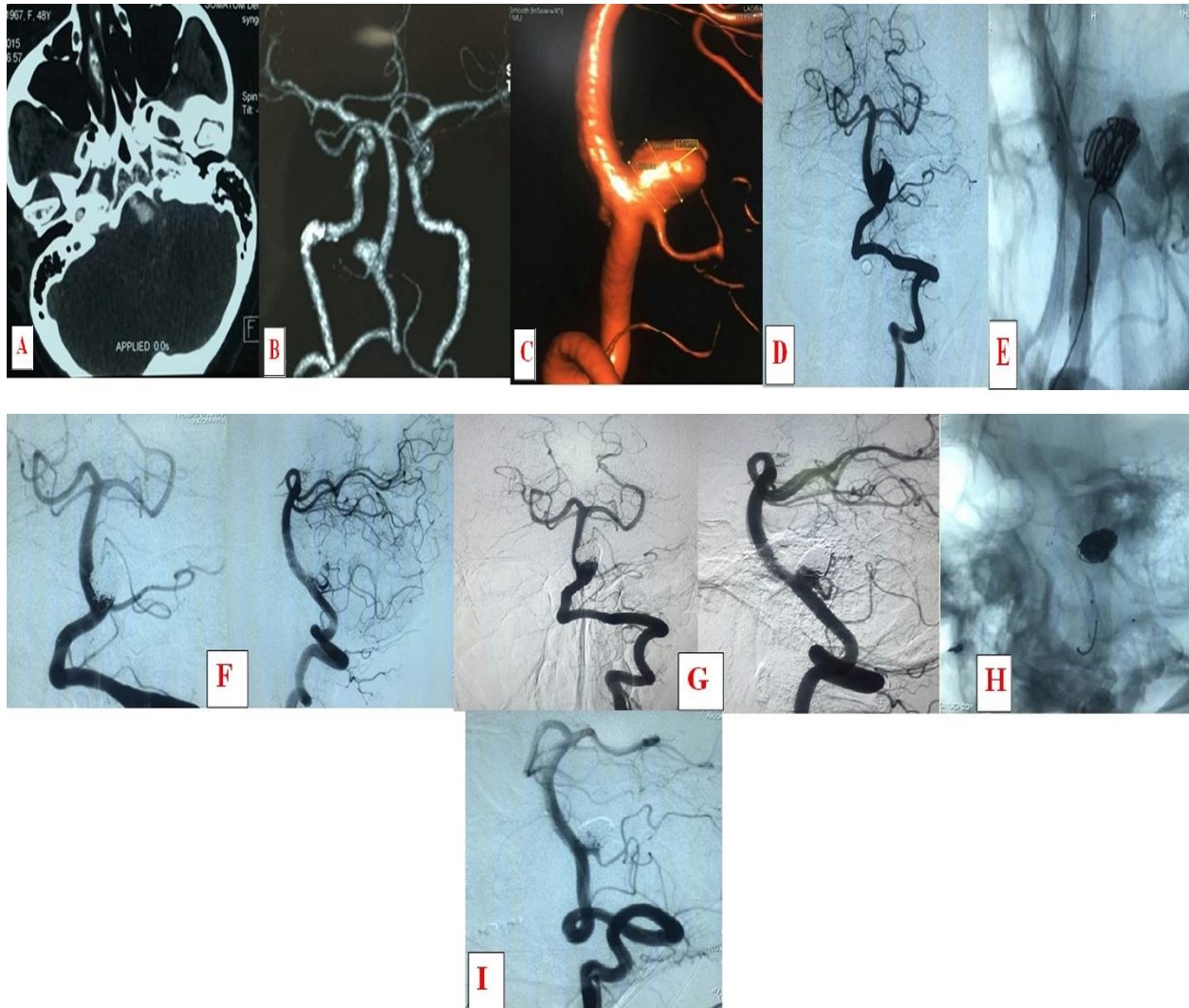
\*Multiple responses.

The in-hospital mortality was found to be in 5.4% patients (Fig. 1).

**Figure 1.** Distribution of in-hospital mortality.



**Fig. 2.** Case 1. A 39-year-old female was admitted at our department with h/o headache and dizziness for 7 days. The CT scan revealed high density anterior to brain stem (A) and CTA revealed aneurysm on tip of basilar artery (B). DSA LVA frontal position (C) DSA LVA lateral position (D) stent assisted coil embolized (RPCA to BA solitaire AB 4mm/20mm, LPCA to BA solitaire AB 4mm/20mm,) (E) frontal position after embolization (F) lateral position after embolization (G) follow up at 9 months, no recurrence (H)



**Fig. 3.** Case 2. 48 years old female, presented with H/O sudden acute headache, vomiting and nausea for 23 days. Clinically patient was aphasic, drowsy, right sided hemiplegic, left side hemiparesis with strength 3/5. CT scan reveals hemorrhage on the medulla oblongata (A) CTA reveals LVA aneurysm, the aneurysm refer to PICA, and left vertebral artery has dominant blood flow (B) DSA 3D(C). DSA frontal view (D). PICA protected by a micro wire, aneurysm is stent assisted(6/20 solitaireAB) coil embolized (E) DSA after embolization, frontal and lateral position, the aneurysm is complete embolized, the PICA remains patent (F). follow up at 7 month, the aneurysm has recurrence, frontal and lateral position at DSA (G). pipeline embolization device inserted (H) angiogram after pipeline embolization, and the aneurysm further occluded, the PICA remains patent (I).

The mean development was 9.59 months (The value of Median = 10 months) ranging from 2 to 48 months. There was no mortality during the follow-up period (Table not shown).

### DISCUSSION:

It has been accounted for that the objective of treatment of aneurysm is finished, quick, changeless, and safe impediment of the aneurysm with safeguarding of the individual conduit [3]. Finish aneurysmal impediment has been accounted for in 57.5% of aneurysms utilizing EVT contrasted with 81.4% utilizing microsurgical cutting [14].

Notwithstanding, as per one examination [12], it is accounted for that, however, EVT prompts roughly 90% of people accomplishing freedom (GOS I or II), the sturdiness of the EVT stays being referred to.

Endovascular coiling of back coursing aneurysms has picked up prevalence consistently, with a few examinations showing better results utilizing this strategy over medical procedure [4]. In this examination, endovascular winding was performed in more than 33% of patients (46.8%). Clinical treatment load and openness of endovascular and

neurological escalated care administrations are essential determinants in procedure's proposals [4].

In the investigation by Turek et al. [16], winding was favored as a first line treatment of less than stellar score patients, particularly those with substantial and difficult to reach aneurysms when choosing whether to clasp or curl. In the present investigation, cutting was done in 14.4% patients.

In the examination by Tureket al. [16], peri-agent entanglements included aneurysm crack (primary inconvenience), intense vasospasm, thromboembolism, and prolapse of a curl. Hemiparesis/hemiplegia, dysphasia/aphasia, vasospasm, and hydrocephalus could show up as post procedural confusions. In the present examination, weakening was observed to be the most widely recognized post treatment difficulty (18%). In the present study, posterior circulation aneurysm was VA in 30.6% patients and BA was in 25.2% patients. PCOM and VBA both were least common posterior circulation aneurysms each constituting 0.9%. In a study conducted by Maus et al. [9], 9 of 15 aneurysms (60%) emerged from the intradural part of the vertebral conduit; 3 are situated on the back mediocre having cerebellar supply route and 1 each on the front substandard cerebellar vein, back cerebral corridor, and basilar course.

In this study, after endovascular treatment, patients were followed from 2 to 48 months with median development of 10 months. No mortality was analyzed during the follow-up. In the study conducted by Maus et al. [9], the median clinical development was 217 days which is lower than the present study. In another study, the median follow-up was reported to be 11.3 months with interquartile range of 5.9–12.7 months after the treatment of posterior circulation aneurysms [15].

One of the limitations of this study was duration of study period and small sample size. The studies with larger sample size and longer duration of study period are recommended for the robust findings.

### CONCLUSION:

These outcomes propose that multimodality of the executives ought to be considered for better outcome in the treatment of back flow aneurysms. Neurosurgeons and Interventional neuroradiologists ought to consider the area of back dissemination aneurysms before the treatment.

### Funding

No funding was received for this research.

### Conflict of Interest

All the authors declare that they have no conflict of interest.

### Informed consent

Informed consent was obtained from all individual participants included in the study.

This article does not contain any studies with animals performed by any of the authors.

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