

# Long-Term Clinical and Imaging Follow-Up of Complex Intracranial Aneurysms Treated by Endovascular Parent Vessel Occlusion

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## Introduction

Flow-diverting stents are increasingly being used for the treatment of complex intracranial aneurysms, but the indications for their use in lieu of traditional endovascular parent vessel occlusion (PVO) have yet to be precisely defined. The purpose of this study was to review the clinical and imaging outcomes of patients with intracranial aneurysms treated by PVO.

## Methods

A total of 28 patients with intracranial aneurysms, treated by PVO between July 1992 and December 2009, were reviewed. Aneurysms arising from peripheral arteries were excluded. Clinical and imaging data were retrospectively analyzed from a prospectively maintained database.

## Results

There were 28 patients with 28 aneurysms treated by PVO. Aneurysms of the anterior circulation presenting with mass effect (n=11) or discovered incidentally (n=1), and dissecting-type vertebrobasilar (VB) aneurysms presenting with SAH (n=6) fared the best with high obliteration rates (83.3% and 83.6%, respectively) and no permanent major ischemic complications. In contrast, VB aneurysms presenting with mass effect (n=7) demonstrated the lowest obliteration rate (57.1%), the highest rate of permanent major ischemic complications (28.6%), and a high mortality rate (28.6%).

Table 1: PVO for anterior circulation aneurysms: demographics, follow-up, and complications

Case No.	Age (yr)/Sex	Location	Size (mm)	Presentation	FU (days)	Aneurysm Obliterated	Complications/Comments
1	85/F	Cavernous	32	H/A, visual loss	n/a	No	Balloons deflated, infarction without clinical deficit, treatment abandoned
2	56/F	Cavernous	17	Visual loss	65	Yes	None
3	62/F	Cavernous	28	H/A, CN palsy	115	Yes	Transient Homer syndrome
4	62/F	Cavernous	23	H/A, CN palsy	236	Yes	Partial deflation of proximal balloon, no clinical sequelae
5	58/F	Cavernous	27	H/A, CN palsy	n/a	No	Partial deflation of proximal balloon, cortical infarction with minor clinical deficit, early aneurysm growth provoked surgical trapping with STA-MCA bypass
6	68/F	Cavernous	35	H/A, CN palsy	867	Yes	None
7	39/M	Cavernous	30	H/A, CN palsy	4914	Yes	Growth of posterior circulation aneurysm
8	52/F	Cavernous	30	H/A, CN palsy, visual loss	6539	Yes	Growth of contralateral (mirror) cavernous aneurysm
9	60/F	Parophthalmic	14	Incidental	181	Yes	None
10	62/F	Parophthalmic	25	Visual loss	416	Yes	None
11	64/F	Parophthalmic	39	Cognitive decline, hydrocephalus	420	Yes	None
12	74/F	Parophthalmic	16	Visual loss	484	Yes	None

Note:—CN indicates cranial nerve; H/A, headache; STA-MCA = superficial temporal artery-middle cerebral artery.

Table 2: PVO for posterior circulation aneurysms: demographics, follow-up, and complications

Case No.	Age (yr)/Sex	Location	Size (mm)	Presentation	FU (days)	Aneurysm Obliterated	Complications/Comments
13	44/F	VB	7	SAH	63	Yes	None
14	52/F	VB	13	SAH	185	Yes	None
15	63/M	VB	5	SAH	656	Yes	None
16	60/F	VB	6	SAH	729	Yes	None
17	50/F	VB	8	SAH	n/a	No	Persistent filling of aneurysm after proximal VA occlusion, large PICA incorporated into dissecting pseudoaneurysm, underwent surgical trapping and PICA-PICA bypass
18	51/F	VB	5	SAH	1379	Yes	None
19	64/F	VB	25	Brain stem compression, H/A	515	Yes	None
20	55/F	VB	26	CN palsy	794	Yes	Lateral medullary infarction with clinical deficit
21	44/M	VB	34	Brain stem compression	1839	Yes	None
22	19/M	VB	20	Brain stem compression	2123	Yes	Brain stem infarction with clinical deficit
23	58/F	VB	26	Brain stem compression	3360	No	Transient episode of "tunnel vision"
24	67/F	VB	20	Brain stem compression, cognitive decline	n/a	No	Vessel rupture, death
25	74/M	VB	28	Brain stem infarction	n/a	No	Brain stem and cerebellar infarctions, death
26	54/M	PCA	20	Incidental	213	Yes	None
27	30/M	PCA	29	Incidental	770	Yes	Transient hemisensory and motor deficits
28	32/F	PCA	26	Incidental	2439	No	Transient homonymous hemianopsia

Note:—CN indicates cranial nerve; H/A, headache.

## Conclusions

PVO is a safe and effective treatment for complex intracranial aneurysms of the carotid artery and dissecting-type VB aneurysms presenting with SAH. In contrast, PVO for aneurysms of the VB circulation presenting with mass effect is less efficacious and associated with significant morbidity and mortality. It is hoped that flow diverters may represent a better treatment technique for these most difficult-to-treat lesions.

## Learning Objectives

By the conclusion of this session, participants should be able to: (1) Discuss the indications for PVO in the treatment of complex intracranial aneurysms, and (2) Describe the complication and obliteration rates for this "destructive" procedure with relation to aneurysm location and pathogenesis.

## References

Matouk CC, Kaderali Z, ter Brugge KG, Willinsky RA. Long-term clinical and imaging follow-up of complex intracranial aneurysms treated by endovascular parent vessel occlusion. *American Journal of Neuroradiology*. [Accepted - in pre-production].