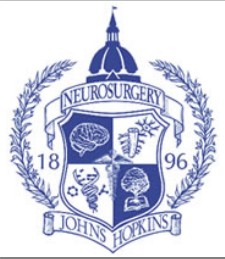


## Safety Assessment of Flow Diversion at the Basilar Apex

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### Introduction

Saccular aneurysms of the basilar apex pose a high rupture risk. Microsurgical treatment has significant morbidity while stent-coiling has high recurrence rates. Reports of flow diversion for basilar apex aneurysms are limited.

### Methods

A prospective, IRB-approved database was analyzed for all patients with basilar apex aneurysms treated with flow diversion. Patients were maintained on dual anti-platelet therapy with Aspirin and Clopidogrel or Prasugrel for Clopidogrel hypo-responders (P2Y12 above 200).

### Results

A total of 7 patients with basilar apex aneurysms were treated with PED. All were female with average age 49 years and aneurysm size 7.7mm. One aneurysm was previously ruptured and coiled and 6 were incidentally discovered. A single PED was used in all cases with adjunctive coiling in 3 cases. Balloon remodeling was utilized in 2 cases. Radiographic evidence of platelet aggregation was observed in 2 cases, which resolved with intra-arterial abciximab without clinical consequence. One patient (14%) developed dysphagia and hemiparesis two weeks after treatment; MRI showed thalamic and pontine perforator ischemia that led to the patient's death. All other patients were followed clinically for

### Results cont.

at least 6 months. Follow-up angiography was available for 4/6 (67%) patients and showed complete occlusion in 75% (3/4) at 6 months and 100% (2/2) at 12 months. In addition, there were 7 cases of distal posterior circulation aneurysms (1 VBJ, 2 mid-basilar, 2 SCA, and 2 PCA) treated with PED in which the device covered the basilar apex. One patient in this group (14%) with a mid-basilar aneurysm developed hemiparesis on post-procedure day 2; MRI showed pontine infarcts and the patient remained mRS 4 at last follow-up one year after treatment.

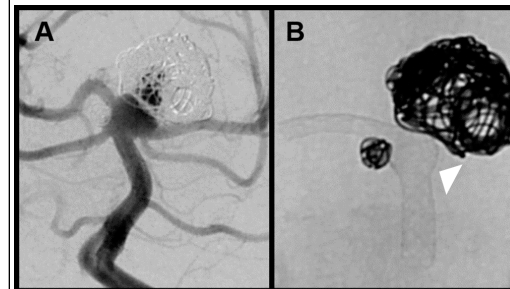
### Conclusions

Reports of flow diversion across the basilar apex are limited. Our preliminary experience suggests it can be carried out with morbidity comparable to existing alternative microsurgical and endovascular treatments.

### References

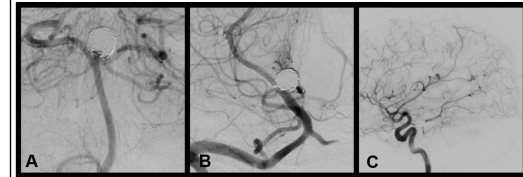
- Phillips TJ, Wenderoth JD, Phatouros CC, Rice H, Singh TP, Devilliers L, Wycoco V, Meckel S, McAuliffe W. Safety of the pipeline embolization device in treatment of posterior circulation aneurysms. *AJNR Am J Neuroradiol.* 2012 Aug;33(7):1225-31. doi: 10.3174/ajnr.A3166. Epub 2012 Jun 7.
- Brinjikji W, Murad MH, Lanzino G, Cloft HJ, Kallmes DF. Endovascular treatment of intracranial aneurysms with flow diverters: a meta-analysis.

**Figure 1. PED treatment of a recurrent previously ruptured and coiled basilar apex aneurysm.**



(A) Pre-embolization digital subtraction angiogram (DSA; anterior-posterior view, AP) of basilar artery demonstrating a broad-based recurrence of a previously coiled basilar apex aneurysm, measuring 5.2 mm across the neck and 4.6 mm in height, and an occluded, previously coiled, right superior cerebellar artery with no residual filling. (B) Native fluoroscopy after deployment of a 3.75 mm x 14 mm PED, positioned distal to aneurysm neck in the right posterior cerebral artery (PCA). In (B) the "oversized" PED is seen with reduced flow diversion in perforator-rich P1 segment of the PCA and distal basilar artery, increased opening at basilar apex to maximize flow diversion (arrowhead), and wall apposition at the basilar apex. Follow-up angiography is pending.

**Figure 2. PED treatment of a 3 mm recurrent, previously coiled, basilar apex aneurysm with occlusion at 10 months.**



(A) Pre-embolization digital subtraction angiogram (DSA; anterior-posterior view, AP) demonstrating a 3 mm recurrence of a previously coiled basilar artery aneurysm. A PED was positioned in the right posterior cerebral artery (PCA) to the distal basilar artery. At 10 months (B), follow-up DSA confirms occlusion of the basilar apex aneurysm, and no filling of the left P1 from injection of the vertebral artery. Follow-up DSA (C) of left internal carotid artery (lateral view) demonstrates filling of the left PCA territory from anterior circulation through fetal-type PCA.