



# Flow Diversion Versus Conventional Endovascular Treatment for Small Unruptured Internal Carotid Artery Aneurysms: Lesser Re-canalization and Re-treatment Rate - A Single Institution Experience from the United States



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## Introduction

Flow diverter has become the preferred treatment for large, fusiform or recurrent complex aneurysms. The purpose of this study is to demonstrate the safety and efficacy of Pipeline Embolisation Device in the treatment of small, unruptured internal carotid artery (ICA) aneurysms and compare it with conventional coil embolization( primary coiling/balloon assisted or stent assisted coiling)

## Methods

IRB approval was obtained from the local Institutional board. From January 2010 to April 2013, 27 aneurysms with PED treatment and 72 aneurysms with conventional endovascular embolization were identified and included in the study. The information about patients, aneurysms, procedural complications and outcomes were carefully recorded. The efficacy and safety of treatments were analyzed and compared.

## Results

The mean patient’s age was 60.0(SD:10.24) years in the PED group and 56.04(SD13.50) years in the coil/stent-coil group (p=0.200)(Table-1). Twenty-five aneurysms (92.6%) had angiographic follow-up after the PED treatment(mean:6.99 months). In the coil/stent-coil group, the angiographic follow-up was available for 58 aneurysms (80.6%) with a mean follow-up duration of 11.43 months.92% aneurysms treated by PED had complete occlusion at the last follow up whereas 70.7% occlusion rate was seen in the coil group (p=0.046)(Table 3 and 4). In the PED cohort, none of the patient had recanalization and only 1

Table 1

Table 1. Demographic and clinical characteristics

Characteristics	PED group	Coil group	P value
Age (years)	60.09 ± 10.24	56.04 ± 13.50	0.200
Female sex (%)	20/22 (90.9)	54/69 (78.3)	0.226
Aneurysm size (mm)	6.54 ± 1.92	6.09 ± 1.86	0.256
Aneurysm location (%)			0.013
Posterior communicating	2 (7.4)	27 (37.5)	
Ophthalmic/paraclinoid	22 (81.5)	41 (56.9)	
Cavernous	2 (7.4)	4 (5.6)	
Petrous	1 (3.7)	0	

PED indicates pipeline embolization device.

Table 2

Table 2. Procedure-related complications and outcomes

	PED group	Coil group	P value
Complications (%)	5/27	7/72	0.232
Delayed in-stent stenosis	3/27	0	
Hemorrhage	0	0	
TIA	2/27	4/72	
Ischemic stroke	0	2/72	
Death	0	0	
Parent artery dissection	0	1	
Angiographic outcome (%)			0.046
Complete occlusion (100%)	23 (92.0)	41 (70.7)	
Incomplete occlusion (<100%)	2	17	
Recanalization (%)	0	10/58 (17.2)	0.028
Retreatment (%)	1	6/58 (10.3)	0.171
Modified Rankin scale score (%)			
0-1	20 (100.0)	63 (95.5)	1.000
2-6	0	3	

PED, pipeline embolization device; TIA, transient ischemic attack;

## Conclusions

The PED provided significantly higher complete occlusion rate than conventional-embolization, with no recanalization and significantly less retreatments with similar procedural risk. Our study has raised the pitch iun favor of PED for the treatment of small aneurysms as well.

## Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of use of PED for small aneurysms. 2) Discuss, in small groups about the recanalization, recurrence of aneurysm treated by PED 3) Identify an effective treatment for small cerebral aneurysms.

Table 3 and 4

Table 3: Rates of complete aneurysm occlusion

	≤ 6 months	6-12 months	> 12 months
PED	16/16 (100%)	11/13 (84.6%)	1/1 (100%)
Coil alone	7/15 (46.7%)	3/3 (100%)	6/11 (54.5%)
Stent-assisted coiling	22/31 (70.9%)	7/10 (70%)	6/8 (75%)

Table 4: Comparison of complete occlusion rates between PED treatment and stent-assisted coiling.

	PED treatment	Stent-assisted coiling	P value
Complete occlusion (100%)	23 (92.0)	28 (75.7)	0.174
Incomplete occlusion (<100%)	2	9	