

De novo vs Salvaged Posterior Communicating Artery Segment Aneurysms Treated with Pipeline Embolization Device

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Introduction

Pipeline embolization device (PED) has been well recognized as an effective modality for management of select intracranial aneurysms. However, little is known about the utility of the PED in the treatment of posterior communicating segment artery (PComA) aneurysms and how previous treatment (microsurgical clipping or endovascular coiling) could impact these aneurysms’ response to salvage flow diversion. Therefore, we sought to compare PED effectiveness in de novo versus salvaged PComA segment aneurysms and evaluate if previous treatment could potentially affect occlusion rates and clinical outcomes.

Methods

A multicenter retrospective review of 3 prospectively collected between January 2013 and December 2017 patients treated with PED.

Results

A total of 57 patients harboring 60 saccular aneurysms were included in this cohort (**Table 1 & 2**); mean age was 60.5 years, with female patients constituting the majority of the population (86%, n=49). Thirteen (22.8%) patients were either current smokers or had significant history of smoking. Prior to treatment, 55 (91.7%) aneurysms were unruptured. The median radiographic follow-up was 8.5 months, ranging from 6 to 18 months. Complete occlusion at latest follow-up was achieved in 84% of aneurysms. Out of the 18 previously treated aneurysms, 12 (66.7%) were coiled and 6 (33.3%) were microsurgically clipped. Patients undergoing salvage treatment were older (p<0.01) and more likely to be smokers (p=0.03) (**Table 3**). There was an observed trend for previously treated aneurysms to achieve complete occlusion at last available follow up when compared to de novo aneurysms that did not occlude (28.6% vs 0%; p 0.08). Favorable functional outcome at last follow-up (mRS 0-2) was recorded in 94.4% of patients.

Table 1

Number of patients	n=57
Female sex	49 (86.0%)
Age (Years)	60.5 (±12.8)
Smoking history	13 (22.8%)
Diabetes Mellitus	10 (17.5%)
Multiple Intracranial Aneurysms	31 (54.4%)
Pretreatment mRS	
0	54 (94.7%)
1	3 (5.3%)

Patient characteristics

Table 2

Treated aneurysms baseline characteristics	n=60
Maximal diameter, mm	5 (IQR 3.6 - 8)
<7	36 (60.0%)
7 - 9.9	12 (20.0%)
10 - 19.9	11 (18.3%)
≥20	1 (1.7%)
Ruptured on presentation	5 (8.3%)
Relationship of PComA to P1 segment of PCA	
Absent P1	3 (5.0%)
Absent PComA	17 (28.3%)
P1 ≥ PComA	35 (58.3%)
PComA > P1	5 (8.3%)
Hypoplastic PComA	23 (38.3%)
Fetal PComA	5 (8.3%)
Previously treated	18 (30.0%)
Coil embolization	12 (66.7%)
Microsurgical clipping	6 (33.3%)
Adjunctive coil during PED embolization	10 (16.7%)

PComA segment aneurysm characteristics

Table 3

Variable	Salvage treatment		p-Value
	No 42 (70.0%)	Yes 18 (30.0%)	
Age at time of treatment (Years)	66 (IQR 56 - 75)	56 (IQR 45 - 59)	<0.001
Female Gender	36 (85.7%)	15 (83.3%)	0.81
Smoking history	6 (14.3%)	7 (38.9%)	0.03
Diabetes Mellitus	9 (21.4%)	2 (11.1%)	0.34
Maximal diameter (millimeters)	5.9 (IQR 3.7 - 9)	4.2 (IQR 3.5 - 6)	0.15
Ruptured aneurysm on presentation	4 (9.5%)	1 (5.6%)	0.61
Multiple Aneurysms	27 (64.3%)	7 (38.9%)	0.07
Absent PComA	12 (28.6%)	5 (27.8%)	0.95
Hypoplastic PComA	16 (38.1%)	7 (38.9%)	0.95
Fetal PComA	3 (7.1%)	2 (11.1%)	0.61
Outcomes			
Complete occlusion on last F/U imaging*	30 (78.9%)	12 (100.0%)	0.08
Time to last F/U imaging*	8.1 (IQR 6 to 18)	12.8 (IQR 6.2 to 22.5)	0.24
PComA patency at last F/U imaging	22 (81.5%)	5 (62.5%)	0.26
mRS on last Follow-up			
>2	4 (9.8%)	0 (0.0%)	0.21
Retreatment	4 (9.5%)	0 (0.0%)	0.17
Thromboembolic complications	3 (7.1%)	0 (0.0%)	0.24
Hemorrhagic complications	3 (7.1%)	1 (5.6%)	0.82

Bold values: p-Value <0.05  
n (%); p-Value: Chi2 test  
Median (IQR); p-Value: Mann-Whitney test

Comparison between salvage and de novo PED treatment for PComA aneurysms.

Conclusions

Salvage treatment of aneurysms in the PComA segment using PED is a safe and effective modality with high occlusion rates.

Learning Objectives

1. Salvage treatment of posterior communicating artery segment aneurysms with flow-diversion therapy is safe and efficacious.
2. Flow diversion therapy is a versatile treatment for intracranial aneurysms that has proven to be efficacious anatomically complex aneurysms that are technically challenging for conventional microsurgical or endovascular therapies