

# Stent-Assisted Coiling of Cerebrovascular Aneurysms: Experience at a Large Tertiary Care Center

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## Introduction

Stent-assisted coiling is a common endovascular technique to treat wide-necked and fusiform cerebral aneurysms. In this study, we evaluated our institutional experience with stent-assisted coiling of cerebral aneurysms to elucidate potential risk factors of recurrence.

## Methods

A retrospective analysis of patients undergoing stent-assisted coiling of cerebral aneurysms from 2005-2012 at the University of Michigan was performed. The primary outcomes of interest were procedural safety, efficacy, and aneurysm recurrence. Univariate, multivariate logistic regression, and chi-squared tests were utilized to determine statistical significance of risk factors.

	Univariate analysis			Multivariate analysis		
	OR	95% CI	p-value	OR	95% CI	p-value
Age	0.96	0.91-1.01	0.08	0.95	0.89-1.02	0.18
Female	0.23	0.07-0.72	0.01	0.19	0.04-1.00	0.05
Obesity	0.44	0.15-1.32	0.14	0.41	0.10-1.72	0.23
Diabetes	0.37	0.09-1.55	0.17	0.14	0.03-1.66	0.14
HTN	1.12	0.38-3.30	0.84			
Hypercoagulable state	1.06	0.22-5.17	0.94			
CAD	1.13	0.13-9.74	0.91			
Currently smoking	1.28	0.38-4.32	0.69			
Elective procedure	0.32	0.08-1.39	0.13	3.01	0.34-26.46	0.32
Anterior circulation	0.76	0.25-2.30	0.63			
Aneurysm volume (mm <sup>3</sup> )	1.00	1.00-1.00	0.20			
Aneurysm neck size (mm)	1.17	0.96-1.42	0.13	0.99	0.73-1.34	0.96
Packing density (%)	0.95	0.88-1.02	0.13	0.95	0.87-1.02	0.17
Enterprise stent	6.14	1.97-19.17	0.002	8.57	1.97-37.19	0.004
Dextran use	3.30	1.04-10.42	0.04	8.42	1.40-50.58	0.02

OR odds ratio, CI confidence interval, HTN hypertension, CAD coronary artery disease

## Results

All 122 stent-assisted coiling procedures led to satisfactory obliteration of the aneurysm with a 3.3% complication rate at the time of treatment. 21 (17.2%) treated patients experienced recurrence at an average follow-up of 297 days. 15 (71.4%) of these were determined to be clinically significant, requiring retreatment. 11 of the 30 (36.7%) procedures that utilized Enterprise stents had a recurrence compared to only 10 of the 92 (10.8%) procedures that used Neuroform stents (p=0.001). The average coiling packing density was 20.3% with Enterprise stents and 22.5% with Neuroform stents (p=.8). In multivariable logistic regression, recurrences that required re-coiling were significantly associated with Enterprise stents (8.57 OR, 1.97-37.19, p=.004), female sex (0.19 OR, 0.04-1.00, p=.05), and post-operative dextran use (8.42 OR, 1.40-50.58, p=.02)(Table 1). In addition, aneurysms with low packing density (<20%) were significantly more likely to have a clinically significant recurrence compared to aneurysms with a packing density > 20% (19% vs. 5.1%, p=.02) (Table 2).

## Conclusions

Stent assisted coiling for wide-necked cerebral aneurysms has a high therapeutic success rate with low procedure related morbidity and mortality. Clinically significant recurrences may occur more frequently with Enterprise stents, with low packing density, and when post-procedural dextran is used.

## Learning Objectives

- 1) Understand risks and outcomes related to stent assisted coiling of cerebral aneurysms.
- 2) Describe key risk factors associated with recurrences post stent-assisted coiling of cerebral aneurysms.

	PD < 20% n = 63	PD > 20% n = 59	p-value
Age	56.4 (11.9) <sup>a</sup>	58.2 (10.0)	0.36
Sex			0.97
Male	13 (20.6%) <sup>b</sup>	12 (20.3%)	
Female	50 (79.4%)	47 (79.7%)	
Obesity	19 (30.2%)	25 (42.4%)	0.16
Diabetes	5 (7.9%)	7 (11.9%)	0.47
HTN	31 (49.2%)	37 (62.7%)	0.13
Hypercoagulable state	13 (20.6%)	4 (6.8%)	0.03
CAD	4 (6.3%)	5 (8.5%)	0.65
Currently smoking	22 (34.9%)	16 (27.1%)	0.35
Type of procedure			0.14
Elective	55 (87.3%)	56 (94.9%)	
Emergent	8 (12.7%)	3 (5.1%)	
Location of aneurysm			0.91
Anterior circulation	41 (65.1%)	39 (66.1%)	
Posterior circulation	22 (34.9%)	20 (33.9%)	
Aneurysm volume (mm <sup>3</sup> )	533.3 (944.3)	345.1 (923.1)	0.27
Aneurysm neck size (mm)	5.2 (2.0)	4.8 (2.4)	0.34
Type of Stent			0.06
Enterprise	20 (31.7%)	10 (16.9%)	
Neuroform	43 (68.3%)	49 (83.1%)	
Dextran use	48 (76.2%)	50 (84.7%)	0.24
Complications	4 (6.3%)	0 (0.0%)	0.12
Recurrence requiring retreatment	12 (19.0%)	3 (5.1%)	0.02

PD packing density HTN hypertension, CAD coronary artery disease  
<sup>a</sup>Continuous variables are displayed as mean (standard deviation)  
<sup>b</sup>Categorical variables are displayed as n (%)