



Outcomes and Long-term Economic Impact of Coiling Versus Clipping for Unruptured Intracranial Aneurysms

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Introduction

The International Study of Unruptured Intracranial Aneurysms (ISUIA) trial represents the only randomized controlled trial to evaluate clip ligation versus coiling for the treatment of unruptured intracranial aneurysms (UIAs). However, this trial provided evidence for the efficacy of various treatments under ideal conditions. As overall effectiveness is established by nationwide practices, we sought to compare the outcomes and cost associated with coiling and clipping in a nationally selected cohort.

Methods

We utilized the Reuters MarketScan database to examine patients who underwent endovascular or surgical treatment for UIAs between 2000 and 2009, comparing reoperation rates, complications, angiogram use, and healthcare resource use. Propensity score matching techniques were used to match patients who underwent clip ligation to those who had coiling procedures.

Characteristics of PSM cohort				
	All Patients (n = 1,338)	Clipping (n = 669)	Coiling (n = 669)	P- value
Age [mean (SD)]	54 (10)	54 (10)	54 (11)	0.92
Postoperative follow-up days [mean (SD)]	1423 (557)	1412 (558)	1434 (556)	0.37
Gender: females [n (%)]	1029 (76.91)	517 (77.28)	512 (76.58)	0.75
Charlson index [n (%)]				
0	947 (70.78)	474 (70.85)	473 (70.70)	0.99
1	287 (21.45)	142 (21.23)	145 (21.67)	
2	64 (4.78)	33 (4.93)	31 (4.63)	
≥3	40 (2.99)	20 (2.99)	20 (2.99)	
Year of initial procedure [n (%)]				0.99
2000	21 (1.57)	11 (1.64)	10 (1.49)	
2001	27 (2.02)	14 (2.09)	13 (1.94)	
2002	62 (4.63)	29 (4.33)	33 (4.93)	
2003	135 (10.09)	67 (10.01)	68 (10.16)	
2004	219 (16.37)	107 (15.99)	112 (16.74)	
2005	235 (17.56)	115 (17.19)	120 (17.94)	
2006	323 (24.14)	168 (25.11)	155 (23.17)	
2007	316 (23.62)	158 (23.62)	158 (23.62)	
Type of Insurance [n (%)]				0.60
Commercial	1004 (75.04)	506 (75.64)	498 (74.44)	
Medicaid	168 (12.56)	78 (11.66)	90 (13.45)	
Medicare	166 (12.41)	85 (12.71)	81 (12.11)	

Abbreviations: SD – standard deviation

Results

We identified 4,504 patients with UIAs treated by surgical (n=1,878) or endovascular treatment (n=2,626), with propensity score matching of 1,338 patients. Reoperation rates were significantly lower in the clipping group compared to the coiling group at 1 year (p<0.0001) and 2 years (p<0.0001) following the procedure. However, postoperative complications (immediate, 30 and 90 days) were significantly higher in those undergoing surgical clipping. Although hospital length of stay and costs were higher in the clipping group for the index procedure, the number of postoperative angiograms and outpatient services used at 1 and 2 years were significantly higher in the coiling group.

Conclusions

Though surgical clipping resulted in lower reoperation rates, it was associated with higher complication rates and initial costs. However, while clipping was more costly than coiling for the index procedure, there was no significant difference in overall costs between the two procedures at 1 and 2 years. This is due to the significantly higher number of follow-up angiograms, outpatient services, and overall outpatient costs in the 1-year and 2 year post-procedure period in those who underwent coiling.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of patient selection when deciding the treatment of unruptured intracranial aneurysms, 2) Discuss, in small groups the efficacy, complications, and cost associated with clipping and coiling for unruptured intracranial aneurysms, 3) Identify an effective treatment for unruptured intracranial aneurysms which is also cost-effective.