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Outcome of Combined Endovascular and Surgical Treatment of Unruptured Anterior Communicating Artery Aneurysms: Is a More Aggressive Management Strategy Warranted?

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Learning Objectives

1) Discuss newer natural history studies and the greater risk posed by anterior communicating artery aneurysms when compared to other anterior circulation aneurysms
2) Appreciate the overall trend in declining risk for aneurysm treatment and greater role of endovascular treatment of unruptured aneurysms
3) Gain a better understanding of treatment risk for anterior communicating artery aneurysms in particular and risk factors for poor outcome.

Introduction

Newer natural history studies show anterior communicating artery aneurysms have a higher risk of rupture than was historically appreciated (1 -3). Concurrent with a better understanding of aneurysm risk, the morbidity of surgical and endovascular treatment continues to decline to levels which suggest intervention even for small aneurysms (4). With declining treatment risk and better understanding of natural history, an aggressive treatment strategy may be warranted.

Methods

149 patients with unruptured anterior communicating aneurysms were treated by the senior authors over a five-year period. Treatment was performed by operators trained in endovascular and surgical techniques. Modality of treatment was based on estimate of highest efficacy/lowest risk. Outcomes were recorded at three months and one year from treatment. The primary outcome measure was a modified Rankin scale (mRS) of >2 or persistent cognitive impairment as assessed by a neuropsychologist when indicated.

Table 1. Sociodemographic data

Variable	n=149 (100%)
Age ζ	61.01 (±9.81)
Gender	
Male	54 (36.24%)
Female	95 (63.76%)
Smoker*	80 (54.05%)
HTN*	94 (63.51%)
CAD/MI*	16 (10.81%)
Atrial fibrillation*	8 (5.41%)
Anticoagulant/antiplatelet use*	42 (28.38%)
ASA	26 (68.42%)
ASA+Clopidogrel	2 (5.26%)
Clopidogrel	2 (5.26%)
Warfarin	4 (10.53%)
Warfarin+ASA	1 (2.63%)
Rivaroxaban	3 (7.89%)
Prior SAH*	9 (6.08%)
Family history of aneurysms**	26 (17.81%)
Aneurysm size	
<7 mm	101 (67.79%)
7 - 12 mm	44 (29.53%)
>12 mm	4 (2.68%)
Median ε	5.5 (IQR 4 - 7)
Treatment	
Microsurgical Clipping	98 (65.77%)
Endovascular treatment	51 (24.23%)
Stent-Coil	28 (54.9%)
Coil	21 (41.17%)
Pipeline	2 (3.92%)
mRS at admission*	
0	126 (85.14%)
1	14 (9.46%)
2	7 (4.73%)
4	1 (0.68%)

* 1 missing data
** 3 missing data
ζ Mean (SD)
ε Median (IQR)

Table 2. Outcomes

Variables	n=149 (100%)
Cognitive impairment	2 (1.34%)
Follow-up mRS	
0	102 (68.92%)
1	26 (17.57%)
2	9 (6.08%)
3	4 (2.7%)
4	6 (4.05%)
6 (Expired)	1 (0.68%)
Follow up mRS >2	11 (7.38%%)
Outcome	
Good	137 (91.95%)
Poor	12 (8.05%)

Good outcome (mRSs2 without cognitive impairment)
Poor outcome (mRS 3-6 or cognitive impairment)

Table 3. Univariate binary logistic regression

Variable	OR	CI95%	p-Value
Age	**1.09**	**(1.019 - 1.17)**	**0.013**
Age≥60	**10.84**	**(1.36 - 86.28)**	**0.024**
Female gender	6.94	(0.87 - 55.32)	0.067
CAD/MI	**8.11**	**(2.20 - 29.86)**	**0.002**
Admission mRS	1.78	(0.88 - 3.61)	0.106

Bold values: p-value<0.05

Table 4. Comparison between poor and good outcomes groups

Variable	Good outcome:	Poor outcome:	p-Value
	137 (91.95%)	12 (8.05%)	
Age	**60.39 (±9.5)**	**68.08 (±10.91)**	**0.0088**
Gender			
Male	53 (38.69%)	1 (8.33%)	
Female	**84 (61.31%)**	**11 (91.67%)**	**0.036**
Smoker*	74 (54.41%)	6 (50%)	0.76
HTN*	86 (63.24%)	8 (66.57%)	0.813
CAD/MI*	**11 (8.09%)**	**5 (41.67%)**	**0.0000**
Atrial fibrillation*	8 (5.88%)	0 (0%)	0.388
Anticoagulant/antiplatelet use*	38 (27.94%)	4 (33.33%)	0.691
Prior SAH*	9 (6.62%)	0 (0%)	0.358
Family history of aneurysms**	23 (17.16%)	3 (25%)	0.497
Aneurysm size	5.5 (IQR 4 - 7)	4.25 (IQR 3.5 - 6.25)	0.0875
Treatment			
Microsurgical Clipping	91 (66.42%)	7 (58.33%)	
Endovascular treatment	46 (33.58%)	5 (41.67%)	0.571
mRS at admission*			
0	116 (85.29%)	10 (83.33%)	
1	14 (10.29%)	0 (0%)	
2	6 (4.41%)	1 (8.33%)	
4	0 (0%)	1 (8.33%)	**0.005**

Bold values: p-value<0.05
*n(%), p-value: Chi² test
** Mean (SD), p-value: Students T-test
***Median (IQR), p-value: Mann-Whitney test

Results

Age averaged 61 years, range of 34-84 years. Median aneurysm size was 5.5 mm (IQR 4-7 mm). Sixty-eight percent of aneurysms were less than 7 mm. Clipping was performed in 98 patients (65.8%). Poor outcome was observed in 12 patients (8%). Neither aneurysm size nor treatment method were predictive of poor outcome. Both a history CAD/MI and older age were most significantly associated with poor outcome (CAD/MI OR=8.11, 95% CI 2.20-29.86, p=0.002; Age OR=1.09, 95%CI 1.019-1.17, p=0.013). When dichotomized for age >65 years, the odds of poor outcome increased nearly 11-fold (OR=10.93, 95% CI 2.29-52.03, p=0.003).

Conclusions

The risk of endovascular or surgical treatment of unruptured anterior communicating artery aneurysms for patients under age 65 is exceedingly low. Comparing treatment risk with natural history studies, patients treated under 65 years old can be expected to outperform natural history within five years. Recognizing the risk of smaller anterior communicating artery aneurysms, an aggressive management strategy is supported, particularly in younger patients.

References

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