

Aneurysms may recur years after endovascular treatment

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Table 2
Long-term Recurrence (Grade 3) Risk Factors

Risk Factors	Data	Data for Recurrence*	RR†
Patient risk factors (n = 132)			
Ruptured aneurysm			
Yes	119	12 (10.1)	0.84 (0.63, 1.12)
No	13	4 (30.8)	
Elevated blood pressure			
Yes	45	7 (15.6)	1.34 (0.72, 2.47)
No	87	9 (10.3)	
Current smoking status			
Yes	54	8 (14.8)	1.26 (0.74, 2.16)
No	78	8 (10.3)	
Aneurysm risk factors (n = 149)			
Fundus size			
≥ 10 mm	23	8 (34.8)	4.43 (2.24, 8.78)
< 10 mm	126	8 (6.3)	
Large neck			
Yes	43	6 (14.0)	1.35 (0.68, 2.69)
No	106	10 (9.4)	
Initial DSA results			
Grade 2	32	6 (18.8)	1.92 (0.93, 3.94)
Grade 1	117	10 (8.5)	
MR angiographic results at 5 years			
Grade 2	24	8 (33.3)	4.16 (2.12, 8.14)
Grade 1	125	8 (6.4)	
Retreatment within 5 years			
Yes	26	7 (26.9)	4.67 (1.55, 14.03)
No	123	9 (7.3)	

* Data in parentheses are percentages.

† Data in parentheses are 95% CIs.

Long-term recurrence risk factors. Credit: Radiological Society of North America

Endovascular treatment (EVT) of intracranial aneurysm is effective in

preventing long-term bleeding, but may be followed by aneurysm recurrences in a significant proportion of cases, according to a new magnetic resonance angiography (MRA) study published online in the journal *Radiology*.

Intracranial aneurysm is a weak or thin spot in a blood vessel in the brain that balloons and fills with blood. It can leak or rupture, leading to a potentially fatal cerebral hemorrhage.

EVT with [coils](#) was developed in the 1990s and became an established treatment for intracranial aneurysm in the early 2000s. In EVT, coils are threaded via a micro-catheter through a blood vessel in the groin to the location of the aneurysm. The coils expand and cause formation of a clot in the aneurysm that provides a seal, or occlusion, to prevent further bleeding.

The main drawback of [endovascular treatment](#) is recanalization, or a return of blood flow into the original aneurysm. Previous studies on the clinical significance of this have followed a limited number of [patients](#) for relatively short periods.

For the new study, researchers looked at the long-term efficacy of EVT in preventing aneurysm ruptures. They performed clinical examination and 3-Tesla MRA 10 years after EVT of intracranial aneurysm in a single institution. In addition, they reviewed results from the medical literature to identify studies reporting bleeding and/or aneurysm recurrence rate in patients followed beyond 10 years after EVT.

Among 129 aneurysms followed for more than 10 years, 16, or 12.4 percent, demonstrated recanalization between midterm and long-term MRA. Incomplete occlusion on midterm MRA and retreatment within five years were risk factors for late recurrence. The literature review of 2,902 aneurysms showed that incomplete occlusion and aneurysm size of

greater than 10 millimeters were risk factors for late recurrence.

Table 3

Population Baseline Characteristics of the 15 Included Studies

Baseline Characteristics	Data Available	Studies	Data
Patient characteristics			
No. of patients	2787*	15	...
No. of aneurysms	2902*	15	...
Sex	734	5	477 (65) [†]
Age at initial treatment	776	6	53.0 (21–79) [‡]
Aneurysm characteristics			
Ruptured status	1111	8	
Ruptured aneurysms	869	...	78.2 [§]
Fundus mean size	714	4	6.6 (2–30)
Fundus size	534	6	
<10 mm	394	...	73.8 [§]
10–25 mm	139	...	26.0 [§]
>25 mm	1	...	< 1.0 [§]
Neck size	212	3	
Neck ≥ 4 mm or dome-to-neck ratio < 1.5	84	...	39.6 [§]
Location	691	5	
Anterior	504	...	72.9 [§]
Posterior	187	...	27.1 [§]

* Including those in the present study.

[†] Data are number of women, with percentage in parentheses.

[‡] Data are mean age in years, with range in parentheses.

[§] Data are percentages.

^{||} Data are size in millimeters, with range in parentheses.

Baseline demographic data. Credit: Radiological Society of North America

The results show that while EVT is effective in preventing long-term bleeding, patients with larger aneurysms or incomplete occlusion face a

long-term risk of aneurysm recurrences.

"This result is of importance since a large proportion of patients in the study were young, with a mean age of 47 years," said Olivier N. Naggara, M.D., Ph.D., from the Centre Hospitalier Sainte-Anne in Paris. "Consequently, demonstration of the efficacy of prevention of rupture more than 10 years after treatment is a crucial point."

If supported by additional research, the findings may mean that longer follow-up protocols are necessary for some [intracranial aneurysm](#) patients who undergo EVT.

Table 4

Meta-Analysis of Clinical and Imaging Long-term Follow-up after EVT

Variable	Information	Rate (%) [†]	Heterogeneity	
	Available [*]		Q Value	I ²
No. of patients	2787 (15)
No. of aneurysms	2902 (15)
Bleeding after EVT (<i>n</i> = 1) [‡]	694 (11)	0.7 (0.2, 2.7)	2.7	0
Aneurysm recurrence (<i>n</i> = 26) [§]	239 (3)	11.4 (7.0, 18.0)	2.6	21.6
Retreatment (<i>n</i> = 26) [§]	1422 (7)	1.6 (0.5, 4.8)	19.5	69.2
de novo aneurysms (<i>n</i> = 25) [‡]	681 (7)	4.1 (1.7, 9.4)	10.9	54.1

^{*} Data are number of patients or aneurysms for which information was available, with number of studies in which information was available in parentheses.

[†] Data in parentheses are 99% CIs.

[‡] Data are number of patients.

[§] Data are number of aneurysms.

^{||} Random effects weighted

Baseline demographic data. Credit: Radiological Society of North America

"We believe that the subgroup of patients with aneurysm size 10 millimeters or more and patients with incomplete occlusions should be followed by noninvasive imaging exams for 10 years or more, particularly young patients," Dr. Naggara said.

EVT can be repeated to prevent a potential angiographic recurrence. However, more research is needed, Dr. Naggara said, to develop a clearer picture of the risks and benefits of this approach.

"Retreating a recurrent [aneurysm](#) with additional coils may fail in up to 50 percent of cases," he said. "Adjunctive techniques we add to standard coiling, such as modified coils, stents and flow diverters, have demonstrated lower recurrence rate after EVT but may involve more risks than simple treatment with platinum coils."

More information: "Intracranial Aneurysms: Recurrences More than 10 Years after Endovascular Treatment—A Prospective Cohort Study, Systematic Review, and Meta-Analysis" *Radiology*, 2015.

Provided by Radiological Society of North America

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