

Intracranial Aneurysm: What's the Latest?

While only a small proportion of the population is affected by intracranial aneurysm, a rupture can be extremely disabling, leaving patients with permanent physical and cognitive defects. It is important to be aware of all options with regard to treatment.

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Margo's case

Margo, 63, is investigated for headaches. She is found to have multiple incidental intracranial aneurysms, including this large right posterior communicating artery aneurysm (Figure 1), for which treatment is recommended on several occasions.

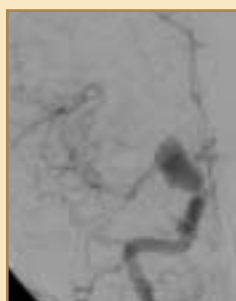


Figure 1. Large right posterior communicating artery aneurysm.



Figure 2. Severe subarachnoid hemorrhage.



Figure 3. Clipped aneurysm.

Margo, however, refuses treatment.

Two years later, she develops a sudden headache and complete right cranial nerve III palsy. Margo also has a rapidly deteriorating level of consciousness secondary to a severe subarachnoid hemorrhage (Figure 2).

The aneurysm is clipped (Figure 3) and the intracerebral hemorrhage is evacuated, but she is left in a dependent state due to the severity of the original hemorrhage.

Management of patients with intracranial aneurysms has recently been the focus of significant research. Autopsy data show that intracranial aneurysms exist in 0.2% to 9.9% of the general population.¹

Rupture causing subarachnoid hemorrhage (SAH) occurs in approximately 0.01% of people per year.² Although this suggests only a small fraction of aneurysms will ultimately rupture, a SAH is extremely disabling, leaving many patients with permanent physical and cognitive deficits. Therefore, an understanding of the natural history of aneurysms is very clinically relevant.

1. Unruptured aneurysms

Advances in diagnostic imaging have facilitated the investigation and treatment of aneurysms, but with increased

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detection comes the dilemma of managing an asymptomatic patient.

The facts

While the natural history of unruptured aneurysms has been studied extensively, the most recent and comprehensive work is the International Study of Unruptured Intracranial Aneurysms (ISUIA).^{3,4}

Findings in the first report from the ISUIA study described retrospective data, suggesting an annual hemorrhage rate for small aneurysms (< 10 mm) that was several-fold lower than what was generally encountered in population-based neurosurgical practice. The data was also discordant with incidence rates when compared to large unselected autopsy series.

The risks

The second ISUIA report of prospective natural history data was published in 2003, based on observation of 1,692 patients.⁴

Risk of hemorrhage from an unruptured aneurysm is based mostly on size and location, with other relevant factors being patient age and history of prior SAH from another aneurysm.

Cumulative five-year hemorrhage risks have been determined:

- For cavernous carotid aneurysms within the cavernous sinus, the risk is extremely low.
- For small, anterior circulation aneurysms (< 7mm) the five-year risk is only significant if the patient bled from a different aneurysm (1.5%).
- For moderate, large and giant anterior circulation aneurysms, the five-year risks are higher (2.6%, 14.5% and 40%, respectively).

David's case

David, 62, has previously undergone carotid artery angioplasty, but develops new left amaurosis fugax.

Investigations include magnetic resonance angiography, which confirms restenosis of the left carotid artery requiring endarterectomy. It also shows an incidental basilar tip aneurysm for which endovascular coiling is recommended after diagnostic angiography (Figure 4).

One year later, David remains neurologically intact and angiographic followup shows no evidence of aneurysm regrowth (Figure 5).



Figure 4. Diagnostic angiography.



Figure 5. Aneurysm showing no regrowth.

- For posterior circulation aneurysms, the risks are similar to those for small aneurysms, regardless of whether there has been a prior hemorrhage (2.5% vs. 3.4%).
- For moderate, large and giant posterior circulation aneurysms, the risks are highest (14.5%, 18.4% and 50%, respectively).

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These data are useful when counselling a patient on the risks of observing the aneurysm rather than obliterating it. Many centres are now participating in a third phase of ISUIA, with the goal of defining 10-year natural history and treatment risks.

The treatment

In ISUIA, many enrolled patients eventually went on to treatment of the aneurysm, primarily for reasons other than rupture; 1,917 patients underwent open surgical repair and 451 had endovascular repair.

For patients who had a craniotomy, age over 59 years was a risk factor for worse outcome, as were large size and posterior circulation location of the aneurysm.

The patients in the endovascular cohort were older, with larger aneurysms located in the posterior circula-

suggestion that the risk of rebleeding is higher following endovascular therapy.⁵

While both microsurgical and endovascular treatment provide good options for aneurysm management, randomized studies comparing the two modalities have not yet been done.

2. Ruptured aneurysms

The treatment

The International Subarachnoid Aneurysm Trial (ISAT) was a multicentre, randomized clinical trial that compared surgical clipping with endovascular treatment in 2,143 patients with ruptured aneurysms when neither treatment was considered better than the other.⁶

Functional outcomes were assessed using the modified Rankin scale. Patients with minor symptoms were graded at level 1 and those who were fully dependent were graded at level 5. The trial demonstrated 23.7% of patients treated with coiling were either significantly impaired or dead one year later compared with 30.6% of patients treated by surgical clipping. This suggested endovascular intervention in ruptured aneurysms lessens the patient's chance of a poor clinical outcome.⁶

Although a randomized study, the composition of those enrolled reflected some pre-established clinical biases (88% were aneurysms of good clinical grade, 93% were < 10 mm and 97.3% were in the anterior circulation). As this was primarily a European study, the results




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tion. However, coiling demonstrated lower combined, one-year morbidity and mortality. Yet, as endovascular procedures are relatively new, there is little evidence on durability.

With coiling, there is long-term risk of compaction, which may result in aneurysm growth and, possibly, the need for repeat treatment. There has been some additional

have been criticized by many experts, citing the lack of subspecialization and operator credentialing as possible factors leading to poor outcome in the surgical group.

Nonetheless, the ISAT has changed neurosurgical practice in Europe. Among participating centres, 34% of aneurysms were coiled prior to the study; following the study, this number rose to 54%.⁷ 

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Take-home message

- The decision to clip or coil an aneurysm depends on:
 - the predicted natural history of the aneurysm,
 - the patient's general status,
 - the angioarchitectural features of the aneurysm and
 - its size and location.
- For patients with small, ruptured aneurysms in good clinical condition, coiling may lessen the chance of poor outcome.
- In patients with mass effect from an associated clot, open surgery may be required.
- Due to uncertainty about durability of coiling, patients who have undergone endovascular therapy are often followed closely with serial angiography to rule out recurrence.
- Although not adequately addressed in many publications, the psychological burden of harbouring an unruptured aneurysm also becomes a factor in patient management.





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