Microsurgical Clipping or Endovascular Coiling for Ruptured Cerebral Aneurysms

Gary J. Redekop, MD, MSc, FRCSC

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From the Division of Neurosurgery, The University of British Columbia, Vancouver, BC.

Correspondence to Gary J. Redekop, Division of Neurosurgery, The University of British Columbia, 3100-910 W 10th Ave, Vancouver, BC, V5Z 4E5. E-mail gredekop@interchange.ubc.ca

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Early aneurysm repair to prevent recurrent bleeding is central to the management of patients with subarachnoid hemorrhage. Over the past 15 years, endovascular occlusion of cerebral aneurysms has emerged as an alternative to microsurgical clipping, and the relative merits and shortcomings of these 2 approaches have been the subject of considerable discussion in the neurosurgical literature and at scientific meetings. The minimally invasive nature of endovascular treatment is inherently appealing, but in spite of technical improvements and adjuncts, such as balloons, stents, and biologically modified coils, complete and durable repair, especially in the case of large aneurysms and those with complex geometry or wide necks, remains a challenge.

The International Subarachnoid Aneurysm Trial (ISAT) compared microsurgical clipping and endovascular coil occlusion in patients with ruptured aneurysms felt to be suitable for either technique. Endovascular coiling resulted in a 23.9% relative risk reduction for death or dependency at 1 year, an absolute reduction of 7.4%. However, the study group represented only 22% of patients treated for subarachnoid hemorrhage at the participating institutions, and the results of the trial should not be generalized to patients with ruptured aneurysms clearly better suited for either clipping or coiling. The ISAT data showed that the risk of late rebleeding was low but more common after endovascular coiling than after clipping, and there are concerns about the long-term durability of coil occlusion, as well as the need for follow-up imaging and further treatment if aneurysm recurrence is detected.

The Cerebral Aneurysm Rerupture After Treatment (CARAT) study, reported in this issue of Stroke, compared rates of recurrent hemorrhage in patients with ruptured aneurysms treated initially with coil embolization or surgical clipping. This was not a randomized trial, and of the 1010 patients, 711 were treated surgically and 299 underwent embolization. Patients treated with coil embolization were older, more likely to have small aneurysms arising from the posterior circulation, and less likely to have middle cerebral artery aneurysms. As in ISAT, there were more episodes of recurrent bleeding in the first year after coil embolization (3.0%) than after clipping (1.3%). The primary outcome measure, bleeding from the index aneurysm >1 year after treatment, occurred in 1 patient treated with clipping, and none with clipping. During a follow-up period averaging 3.7 years for coiled patients and 4.4 years for clipped patients, the annual rates of recurrent bleeding after the first year were 0.11% and 0% respectively. Significantly more patients treated with clipping required repeat treatment during the first year, and continued to require additional treatment, although infrequently, as long as 5 years after the initial procedure. Serious morbidity occurred in 11% of patients undergoing repeat coil embolization and 17% of those undergoing repeat surgery.

The CARAT study shows that both surgical clipping and endovascular coiling are highly effective at preventing recurrent bleeding from ruptured aneurysms. It is increasingly clear that excellent results can be achieved with clipping and coiling, and that outcomes are better in centers with experience and expertise in both techniques. Specific treatment strategies must be individualized, taking into consideration the patient’s age, neurological status, and medical comorbidities, as well as angiographic aspects such as aneurysm location, size, geometry, neck to dome ratio, and presence of calcification or intraluminal thrombus. Even densely packed aneurysms have a propensity to coil compaction and subsequent recurrence, necessitating long-term follow-up and possibly further treatment, even years after the initial procedure. Recurrence after complete aneurysm clipping is extremely unlikely, and late imaging follow-up is probably not required. However, if there is incomplete clipping, continued surveillance is warranted. A multidisciplinary approach emphasizing honest and valid assessment of local expertise and unbiased collaboration between surgeons and interventionalists is critical to decision making and will lead to improved outcomes.

References


**KEY WORDS:** coil embolization  intracranial aneurysm  subarachnoid hemorrhage  surgical clipping
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