

Editorial

The Barrow Ruptured Aneurysm Trial

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This is a landmark study.

In 2002, the International Subarachnoid Aneurysm Trial (ISAT) concluded that, in patients with ruptured aneurysms amenable to either surgical clipping or endovascular coil embolization, coil treatment was associated with a better functional outcome at 1 year.⁴ Publication of the ISAT results has radically changed treatment of ruptured intracranial aneurysms around the world; however, concerns were raised about the applicability of these results to all patients with ruptured aneurysms. These concerns revolved around the issue that the ISAT investigators enrolled only 22% of the patients treated at their centers during the study period. Additional critiques of the ISAT study included differences in experience between participating neurointerventionalists and neurosurgeons and applicability of the ISAT results to North America, where a potentially higher degree of subspecialization exists among vascular neurosurgeons treating patients with intracranial aneurysms. To address these critiques and concerns, neurosurgeons from the Barrow Neurological Institute launched the Barrow Ruptured Aneurysm Trial (BRAT) soon after the ISAT results became available. The premise of the BRAT was to include all patients seen during the study period at a center where superspecialized, experienced, and highly skilled vascular and endovascular neurosurgeons are available.

In this issue of the *Journal of Neurosurgery*, the BRAT investigators report the results of their study with 1-year outcomes.³ In response to the perceived ISAT shortcomings, the BRAT study included every patient with aneurysmal subarachnoid hemorrhage admitted during the study period. Patients were assigned in an alternating fashion (in the first part of the study) and then by lottery (for the last 100 patients) to endovascular or surgical treatment. Crossing over from one group to the other was allowed if the allocated treatment was judged not to be the ideal one for a given aneurysm. It is no surprise that the rate of crossing over from coil therapy to surgical clipping was high, since by design (unlike in the ISAT), aneurysms not ideal for endovascular coil embolization were initially allocated to this treatment. Irrespective of any methodological issue, the message of the

study is clear: regardless of how the results are analyzed (intent-to-treat or as-treated), endovascular treatment is associated with a better functional outcome at 1 year.

The authors may have designed the BRAT as a “pilot,” but in my opinion, this study is the definitive word on the best treatment for ruptured intracranial aneurysms amenable to either surgical or endovascular procedures. The treatment difference is marked, and this is validated by the observation (acknowledged by these authors) that the BRAT results are in accordance with the other 2 randomized studies published on this topic, the so-called Kuopio study¹ and the ISAT.⁴ This concordance among trials performed in different parts of the world (reminiscent of the results of the large randomized trials of carotid endarterectomy in the 1990s) further reinforces the importance and the validity of the observed effect. Recently, the BRAT investigators reported the 3-year outcomes in an abstract at the American Association of Neurological Surgeons’ annual meeting in Denver, Colorado, on April 13, 2011 (Spetzler RF et al: Three-year follow-up results of BRAT). There continues to be a trend favoring endovascular treatment after 3 years, but the statistical significance is lost. This observation does not negate the importance of the results reported in this issue of the *Journal*, because no patient would elect to undergo a treatment that requires at least 3 years to reach equivalent outcomes.

One of the main concerns in the ISAT was the risk of rebleeding after endovascular treatment. In patients undergoing coil therapy, rebleeding from the treated aneurysm was observed more often after coil embolization than after surgical treatment.⁵ An important finding in the BRAT is the lack of any rebleeding in aneurysms treated with coil embolization up to 3 years after treatment. This observation may suggest that endovascular treatment has improved since the ISAT, and this supposition is confirmed by better outcomes (compared to those reported in the ISAT) observed in the most recent trials on the efficacy of different coil types (A. Molyneux, personal communication, 2010).

The results of this study should not be interpreted as the end of surgical treatment for ruptured intracranial aneurysms. Obviously, over the past 20 years there has been a significant shift in the treatment of ruptured intracranial aneurysms, from surgery exclusively to predominantly endovascular coil embolization, and this trend is likely to continue. However, it would be a major mistake and a disservice to patients to adopt a policy of exclusive endovascular treatment. There are situations in which surgery is still a valid and better option, as in some young

patients with easily accessible (from a surgical point of view) aneurysms; patients with very small ruptured aneurysms, which continue to be an endovascular challenge; and aneurysms with unfavorable geometry, such as some aneurysms of the middle cerebral artery bifurcation. In the year 2011, ruptured aneurysms should be treated only in centers where both endovascular and surgical expertise are available. Treatment decisions must be individualized, considering patient- and aneurysm-associated factors as well as local logistics and expertise.²

The BRAT investigators must be commended for completing such a landmark study and for the high rates of follow-up. Hopefully this study will end discussions on the best treatment for ruptured aneurysms amenable to either endovascular or surgical treatment. There is firm and convincing evidence to support coil embolization in these cases.

Disclosure

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Response

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We thank Dr. Lanzino for his generous comments and are pleased that what we found to be the salient points are apparent. We have made every effort to be faithful to the data and hope that “res ipsa loquitur.”

Clinical outcomes at 1 year are improved if patients with ruptured aneurysms suitable for endovascular coil therapy are treated in this manner. Because there are a considerable number of patients whose aneurysms may not be well suited for endovascular therapy, it is important that patients be treated at comprehensive centers where there is also ready access to high-quality open surgical care.

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