Patients With Small, Asymptomatic, Unruptured Intracranial Aneurysms and No History of Subarachnoid Hemorrhage Should Generally Be Treated Conservatively For

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The management of patients with unruptured intracranial aneurysms depends on the natural history of these lesions and on morbidity and mortality rates associated with their repair. Epidemiological evidence from multiple vantage points suggests that a large majority of intracranial aneurysms do not rupture. It is therefore desirable to identify which unruptured aneurysms are at greatest risk of rupture and least risk for repair when considering which ones to treat.

Over the years, some have called attention to patients with small ruptured aneurysms diagnosed following subarachnoid hemorrhage (SAH), inferring that small unruptured aneurysms among patients with no history of SAH may have substantial subsequent rupture rates. Others have tried to extrapolate the natural history of UIAs by considering incidence rates of SAH to infer prevalences of UIAs in the population. The findings of the International Study of Unruptured Intracranial Aneurysms (ISUIA)1,2 and other natural history studies emphasize that the natural history of UIAs cannot be extrapolated from considering series of patients with ruptured aneurysms. Considerable confusion has arisen from not recognizing the substantial difference between the following questions: (1) what is the probability of a ruptured aneurysm being a certain size, and (2) what is the probability of future rupture of a given-sized aneurysm discovered before rupture? The second of these questions is relevant to clinical management of patients with UIAs. Available information suggests that most aneurysms that are going to rupture do so at the time of or soon after they form, and that the critical size for rupture is lower for those aneurysms that rupture early. The critical point is that one learns nothing about the natural history of UIAs by studying series of patients with ruptured aneurysms (and no UIAs). This applies not only to aneurysmal size but also to aneurysmal location.

A report in 19983 by the ISUIA Investigators, based on 2621 patients with UIAs from Phase I of this study, included retrospective natural history data and prospective surgical morbidity and mortality data. Based on those data and other available information regarding unruptured intracranial aneurysms, the conclusion that one could not generally advocate repair of small UIAs in patients without prior SAH (Group I) was unavoidable. The magnitude of the difference between the best available natural history data concerning these patients and the morbidity and mortality associated with repair was such that one would be taking more than a normal lifetime of risk in 1 day to surgically repair such a lesion.

Following publication of the ISUIA data, others came to the same conclusion regarding conservative management of this group of patients.3–6 An expert panel convened by the American Heart Association with major neurosurgical representation concluded that “in consideration of the apparent low risk of hemorrhage from incidental small (<10 mm) aneurysms in patients without previous SAH, treatment rather than observation cannot be generally advocated.”5 Johnston et al5 in an extensive cost utility analysis regarding UIAs concluded that “treatment of small, asymptomatic, unruptured cerebral aneurysms in patients without a history of SAH worsens clinical outcomes and thus is neither effective nor cost-effective.”

More recent data from ISUIA2 include prospective natural history information regarding unruptured intracranial aneurysms and generally support the conclusions noted. Credible evidence to the contrary is lacking. It is unlikely that selection bias is relevant in the outcomes of this prospective cohort of largely asymptomatic patients whose aneurysmal characteristics were well represented across the entire gamut of aneurysmal sizes, locations, and patient ages and closely resembled those for the entire group of UIA patients and the treated UIA group. Analysis of censoring patterns also confirmed the above regarding potential treatment selection bias. Prospective ISUIA natural history data confirm retrospective results that aneurysm size (particularly in Group I patients) and location play a significant role in determining the risk of future rupture and provide more detailed rupture risk according to aneurysm size, location, and patient group. Compared with rupture rates in the retrospective cohort, however, there was an increased rupture rate among Group I prospective patients who had unruptured aneurysms at least 7 mm in diameter.

Operative morbidity and mortality associated with prospective repair of unruptured intracranial aneurysms involving 1917 UIA patients undergoing surgical repair and 451 undergoing endovascular repair revealed overall morbidity and mortality at 1 year of 12.2% and 9.5%, respectively. The
groups differed substantially in that higher risk patients were selected for endovascular repair. Age was a strong predictor of surgical outcome, and aneurysm size and location predicted surgical and endovascular outcomes.

The new ISUIA data allow one to go beyond aneurysmal size alone to identify subgroups of patients with UIAs who may be more or less likely to benefit from UIA repair (based on size/location/group specific natural history and age/size/location specific treatment morbidity and mortality rates). Although the question for the current discussion was centered around small Group I unruptured aneurysms, it is important to recognize the need to compare natural history and treatment morbidity and mortality rates for all sizes and sites of Group I and Group II UIAs, because more risky UIAs with respect to natural history often are more risky to repair. One must be particularly thoughtful regarding surgical repair of UIAs in patients \( \geq 50 \) years of age and endovascular repair in patients \( \geq 70 \) years of age.6

Although it is always prudent to consider many medical components in a patient’s history regarding the advisability of surgery, the likelihood of improving on the observed natural history risk in the current group of patients (particularly those with anterior circulation UIAs <7 mm in diameter) is so low that it does not seem reasonable to invoke other common patient characteristics that would warrant repair. Some potential exceptions may warrant different consideration, such as the rare patient with a small Group I UIA causing symptoms other than rupture, particularly if these symptoms are acute or progressive. Other complex factors which are often taken into account include a positive family history of intracranial aneurysmal or SAH and the presence of daughter sacs, multiple lobes, or other unusual hemodynamic or morphological aneurysmal characteristics. Such factors could confer greater risk with regard to natural history, but this cannot be substantiated by the available natural history data. It is, of course, also very important to consider the patient’s perspective regarding his or her desire to have the aneurysm treated even with the low risk of rupture but only with full recognition of the physician’s substantial capacity and responsibility to influence a patient’s peace of mind by the physician’s own perspective and counsel.

Endovascular treatment of intracranial aneurysms is an evolving technology which may offer benefits of definitive management without the risks of a craniotomy. Long-term efficacy of endovascular techniques is not yet known, and it is premature to make definitive comparisons of these techniques to open surgery for UIAs with current information. Although one meta-analysis7 involving both ruptured and unruptured aneurysms has suggested surgical morbidity and mortality was significantly higher than endovascular morbidity and mortality, morbidity was assessed at hospital discharge only and the studies involved are not standardized for entry criteria or end points. A recent randomized trial provided short-term comparative data regarding surgical and endovascular treatment of ruptured intracranial aneurysms.8 A randomized trial for those patients with UIAs appropriate for aneurysmal treatment comparing endovascular techniques with open surgery would be required to optimally compare these techniques.

References

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