Management of Unruptured Intracranial Aneurysms

Increased use of brain imaging has resulted in more frequent recognition of unruptured intracranial aneurysms. The optimal management of these lesions is highly controversial because of uncertainty about the probability of rupture and the risks of surgical repair. The International Study of Unruptured Intracranial Aneurysms (ISUIA) was undertaken to delineate the natural rate of aneurysm rupture, the outcomes of endovascular treatment, and the risks and outcomes of surgical intervention.

More than 4,000 patients with at least one unruptured aneurysm were enrolled from 61 centers between 1991 and 1998. Patients with small lesions (i.e., less than 2 mm in diameter) were not included in the study, nor were patients with fusiform, traumatic, or mycotic lesions. Other exclusion criteria were subarachnoid hemorrhage from a single ruptured aneurysm or an unknown source, attempted manipulation of the aneurysm before enrollment in the study, malignant brain tumor, and inability to communicate or participate in follow-up. Patients were excluded if they had a history of intracranial hemorrhage with no known cause, or if an underlying structural lesion was not repaired.

All patients underwent cerebral arteriography to confirm the size and location of the aneurysm. Based on clinical judgment, patients were allocated to treatment or observation. Follow-up occurred at least once per year and included neurologic examination and assessment of cognitive function, general health, and quality of life. Medication use also was noted. Patients who underwent surgery were assessed seven days after the procedure, at the time of hospital discharge, 30 days after surgery, and at least once per year thereafter.

Patients who underwent surgery were slightly younger and significantly more likely to have symptoms such as headaches and cranial nerve defects. They also were significantly more likely to have large single lesions than patients who did not undergo surgery. Of the 1,692 patients assigned to observation, 410 eventually had surgery, 124 had endovascular therapy, and 193 died. Aneurysm rupture occurred in 51 of the patients assigned to observation (3 percent); nearly all ruptures occurred within five years of diagnosis. Lesions in the anterior circulation were more likely to rupture. In patients without subarachnoid hemorrhage from a separate aneurysm, larger aneurysms also were more likely to rupture. In patients with unruptured aneurysms in the internal carotid, anterior communicating, anterior cerebral, and middle cerebral arteries, the five-year rupture rate of lesions with diameters of 7 to 12 mm was 2.6 percent; lesions 13 to 24 mm in diameter had a 14.5 percent rupture rate; and lesions with diameters greater than 24 mm had a 40 percent rupture rate. Corresponding rates of rupture for lesions in the posterior circulation were 14.5 percent, 18.4 percent, and 50 percent, respectively.

A one-year overall morbidity and mortality rate in the 1,917 patients who underwent open surgical repair was 12.2 percent; the rate in patients who underwent endovascular repair was 9.5 percent. Patients who had previous ischemic cerebrovascular disease, aneurysmal symptoms other than rupture, or lesions greater than 12 mm in diameter or located in the posterior circulation were more likely to have poor

outcomes, as were patients at least 50 years of age. Of the patients treated endovascularly, aneurysms were judged to be obliterated in 51 percent, partially obliterated in 21 percent, and not obliterated in 23 percent. Similar results were obtained in patients treated with endovascular coiling.

The authors conclude that patients with unruptured intracranial aneurysms less than 7 mm in diameter who have no history of subarachnoid hemorrhage have a rupture rate of 0.1 percent per year. Family history does not appear to increase this risk.

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International Study of Unruptured Intracranial Aneurysms Investigators. Unruptured intracranial aneurysms: natural history, clinical outcome, and risks of surgical and endovascular treatment. Lancet July 12, 2003;362:103-10.