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Risks and Benefits of Screening for Intracranial Aneurysms in First-Degree Relatives of Patients With Sporadic Subarachnoid Hemorrhage

The Magnetic Resonance Angiography in Relatives of Patients With Subarachnoid Hemorrhage Study Group

Background: The first-degree relatives of patients who have subarachnoid hemorrhage from ruptured intracranial aneurysms are themselves at risk for subarachnoid hemorrhage. We studied the benefits and risks of screening for aneurysms in the first-degree relatives of patients with sporadic subarachnoid hemorrhage. **Methods:** We screened 626 first-degree relatives (parents, siblings, or children) of 160 patients with sporadic subarachnoid hemorrhage, from a prospective series of 193 consecutive index patients. Magnetic resonance angiography was the screening tool, and conventional angiography was used as the reference test in subjects thought to have aneurysms. Six months after elective operation, outcome was assessed by means of the modified Rankin scale of neurologic function. This observational study design was combined with a decision-analysis model to estimate the effectiveness of screening. The efficiency of screening was defined by the number of relatives who needed to be screened in order to prevent one subarachnoid hemorrhage. **Results:** Aneurysms were found in 25 of 626 first-degree relatives (4.0 percent; 95 percent confidence interval, 2.6 to 5.8 percent). Eighteen underwent surgery, which resulted in a decrease in function in 11 (disabling in 1). Five had medium-sized aneurysms that were 5 to 11 mm in diameter, 11 had small aneurysms that were less than 5 mm, and 2 had both small and medium-sized aneurysms. On average, surgery increased estimated life expectancy by 2.5 years for these 18 subjects (or by 0.9 month per person screened), at the expense of 19 years of decreased function per person. The number of relatives who would need to be screened in order to prevent 1 subarachnoid hemorrhage on a lifetime basis was 149, and 298 would have to be screened in order to prevent 1 fatal subarachnoid hemorrhage. **Conclusions:** Implementation of a screening program for the first-degree relatives of patients with sporadic subarachnoid hemorrhage does not seem warranted at this time, since the resulting slight increase in life expectancy does not offset the risk of postoperative sequelae.

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Comments:

This study will surely be viewed as controversial by the neurosurgical community and deserves careful scrutiny for the varying messages it attempts to deliver.

The authors deserve credit for the prospective nature of the study as well as for the information that is carefully obtained and presented on the incidence of magnetic resonance (MR) angiography--detectable

aneurysms in a cohort of first-degree relatives of patients suffering sporadic subarachnoid hemorrhage (SAH). Of 172 eligible patients with SAH, 960 first-degree relatives were approached, and 626 agreed to aneurysm screening by MR angiography. The 4% incidence of MR angiography--detectable aneurysms is a useful figure for the practicing neurosurgeon and will help in the counseling the family of patients who have experienced sporadic SAH, with the limitation that the data were primarily obtained in patients of Dutch heritage. The data are well presented, and the authors agree that this may represent an underestimation of the true incidence because of the current resolution of MR angiography technology in the detection of small lesions.

In the second part of the study, the authors sought to determine if the discovery of unruptured aneurysms in first-degree relatives justified the examination of a large number of relatives, given the relatively low incidence. Here is a likely point of controversy. The authors have assumed a fixed annualized rate of rupture of discovered aneurysms in their calculations based solely on size, but not location and other factors that we know may be associated with the risk of rupture. As noted in the abstract, 18 of 25 patients with detected aneurysms underwent ligation of their aneurysms in which surgical clips were used. Of these 18, 11 patients experienced a decrease in function as reflected by the postoperative Rankin score. The authors then extrapolate these results to conclude that the increase in life expectancy in light of the risk of posoperative sequelae does not justify the routine screening of patients.

The "loss of function" in the aftermentioned 11 patients included six patients with "nonspecific symptoms such as headache, fatigue, impaired concentration, and emotional problems." What neurosurgeon has not witnessed a significant number of postoperative craniotomy patients with such nonpsecific symptoms? Of the 11 patients experiencing loss of function, eight had a Rankin score of 1, which is defined as "minor symptoms but no limitations." If such nonspecific symptoms were excluded, would the conclusions of the authors be different? An additional patient, the worst complication in the operative group with a Rankin score of 3, actually experienced the complication due to the diagnostic angiography and not surgery.

Are the conclusions of this study justified based on a small operative series (18 patients) with such follow-up evaluation? Did the patients in the operative series express in retrospect that they would or would not have proceeded with treatment again based on their outcome and the well-being associated with a treated aneurysm? These are all questions that need to be addressed in follow-up studies. This provocative study has attempted to tackle an important and practical clinical problem facing the practicing neurosurgeon in defining who is appropriate for noninvasive screening for unruptured aneurysms; we must hope that the results of the study will not be misconstrued by payors to limit radiographic screening of appropriate patients and that this study will compel other investigators to review their own experience with such screening.

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