Aneurysmal subarachnoid hemorrhage in the elderly

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The incidence of aneurysmal subarachnoid hemorrhage (SAH) increases with age. Individuals 70 years or older represent 10–15% of the patients suffering from aneurysmal SAH. Advanced age is significantly associated with poor outcome after SAH, and elderly patients are at higher risk for surgical complications. Endovascular techniques allow a less invasive treatment. Thus, it would make sense to consider endovascular treatment in the vast majority of elderly patients with aneurysmal SAH. However, endovascular treatment in patients 70 years and older is not devoid of potentially disabling complications. These complications are related to the increased tortuosity of the proximal vasculature (which makes catheterization of the aneurysm more challenging) and to the presence of atherosclerotic disease (which increases the likelihood of thromboembolic complications). A recent subgroup analysis of patients enrolled in the International Subarachnoid Aneurysm Trial (ISAT) concluded that microsurgical treatment may be preferable to endovascular embolization in elderly patients with middle cerebral artery (MCA) aneurysms.1

In this issue of the Journal of Neurosurgery, Proust and colleagues2 summarize their experience in treating 64 patients 70 years or older with aneurysmal SAH during a 10-year interval. Since 1995, endovascular treatment has been available at their center and patients have been managed by an interdisciplinary team of neurosurgeons and interventional neuroradiologists. Fifty-three percent of the patients underwent microsurgical clipping and 47% underwent endovascular treatment. Overall, 61% of patients achieved a favorable outcome (modified Rankin Scale Scores 0–2) at 6 months. Patients with intraparenchymal hemorrhage underwent microsurgical treatment more often than endovascular treatment. The location of the aneurysm influenced the choice of treatment modality more than a patient’s clinical condition. Anterior communicating artery and posterior circulation aneurysms were more likely to be treated with embolization, whereas all ruptured MCA aneurysm were treated by surgical clipping.

The decision to undertake aggressive treatment in elderly patients with aneurysmal SAH can be a difficult one. Patients’ and families’ perceptions of an “acceptable” functional outcome vary a lot in this age group. Not only the likelihood of a good functional outcome but also the extent of family support, and the presence of preexisting cognitive impairment and serious comorbidities are important considerations in this population. As demonstrated by Proust and colleagues’ study,3 excellent neurological outcomes are not uncommon in the elderly, but cognitive dysfunction related to short-term memory problems and inability to return to some instrumental activities of daily living such as driving can have a dramatic, detrimental effect on quality of life. In this respect, it should be emphasized that Proust and colleagues’ report corresponds to a carefully “selected series” of elderly patients. Only poor-grade patients with a potentially reversible cause for their neurological compromise (that is, hydrocephalus or seizures) were considered for treatment and included in the study.

Based on growing clinical evidence,2,3 we have adopted a policy of attempting endovascular occlusion as first choice of therapy for amenable ruptured aneurysms. Over the years, with continuous advances in endovascular therapy, the definition of “aneurysms amenable to endovascular treatment” has expanded to account for approximately 75% of the aneurysms treated at our institution. However, when we initiate endovascular treatment, we maintain a very low threshold to abort embolization and take the patient to surgery if the endovascular procedure is more difficult than anticipated, especially when the aneurysm appears easy to expose and access surgically. We agree with Proust and colleagues4 that the MCA location poses particular risks from an endovascular point of view. Aneurysms of the MCA represent the majority of such lesions we treat microsurgically. In the elderly, the combination of brain atrophy and a subarachnoid clot facilitates dissection of the Sylvian fissure and exposure of the aneurysm. An important consideration during surgery in this patient population is to maintain absolute respect for venous structures. The anatomy in elderly patients is not as “forgiving” as that in younger ones after sacrifice of “innocent veins” during surgical approaches.

Proust and colleagues5 indicate that at their institution surgery is preferred for aneurysms > 10 mm. We disagree with this statement when it refers to elderly patients. Endovascular catheterization of large aneurysms is usually not as difficult as catheterization of very small ruptured intracranial aneurysms. Moreover, we think that in the elderly, suboptimal aneurysm packing with the goal of “protecting
the dome” is reasonable. Definitive treatment (surgical or additional embolization) can then be performed at a later time if the patient survives and achieves a good functional outcome. There is no doubt that endovascular treatment is not as effective as microsurgery in large aneurysms. However, clipping of large aneurysms often requires temporary clipping with the ensuing risks of ischemia, which are higher in elderly patients.

More than 50% of patients required temporary CSF diversion in the series and more than 33% required placement of a ventriculoperitoneal shunt. Hydrocephalus, both acute and chronic, plays a significant role in the pathogenesis of cognitive dysfunction after SAH, and this is especially problematic in elderly patients in whom CSF reabsorption may already be “borderline.” Therefore, we keep a low threshold for placing external ventricular drains in patients with even minimal symptoms and signs of hydrocephalus, and ventriculoperitoneal shunts in those with persistent or recurrent symptoms. Yet we acknowledge that this strategy is not devoid of complications. For example, the risk of subdural hematomas after minor falls is increased in elderly patients with ventricular shunts.

In line with the recent guidelines, the study by Proust and colleagues emphasizes the importance of a multidisciplinary approach to the treatment of aneurysmal SAH. Multidisciplinary contributions become paramount when treating elderly patients, as they pose additional challenges to the decision-making process. Modern aneurysm treatment should be done in centers where both treatment modalities, surgical and endovascular, are offered.

References


3. Molyneux AJ, Kerr RS, Birks J, Ramzi N, Yarnold J, Sneade M, et al: Risk of recurrent subarachnoid hemorrhage, death, or aneurysm recanalization. In the elderly subgroup from the ISAT, however, the risk of morbidity was slighter than clipping for all aneurysms in all patients. For the patient, the principle to propose an optimal treatment adapted to each individual case is fundamental, with regard to SAH severity, ischemic procedural risk, and aneurysm recanalization. In the elderly subgroup from the ISAT, however, the risk of morbidity was slightly increased after endovascular occlusion. In a secondary analysis focused on the elderly subgroup from the population included during the ISAT, the location was the single criterion of distinction between both treatments: the MCA aneurysm has rather been treated by microsurgical exclusion, whereas for the anterior communicating artery aneurysm an endovascular occlusion has been used. Due to the limited amount of evidence regarding the choice of these procedures, a French multicenter randomized trial financed by the Health Ministry (PHRC 2007–042/HP; www.clinicaltrial.gov) is currently underway.

The suggestions proposed by Drs. Lanzino and Rabinstein are very constructive. The approach to an MCA aneurysm is easier in the elderly because of the large sylvian fissure related to brain atrophy, and a suboptimal endovascular occlusion is justifiable in this age group despite the latest results of ISAT. Nevertheless, these strategies are not sufficient to avoid an ischemic event. After microsurgical exclusion, we have previously observed secondary ischemia unrelated to a cerebral vasospasm. Moreover, if suboptimal packing is a suitable objective in this age group, it may induce secondary embolus migration or exposure to effective recanalization.

Hydrocephalus is the main consequence of SAH. Careful reflection is needed before undertaking CSF diversion. We agree with Drs. Lanzino and Rabinstein with regard to the indication to insert an external ventricular drain at an early stage to avoid the occurrence of complications related to an alteration in consciousness. Even external ventricular drainage has presented some difficulties in terms of anticoagulation, and thus a critical period

Response

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We would like to thank Drs. Lanzino and Rabinstein for their very illuminating and pragmatic editorial regarding aneurysmal SAH in the elderly. They have underlined several points: the application of the ISAT principle, the characteristics of MCA aneurysms and large aneurysms in this age group, the crucial problem of hydrocephalus, and the multidisciplinary approach.

Neurovascular susceptibility is commonly observed in the elderly. The susceptibility to a reduction of blood flow during invasive treatment such as microsurgical exclusion or endovascular occlusion has been explained by the combination of several factors. The hemodynamic modifications constantly correlated with age are the reduction of cerebral blood flow and lower cardiac output, explaining the absence of cerebral vascular compensatory reserve. Furthermore, the morphological alterations such as advanced arterial atheroma or arterial tortuosity expose patients to embolic migrations and arterial tears during the endovascular approach or the clip application. Indeed, all procedural maneuvers may affect low regional cerebral blood flow during systemic events such as intraoperative hypotension or physiological disturbances after SAH.

The ISAT has provided clinical evidence that a suitable configuration to coiling in the patients with aneurysms 10 mm or smaller in size must favor the endovascular option. However, this finding does not signify that clipping is safer than clipping for all aneurysms in all patients. For the patient, the principle to propose an optimal treatment adapted to each individual case is fundamental, with regard to SAH severity, ischemic procedural risk, and aneurysm recanalization. In the elderly subgroup from the ISAT, however, the risk of morbidity was slightly increased after endovascular occlusion. In a secondary analysis focused on the elderly subgroup from the population included during the ISAT, the location was the single criterion of distinction between both treatments: the MCA aneurysm has rather been treated by microsurgical exclusion, whereas for the anterior communicating artery aneurysm an endovascular occlusion has been used. Due to the limited amount of evidence regarding the choice of these procedures, a French multicenter randomized trial financed by the Health Ministry (PHRC 2007–042/HP; www.clinicaltrial.gov) is currently underway.

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