Prognostic Factors and Targets for Intervention After Subarachnoid Hemorrhage

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Aneurysmal subarachnoid hemorrhage is associated with a high risk of morbidity and mortality. Treatment requires early aneurysm repair to prevent catastrophic rebleeding and intensive medical care to manage associated problems including hydrocephalus, cerebral vasospasm, electrolyte disorders, infection, and seizures. Prognosis after SAH is determined in part by factors that are present from the outset and not modifiable, but recent evidence suggests potential opportunities to improve outcomes.

Rosengart et al1 analyzed a large series of patients with ruptured aneurysms and determined that the most important factors leading to unfavorable outcome were cerebral infarction, worse clinical grade on admission, advanced age, fever, and symptomatic vasospasm. Other significant variables were greater clot thickness on admission CT scan, posterior circulation aneurysms, large aneurysms, intraventricular or intracerebral hemorrhage, anticonvulsant use, and not using hypertensive hypervolemic therapy.

This analysis expands on previous studies using multivariable analysis to determine prognostic factors in SAH,2–4 and has the advantage of a large patient population treated with more contemporary medical management. However, the patients studied were enrolled in 4 randomized trials of tirilazad mesylate in aneurysmal subarachnoid hemorrhage,5–8 and therefore represent a selected population. Exclusion criteria included severe concomitant medical or neurological illness, uncontrolled hypertension, recent myocardial infarction, congestive heart failure, and patients taking corticosteroids or calcium antagonists other than nimodipine. Most important, patients whose aneurysms were repaired with endovascular techniques were also excluded.

The superiority of endovascular treatment over clipping for ruptured aneurysms suitable for either approach9 has led to marked changes in practice in recent years, especially for aneurysms of the posterior circulation, and it is possible that aneurysm location will diminish in relative significance as a prognostic factor in future studies. Older patients, those with more extensive hemorrhage, and those with larger aneurysms continue to experience worse outcomes, in spite of technical and medical advances. The use of hypertensive hypervolemic therapy in this study was associated with better outcomes and attests to the critical importance of cerebral vasospasm as a cause of morbidity. Patients in the 4 trials received nimodipine as well as either tirilazad mesylate or placebo, although no clinical benefit was seen in the experimental groups. Pravastatin has recently emerged as another potential treatment to ameliorate vasospasm and further studies are needed to determine its effect on vasospasm-related ischemia.10

Use of anticonvulsants after SAH is controversial. Seizure prevention may reduce the risk of recurrent hemorrhage from unsecured aneurysms, but this has not been proven. Benefit from prophylaxis assumes that seizures are harmful and anticonvulsants are without risk. Rosengart et al1 found that anticonvulsant use was associated with unfavorable outcomes. A recent study by Naidech et al11 found that exposure to phenytoin after SAH was associated with poor functional and cognitive outcome in a dose-dependent manner. These data suggest that exposure to phenytoin after SAH should be minimized and warrant further study into the use of anticonvulsants in patients at high risk for seizures after SAH.

Fever is also an important consideration in patients with SAH. Among the most important factors leading to unfavorable outcomes by Rosengart et al,1 it is arguably the most readily amenable to treatment. Fernandez et al12 studied a consecutive cohort of 353 patients with SAH and found that fever during the first 10 days after SAH was associated with increased mortality and greater functional disability among survivors. More evidence is needed. The impact of measures to reduce fever after SAH also warrants aggressive investigation.

Disclosures

None.

References


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