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## Cerebral Vasospasm

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### Cerebral Vasospasm

R.W. Seiler and H.J. Steiger, eds; Vienna: Acta Neurochirurgica, Supplement 77; 2001. 269 pages. 90 illustrations. Price: \$105.85.

Cerebral vasospasm is a major cause of disability and death associated with subarachnoid hemorrhage. The International Cooperative Study on the Timing of Aneurysm Surgery (1980–1983) showed that clinical vasospasm affected 13.5% of patients with subarachnoid hemorrhage and was responsible for 33% of the occurrences of disability and death in patients with subarachnoid hemorrhage. The introduction of triple-H-therapy (hypervolemia, hemodilution, and hypertension) in the late 1980s helped to reduce ischemic brain damage; however, complications such as hemorrhagic transformation of the ischemic brain tissue, myocardial infarct, and pulmonary edema remain as major limitations. Interventions such as clot lysis, cisternal irrigation with urokinase, neuroprotective agents, and percutaneous transluminal angioplasty have been proposed as ways to reduce cerebral ischemic damage. To date, the use of triple-H-therapy and better overall patient management have led to a significant reduction in permanent neurologic impairment, which is now observed in only 5% to 7% of all patients with aneurysmal subarachnoid hemorrhage. Further risk reduction may be expected with the introduction of less invasive endovascular treatment modalities for ruptured aneurysms.

In this 77<sup>th</sup> supplement to *Acta Neurochirurgica*, well edited by Seiler and Steiger, world-renowned clinicians and basic scientists have summarized their work in the form of proceedings, which are structured as scientific papers (ie, Introduction, Materials and Methods, Results, Discussion, Conclusions, and most pertinent References). These were presented at the 7<sup>th</sup> International Conference on Cerebral Vasospasm, held in Interlaken, Switzerland, in June 2000.

“Is Cerebral Vasospasm Still a Clinical Problem?” is the title of the brief introduction. Two major parts are presented next and are divided into a total of 10 chapters focusing on the currently known aspects of cerebral vasospasm. The first part of the book, “Basic Science and Experimental Vasospasm,” introduces the reader to the molecular biology of vasospasm, the role of endothelin as a potent vasoconstrictor, the role of nitric oxide as a potent vasodilator, the role of genes and the potential use of gene therapy, and a presentation of currently available experimental models for the study of vasospasm. For nonbasic scientists and readers without sufficient background in molecular biology, this part may not be easy to read. It is better suited for scientists and clinicians involved with cerebral vasospasm on a regular basis; it provides them with an overview of current basic understanding and ongoing research. Because *Cerebral Vasospasm* is a compendium of proceedings, the table and figures

are comparable with those found in scientific publications. The references are comprehensive and basically cover all the important published material pertinent to cerebral vasospasm.

The second part, subdivided into six chapters, is addressed more to the practicing clinician who deals with vasospasm in major clinical institutions and academic centers. The first section discusses the diagnosis of vasospasm and includes an interesting and comprehensive presentation of the role of diffusion-weighted and perfusion-weighted MR imaging in cases of cerebral vasospasm. Assessment of cerebral microcirculation by using digital subtraction angiography is presented next, and I found this to be a poorly designed study. A paper on MR proton spectroscopy presents the changes of choline:creatine and *N*-acetylaspartate:creatine ratios during acute and chronic stages of subarachnoid hemorrhage in patients with symptomatic vasospasm. Several papers address the value of using microdialysis for metabolic monitoring after subarachnoid hemorrhage to improve clinical outcome. This more invasive method, practiced by neurosurgeons in the neurointensive care unit, uses a microdialysis catheter that is placed into the brain tissue mostly affected by the vasospasm to sample metabolites (eg, glutamate, lactate, glucose) and to determine nitric oxide levels or brain tissue oxygen tension. Another section deals with the value of clot lysis by using urokinase to prevent vasospasm. One section is dedicated to the endovascular treatment of cerebral vasospasm and basically summarizes the indications for and results of angioplasty, the long-term outcomes, and the limited use of intra-arterial papaverine infusion. The last section summarizes investigational forms of vasospasm treatment with novel drugs such as fasudil hydrochloride, a protein kinase inhibitor that is a vasodilator and an intracellular calcium antagonist, and the value of neuroprotective agents. In addition, some experimental projects such as spinal cord stimulation are presented. The last section is a collection of proceedings addressing the value of triple-H-therapy and hypothermia for vasospasm and the role of neuroprotective treatment in vascular surgery in an experimental setup. Surprisingly, a paper on transcranial Doppler ultrasonography-guided hypertensive therapy presented by a group from a major center in Germany found only marginally beneficial effects on the health-related quality of life. The aggressive hypertensive treatment used in 52 patients versus conventional normovolemic hemodilution and maintenance of normal to slightly elevated blood pressure values in 39 patients had a positive effect on neurologic outcome

initially. The unfavorable results are probably related to neurologic impairment associated with hemorrhage.

Being a compendium of meeting proceedings, the supplement naturally does not read like a standard textbook. Predominantly, the presented work involves understanding the role of blood degradation products in creating an imbalance between the vasoconstriction (endothelin-mediated) and vasodilation (nitric oxide-mediated) and the induction of vascular inflammatory response. The focus is also toward the development of chemical agents that might interact to correct the imbalance.

I enjoyed reading the book because it well shows how to approach a clinically complex problem from both a research and a clinical perspective; however, it predominantly addresses neurosurgeons and neurointensivists. Because only three papers deal with the value of imaging for cerebral vasospasm and only five proceedings deal with neurointervention, I do not think this book would be of great significance to an interested neuroradiologist who currently has easy access to the latest publications by using the web. In summary, this supplement has more of a place in a library rather than in the hands of a general practicing neuroradiologist.