

## Editorial

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# Vasospasm Monitored by Transcranial Doppler

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Vasospasm almost always occurs following rupture of an aneurysm in the Circle of Willis. Spasm is less likely in peripherally located aneurysms, for example those complicating bacterial endocarditis.

For a day or two spasm is often absent or minimal. If the patient's condition is good, many surgeons will proceed at this time either with surgery or endovascular placement of coils in the aneurysm to make it undergo thrombosis.

Spasm is due to the evolution of oxyhemoglobin from hemoglobin, causing depletion of the vasodilating nitrous oxide synthase.<sup>1</sup> From the third day after hemorrhage onward, with or without surgical or endovascular intervention, spasm develops progressively, generally reaching a maximum plateau at the end of the first week. It is during the period of increasing spasm and the early plateau period that serious ischemic complications are likely to occur. The standard management during this time is "Triple H": Hypertension, Hemodilution, and Hypervolemia.

Although this paradigm has been widely accepted for 20 years its efficacy remains unproven. Moreover it may carry medical morbidity, including pulmonary edema, myocardial ischemia, catheter infections, and cerebral edema.<sup>2</sup> Obviously careful ICU monitoring of the potential medical morbidities is important.

For specific monitoring, we have adopted the technique of Transcranial Doppler (TCD).<sup>3</sup> This non-invasive method permits daily measurements defining the severity and time course of the evolving spasm in the individual patient. We have found that daily measurements are essential for this purpose. This enables optimization of medical management of the medical therapy.

In most cases this is adequate to bring the patient through without ischemic damage. In rare cases, TCD demonstrates a rapidly increasing severity of spasm. This is usually confirmed by angiography representing a vascular emergency. This can be dealt with by percutaneous angioplasty As the plateau progresses after which spasm decreases. All this can be objectively defined by TCD.

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