

**Intention-to-treat analysis of Spetzler-Martin grades IV and V arteriovenous malformations: Natural history and treatment paradigm**

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**Abstract:**

**Object.** In this study the authors quantified a subgroup of patients with Spetzler-Martin Grades IV and V arteriovenous malformations (AVMs) recommended for complete, partial, or no treatment, and calculated the retrospective hemorrhage rate for these lesions.

**Methods.** Between July 1997 and May 2000, 73 consecutive patients with Grades IV and V AVMs were evaluated prospectively by the cerebrovascular team at Barrow Neurological Institute. Treatment recommendations given to the patients or referring physicians were classified as complete treatment, partial treatment, and no treatment. Retrospectively, the hemorrhage rates associated with these treatment groups were also calculated.

In the prospective portion of the study (the intention-to-treat analysis), no treatment of the AVM, was recommended for 55 patients (75%) and partial treatment was recommended for seven patients (10%). Aneurysms associated with an AVM were obliterated by surgical or endovascular treatment in seven patients (10%), and complete surgical removal was recommended for four patients (5%). The overall hemorrhage rate for Grades IV and V AVMs was 1.5% per year. The annual risk of hemorrhage was 10.4% among patients who previously had received incomplete treatment, compared with patients without previous treatment.

**Conclusions.** The hemorrhage risk of 1.5% per year, which was associated with Grades IV and V AVMs appears to be lower than that reported for Grades I through III AVMs. The authors recommend that no treatment be given for most Grades IV and V AVMs. No evidence indicates that partial treatment of an AVM reduces a patient's risk of hemorrhage. In fact, partial treatment may worsen the natural history of an AVM. The authors do not support palliative treatment of AVMs, except in the specific circumstances of arterial or intranidal aneurysms or progressive neurological deficits related to vascular steal. Complete treatment is warranted for patients with progressive neurological deficits caused by hemorrhage of the AVM. This selection process plays a significant role in the relatively low combined morbidity and mortality rates for Grade IV and Grade V AVMs (17 and 22%, respectively) reported by the cerebrovascular group in both retrospective and prospective studies.

**Author Keywords:**

arteriovenous malformation, natural history, Spetzler-Martin grading system

**KeyWords Plus:**

LINEAR-ACCELERATOR RADIOSURGERY, VENOUS DRAINAGE, INTRACRANIAL ANEURYSMS, ENDOVASCULAR TREATMENT, PEDICLE ANEURYSMS, GRADING SYSTEM, FOLLOW-UP, HEMORRHAGE, BRAIN, RISK

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