Arteriovenous Malformations of the Brain
Lessons to Learn

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See related article, pages 878–885.

Cerebral arteriovenous malformations (AVM) represent a heterogeneous entity, and a multitude of classifications for this rare disorder exists. Moreover, data on different treatment regimens are controversial.1

In this issue of Stroke, Lasjaunias et al2 present a group of vascular malformations which they consider a distinct entity separate from other brain AVM and classify them as cerebral proliferative angiopathy. Criteria for this classification were predefined almost 20 years ago and included angiographical, cross-sectional imaging and in one case also histopathological data. In a large patient cohort of >1400 patients 49 patients (3.4%) were found to meet these criteria. Clinical signs included seizures, headaches and nonhemorrhagic neurological deficits. Angiography demonstrated a diffuse nidus, stenosis of the proximal arteries in almost 40% and a transdural supply in almost 60% of the cases. This angiographic appearance was considered as typical for this disorder. In 1 case with a histopathological work-up the authors found normal-appearing neural tissue in between pathological AVM vessels.

Notwithstanding the authors’ vast experience, one must recognize that the conclusions are derived from a retrospective analysis of a huge database installed primarily for clinical quality management reasons and not for this particular study purpose. This alone introduces a definite element of bias. Furthermore, only the clinical data of both classical AVM and cerebral proliferative angiopathy were compared, and it remains unclear how frequently angiographic and histological findings considered as typical for cerebral proliferative angiopathy were also present in classic AVM. In this respect one must keep in mind that statistical analyses of clinical data, ie, rebleeding rates etc, with extreme intergroup differences in sample size (49 versus 1434) are to be regarded with extraordinary caution. On top of this, all notions on proliferative angiogenic activity are mere extrapolations from angiographies whereas angiogenesis per se denotes a dynamic, pathophysiological process. All in all, these issues put the “evidence” provided here in a somewhat relative perspective, because there is too much room for speculation.

To deduce meaningful therapeutic options under these premises seems difficult. The authors suggest “less aggressive” forms of treatment and performed partial targeted embolization in selected cases (23 of 49). The indications for these interventions remain somewhat elusive because the authors concede that “hemorrhage is an exception”. Above the well known fact that partial occlusion of an AVM does not reduce its propensity for hemorrhage, recent evidence shows that any treatment in unruptured AVM is associated with a higher morbidity than the natural course.1 By the way, recent studies have demonstrated a much lower risk for spontaneous and disabling hemorrhage in all unruptured AVM than previously thought.3 Treatment of nonhemorrhagic symptoms in this manner is also an unproven concept with uncertain long-term prognosis, because partial embolization may trigger neoangiogenesis via a higher expression of vascular endothelial growth factor.4

Hence the question, “what would be the clinical impact if this kind of AVM was considered a separate entity?” First of all the necessity for this subclassification is questionable, because these cases are extremely rare among AVM, which per se have a very low incidence. Secondly, these malformations would normally—at least among neurosurgeons—be classified as AVM of Spetzler/Martin grades 4 to 5 with a diffuse and patchy nidus—which implies the occurrence of intermingled functional brain tissue—and additional transdural supply. These types have (a) been described before as “diffuse nidus AVM”,5 (b) are already known to present rarely in a hemorrhagic manner, and are (c) almost never candidates for any active treatment. So, after reading this article, does “cerebral proliferative angiopathy” exists as a separate entity? The answer is maybe. Would it be clinically important? The answer is not really, because we will rarely see one in the future and if we do, we will treat this new case just as the ones before.

The authors are to be commended for sharing their vast clinical experience with us and adding another interesting and potentially important aspect in the understanding of brain AVMs. Nevertheless, it becomes evident that larger and prospective patient populations are necessary to understand pathophysiology, natural course and the impact of treatment in brain AVMs. The randomized trial of unruptured brain arteriovenous malformations (http://www.arubastudy.org/) may provide important answers.

Disclosures

None.
References


**Key Words:** AVM
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Stroke. 2008;39:741-742; originally published online January 31, 2008;
doi: 10.1161/STROKEAHA.107.500975
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://stroke.ahajournals.org/content/39/3/741

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