High-grade arteriovenous malformation

Treatment

High-grade arteriovenous malformation treatment.

Outcome

Untreated high grade AVMs presenting with hemorrhage have a significant risk of subsequent rupture, and their rupture carries a higher risk of case fatality and permanent morbidity than AVMs in general. The risks associated with their treatment should be appraised in light of perilous natural history ¹.

Case series

A retrospective analysis of a prospectively maintained database was performed in children with treated and nontreated pediatric AVMs at the University of California, San Francisco, from 1998 to 2017. Inclusion criteria were age \leq 18 years at time of diagnosis and an AVM confirmed by a catheter angiogram.

The authors evaluated 189 pediatric patients with AVMs over the study period, including 119 ruptured (63%) and 70 unruptured (37%) AVMs. The mean age at diagnosis was 11.6 \pm 4.3 years. With respect to Spetzler-Martin (SM) grade, there were 38 (20.1%) grade I, 40 (21.2%) grade II, 62 (32.8%) grade III, 40 (21.2%) grade IV, and 9 (4.8%) grade V lesions. Six patients were managed conservatively, and 183 patients underwent treatment, including 120 resections, 82 stereotactic radiosurgery (SRS), and 37 endovascular embolizations. Forty-four of 49 (89.8%) high-grade AVMs (SM grade IV or V) were treated. Multiple treatment modalities were used in 29.5% of low-grade and 27.3% of high-grade AVMs. Complete angiographic obliteration was obtained in 73.4% of low-grade lesions (SM grade I-III) and in 45.2% of high-grade lesions. A periprocedural stroke occurred in a single patient (0.5%), and there was 1 treatment-related death. The mean clinical follow-up for the cohort was 4.1 \pm 4.6 years, and 96.6% and 84.3% of patients neurologically improved or remained unchanged in the ruptured and unruptured AVM groups following treatment, respectively. There were 16 bleeding events following initiation of AVM treatment (annual rate: 0.02 events per person-year).

Coordinated multidisciplinary evaluation and individualized planning can result in safe and effective treatment of children with AVMs. In particular, it is possible to treat the majority of high-grade arteriovenous malformations with an acceptable safety profile. Judicious use of multimodality therapy should be limited to appropriately selected patients after thorough team-based discussions to avoid additive morbidity. Future multicenter studies are required to better design predictive models to aid with patient selection for multimodal pediatric care, especially with high-grade AVMs²⁾.

Long-term Outcomes With Planned Multistage Reduced Dose Repeat Stereotactic Radiosurgery for Treatment of Inoperable High-Grade Arteriovenous Malformations: An Observational Retrospective Last update: 2024/06/07 high-grade_arteriovenous_malformation https://neurosurgerywiki.com/wiki/doku.php?id=high-grade_arteriovenous_malformation 02:58

Cohort Study ³⁾.

Treatment of Spetzler-Martin Grade IV and V brain arteriovenous malformations (ie, high-grade AVMs) carries a high risk of morbidity and even mortality. However, little is known about the behavior of these lesions if left untreated.

Objective: To investigate the natural history of patients with high-grade AVMs.

Methods: Patients with untreated high-grade AVMs admitted to our center between 1952 and 2005 were followed from admission until death, AVM rupture, or initiation of treatment. Rates of rupture and various risk factors were analyzed using Kaplan-Meier life table analyses and Cox proportional hazards models. Functional outcome was assessed 1 year after possible AVM rupture using the Glasgow Outcome Scale.

Results: Sixty-three patients with a mean follow-up time of 11.0 years (range, 1 month to 39.6 years) were identified. Twenty-three patients (37%) experienced a subsequent rupture. The average annual rate of rupture was 3.3%. In patients with hemorrhagic presentation, the annual rate was 6.0%, compared to 1.1% in patients with unruptured AVMs (P = .001, log-rank test; hazard ratio, 5.09 [1.40-18.5, 95% CI]; P = .013, multivariate Cox regression model). One year after the first subsequent rupture, 6 patients (26%) had died, and 9 (39%) had moderate or severe disability.

Untreated high grade AVMs presenting with hemorrhage have a significant risk of subsequent rupture, and their rupture carries a higher risk of case fatality and permanent morbidity than AVMs in general. The risks associated with their treatment should be appraised in light of perilous natural history ⁴.

Jayaraman et al. examined the prospective annual risk of hemorrhage in patients harboring Spetzler-Martin grades IV and V arteriovenous malformations (AVMs) before and after initiation of treatment.

Medical records of 61 consecutive patients presenting with Spetzler-Martin grades IV and V AVMs were retrospectively reviewed for demographics, angiographic features, presenting symptom(s), and time of all hemorrhage events, before or after treatment initiation. Pretreatment hemorrhage rates (excluding hemorrhages at presentation) and posttreatment rates were subsequently calculated. Modified Rankin Scale (mRS) scores before and after treatment were recorded.

The annual pretreatment hemorrhage rate for all patients was 10.4% per year (95% CI, 2.2 to 15.4%), 13.9% (95% CI, 3.5 to 22.1%) in patients with hemorrhagic presentation and 7.3% (2.6 to 14.3%) in patients with nonhemorrhagic presentation. Posttreatment hemorrhage rates were 6.1% per year (95% CI, 2.5 to 13.2%) for all patients, 5.6% (95% CI, 2.1 to 11.8%) for patients presenting with hemorrhage and 6.4% (95% CI, 1.6 to 10.1%) in patients with nonhemorrhagic presentation. A noninferiority test showed that the posttreatment hemorrhage rate was less than or equal to the pretreatment hemorrhage rate (P<0.0001), with some indication that the reduction was greatest in patients with hemorrhagic presentation. Of the 62 patients, 51 (82%) had an mRS score of 0 to 2 before treatment, and 47 (76%) had an mRS score of 0 to 2 at the last follow-up after treatment.

The annual rate of hemorrhage in grades IV and V AVMs is higher in this series than reported for all AVMs, which may reflect some referral bias in this single-center study. Nevertheless, initiation of

treatment does not appear to increase the rate of subsequent hemorrhage. Treatment for these lesions may be warranted, given their poor natural history ⁵⁾.

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.

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. ⁶⁾.

The aim of a study was to compare operatively and non-operatively managed high-grade arteriovenous malformations (AVMs) and to identify risk factors for surgical morbidity. Three hundred and ninety-one consecutively enrolled patients with AVMs were graded using the Spetzler Martin grading scheme. Forty-six of these patients had grade 4 or 5 AVMs. Twenty-nine patients underwent surgery and 17 were conservatively managed. During an average of 33 months follow-up the nonoperative group experienced a decline in function in 27% of cases followed. These deteriorations were due to haemorrhage, progressive neurological deficits and seizures. In the surgical group completing treatment there was a mortality and morbidity impacting on self-care of 15%. In those without deep perforating arterial supply the morbidity was 10% and with deep perforating arterial supply or deep meningeal recruitment there was a combined morbidity and mortality of 44%. This difference in outcome was statistically significant (P<0.01). We conclude that high-grade AVMs have a high operative morbidity. However, these lesions often have a poor natural history and with careful selection (based on the presence or absence of deep perforating arterial supply) a group can be selected that benefits from surgery. Grade 4 and 5 AVMs with supply from lenticulostriate, choroidal, thalamic deep perforating arteries or deep meningeal recruitment may be best treated conservatively or possibly by multimodality treatment utilising radiotherapy and embolisation combined with surgery 7)

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