



Spinal Glomus Arteriovenous Malformations: Risk of hemorrhage and results of surgical and endovascular treatment. A meta-analysis.

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Introduction

Spinal glomus arteriovenous malformations (AVMs) are rare lesions that are a considerable source of neurologic morbidity as a result of progressive neurologic deficits or hemorrhage. The risk of hemorrhage and results of intervention for these lesions are infrequently reported.

Methods

We performed a meta-analysis via the PubMed database through May 2012. We included all studies with at least 3 cases allowing us to calculate an overall hemorrhage rate, risk factors for hemorrhage, and/or results of surgical or endovascular treatment. Hazard ratios were calculated using univariate and multivariate Cox proportional hazards regression models.

Results

After an initial screening of 2289 studies, 232 full text articles were perused for eligibility, affording 33 reports meeting inclusion criteria (Figure 1). Mean patient age was 29.1 (95% CI 25.5-32.8) without a significant sex predilection. Half of the patients presented with hemorrhage (95% CI 44-55%), with 35% of patients suffering from spinal pain syndromes at the time of presentation (95% CI 29-42%). The majority of AVMs were thoracic (51%, 95% CI 44-57%); 29% were cervical (95% CI 23-35%) and 20% were lumbar/conus (95% CI 16-26%). Of note, 29% had an associated aneurysm (95% CI 21-38%). The overall annual hemorrhage rate prior to treatment was 4% (95% CI 3-6%), increasing to 10% (95% CI 7-16%) for AVMs with a prior history of hemorrhage. The hazard ratio for hemorrhagic presentation as a risk factor for subsequent hemorrhage was 2.25 (95% CI 0.71-7.07), increasing to 13.0 (95% CI 1.44-118) when restricting the analysis to an initial follow-up period of 10 years. The overall rates of complete obliteration were 78% (95% CI 72-83%) for surgery and 33% (95% CI 24-43%) for endovascular treatment. Long term clinical worsening occurred in 12% of patients after surgical treatment (95% CI 8-16%) and 13% of patients after endovascular treatment (95% CI 7-21%). No hemorrhages occurred after complete obliteration. After partial surgical treatment, the annual hemorrhage rate was 3% (95% CI 1-6%); no hemorrhages were reported over 196 patient-years after partial endovascular treatment.

Conclusions

Like their cerebral AVM counterparts, ruptured spinal AVMs have a greater risk of subsequent hemorrhage, particularly within the first 10 years. Complete obliteration and even partial endovascular treatment decreases their risk of hemorrhage.

Learning Objectives

- 1) Identify the annual rate of hemorrhage for spinal AVMs.
- 2) Identify obliteration rates and outcomes after surgical/endovascular

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