Giant intracranial arteriovenous malformation

Giant intracranial arteriovenous malformations (AVMs) are rare cerebrovascular lesions that pose management challenges.

Treatment

Giant AVMs should be considered cautiously because hemorrhagic risk is similar regardless of management strategy and functional outcome is likely to be same or better in the conservatively managed population ¹⁾.

Volume-staged stereotactic radiosurgery (VS-SRS) can downgrade AVMs, transforming high-grade AVMs (initially considered inoperable) into operable AVMs with acceptable surgical risks. This treatment paradigm offers an alternative to conservative observation for young patients with unruptured AVMs and long life expectancy, where the risk of hemorrhage is substantial. Difficult AVMs were cured in 15 patients. Surgical morbidity associated with downgraded AVMs is reduced to that of postradiosurgical/preoperative supplemented Spetzler-Martin grades, not their initial AVM grades².

Case series

2016

Yang et al performed a retrospective review of all patients diagnosed with AVMs evaluated from 1990 to 2013. Patients with a single intracranial AVM >6 cm were included. Patients were divided into 2 groups: conservative management or intervention (microsurgery, radiosurgery, or embolization). Functional outcome was assessed with the modified Rankin Scale (mRS) and compared between the 2 groups.

A total of 55 patients with giant AVMs were included, and 35 patients (63.6%) had clinical follow-up with a mean of 11.8 years. Spetzler-Martin grades were as follows: grade III, n = 2 (3.6%); grade IV, n = 15 (27.3%); and grade V, n = 38 (69.1%). Twenty-four patients (43.6%) were conservatively managed. The patients in the conservatively managed group had larger AVMs (P < .05) with more frequent involvement of the temporal lobe (P = .02). Five patients (26.3%) in the conservatively managed group and 5 (31.3%) in the intervention group experienced hemorrhage during follow-up, translating to an annualized risk of 2.7% and 4.1%, respectively. No significant difference in risk of first subsequent hemorrhage was observed (P = .78). Despite comparable mRS scores at presentation, we observed a trend toward better outcomes (mRS < 2) in patients undergoing conservative management (P = .06) compared with the intervention group at last follow-up.

This study suggests that interventions for giant AVMs should be considered cautiously because hemorrhagic risk is similar regardless of management strategy and functional outcome is likely to be same or better in the conservatively managed population ³.

Of 69 patients intended for VS-SRS, 63 completed all stages. The median patient age at the first stage of VS-SRS was 34 years (range 9-68 years). The median modified radiosurgery-based AVM score

(mRBAS), total AVM volume, and volume per stage in Era 1 versus Era 2 were 3.6 versus 2.7, 27.3 ml versus 18.9 ml, and 15.0 ml versus 6.8 ml, respectively. The median radiation dose per stage was 15.5 Gy in Era 1 and 17.0 Gy in Era 2, and the median clinical follow-up period in living patients was 8.6 years in Era 1 and 4.8 years in Era 2. All outcomes were measured from the first stage of VS-SRS. Near or complete obliteration was more common in Era 2 (log-rank test, p = 0.0003), with 3- and 5year probabilities of 5% and 21%, respectively, in Era 1 compared with 24% and 68% in Era 2. Radiosurgical dose, AVM volume per stage, total AVM volume, era, compact nidus, Spetzler-Martin grade, and mRBAS were significantly associated with near or complete obliteration on univariate analysis. Dose was a strong predictor of response (Cox proportional hazards, p < 0.001, HR 6.99), with 3- and 5-year probabilities of near or complete obliteration of 5% and 16%, respectively, at a dose < 17 Gy versus 23% and 74% at a dose \geq 17 Gy. Dose per stage, compact nidus, and total AVM volume remained significant predictors of near or complete obliteration on multivariate analysis. Seventeen patients (25%) had salvage surgery, SRS, and/or embolization. Allowing for salvage therapy, the probability of cure was more common in Era 2 (log-rank test, p = 0.0007) with 5-year probabilities of 0% in Era 1 versus 41% in Era 2. The strong trend toward improved cure in Era 2 persisted on multivariate analysis even when considering mRBAS (Cox proportional hazards, p =0.055, HR 4.01, 95% CI 0.97-16.59). The complication rate was 29% in Era 1 compared with 13% in Era 2 (Cox proportional hazards, not significant).

VS-SRS is an option to obliterate or downsize large AVMs. Decreasing the AVM treatment volume per stage to ≤ 8 ml with this technique allowed a higher dose per fraction and decreased time to response, as well as improved rates of near obliteration and cure without increasing complications. Reducing the volume of these very large lesions can facilitate a surgical approach for cure ⁴.

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