

## Worse Stereotactic Radiosurgery Outcomes for Intracranial Arteriovenous Malformations After Repeat Versus Initial Treatment: A Matched Cohort Study

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### Introduction

Incompletely obliterated intracranial arteriovenous malformations (AVM) after initial treatment with stereotactic radiosurgery (SRS) can be treated with a repeat session of SRS. However, the relative efficacy of repeat versus initial SRS is not well defined. The goal of this retrospective case-control study is to compare the outcomes of repeat versus initial SRS for the treatment of matched cohorts comprising angioarchitecturally similar AVMs.

### Methods

We evaluated a prospective database of AVM patients treated with SRS from 1989-2013. AVM patients who underwent repeat SRS with radiologic follow-up =2 years or nidus obliteration were selected for analysis and matched, in a 1:1 fashion and blinded to outcome, to previously untreated AVMs which underwent initial SRS. Statistical analyses were performed to compare the outcomes after repeat versus initial SRS.

### Conclusions

Repeat SRS yields considerably poorer outcomes than initial SRS for angioarchitecturally comparable AVMs. Further studies in AVM radiobiology and vascular structure are necessary to elucidate this potentially differential response.

### Results

The matching processes yielded 84 patients in each of the repeat and initial SRS cohorts (mean margin doses 20.7 and 20.9 Gy, respectively;  $P=0.74$ ).

In the repeat SRS cohort, obliteration was achieved in 67%; the rates of radiologic, symptomatic, and permanent radiation-induced changes (RIC) were 35%, 10%, and 4%, respectively; and the annual post-SRS hemorrhage rate was 3.1%.

Compared to the initial SRS cohort, the repeat SRS cohort had significantly lower obliteration rates ( $P=0.038$ ) and higher post-SRS hemorrhage rates ( $P=0.04$ ). The RIC rates of the two cohorts were not significantly different.

### Learning Objectives

By the conclusion of this session, participants should be able to 1) Describe the importance of repeat SRS in the management AVMs, 2) Discuss, in small groups the outcomes after repeat compared to initial SRS for AVMs, and 3) Identify an effective treatment for incompletely obliterated AVMs after initial SRS.

### References

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