



Endovascular Embolization Before Stereotactic Radiosurgery for Brain Arteriovenous Malformations

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Introduction

The effectiveness and safety of endovascular embolization of brain arteriovenous malformations (BAVMs) as adjunctive therapy for stereotactic radiosurgery (SRS) is controversial. The purpose of this study was to compare clinical and radiographic outcomes of patients treated without and with embolization prior to SRS.

Methods

106 consecutive patients treated with SRS were identified from a database of BAVMs treated from 2005-2012 at our institution and retrospectively reviewed. 35 patients were excluded from analysis for treatment before 2005, treatment at outside institutions, or lack of follow-up. Embolization was performed with Onyx®, and SRS was performed using Gamma Knife®. The modified Rankin scale (mRS) was used to assess pre-SRS and post-SRS functional status.

Results

20/71 patients (39%) underwent BAVM embolization prior to SRS. Embolization was used more frequently for ruptured compared to unruptured BAVMs (65% vs 31%, $p = .015$). There were no significant differences in age, Spetzler-Martin grade, modified Pollock-Flickinger score, or location between embolization and non-embolization patients although embolization patients were on average younger (32 vs 39 years, $p = .187$) and had higher grade BAVMs (3.3 vs 2.8, $p = .128$). Mean follow-up (3.7 vs 3.7 years, $p = .961$) and mean mRS change with SRS (0.05 vs -0.06, $p = .722$) were similar between embolization and non-embolization patients. Kaplan-Meier survival analysis found no significant differences in rates of cure (50% vs 61%, HR 0.87, $p = .715$) or complication after SRS (25% vs 33%, HR 0.54 $p = .286$) between embolization and non-embolization patients. There was 1 neurological complication after embolization in 41 total treatments (2.4%).

Conclusions

Embolization of BAVMs prior to SRS appears to be a safe treatment option. There were no significant differences in clinical and radiographic outcomes between embolization and non-embolization patients. In this series, embolization was used more frequently to treat ruptured BAVMs prior to SRS.

Learning Objectives

- 1) Describe the indications for and methods of endovascular embolization of BAVMs prior to stereotactic radiosurgery.
- 2) Discuss the clinical and radiographic outcomes of SRS for BAVMs without and with prior endovascular embolization.
- 3) Identify an effective treatment for patients with ruptured and unruptured BAVMs who are candidates for SRS.