

The Role of Preoperative Embolization in Surgical Management of Brain Arteriovenous Malformations (AVMs)

Andrew Luksik BA; Jody Law; Wuyang Yang MD, MS; Tomas Garzon-Muvdi MD MS; Justin M. Caplan MD; Geoffrey P. Colby MD, PhD, FAANS; Alexander L. Coon MD; Rafael Jesus Tamargo MD; Judy Huang MD
Department of Neurosurgery, Johns Hopkins University School of Medicine

Introduction

Preoperative embolization is established as an advantageous adjunct in multimodality treatment of cerebral arteriovenous malformations (AVMs). However, this intervention is not without risk and cost, and the benefit of preoperative embolization in AVMs with favorable surgical risk profile is debatable, as it has yet to be supported by evidence in comparative studies. In this study, we assessed outcome of surgically-treated patients in a comparative setting.

Methods

Our institutional AVM database of retrospectively and prospectively collected data between 1990-2015 was reviewed. Patients with complete clinical and follow up data who underwent surgical resection for AVMs were included. We performed a 1:1 ratio propensity-score match for baseline variables that differed between patients with or without preoperative embolization. Differences in surgical risk and outcomes were evaluated between these two groups.

Results

AVM size, eloquence, deep drainage, MCA feeder and ruptured presentation differed significantly between the two groups, and were included in the matching algorithm mentioned above. Forty-eight patients without preoperative embolization were matched to 48 with embolization, and there were no significant differences in baseline variables or AVM characteristics between the two groups. We found no significant differences in AVM obliteration (91.7% versus 93.8%, $p > 0.999$) and postoperative mRS (mRS = 1: 56.6% versus 68.7%, $p = 0.723$) between embolized and non-embolized patients, respectively. Change in mRS from preoperative score was also not significant, although more embolized patients had a decline in mRS (14.6% versus 6.3%, $p = 0.385$). Secondary outcome measures including duration of surgery (>6 hours: 45.8 versus 43.8%, $p = 0.172$), intraoperative bleeding (>450mL: 18.8% versus 31.3%, $p = 0.280$), duration of hospitalization (>10 days: 16.7% versus 14.6%, $p = 0.368$), and postoperative symptoms were also similar between both groups.

Conclusions

Our data reveal no substantial benefit of preoperative embolization for patients with favorable surgical risk-profile. Due to risks and costs with this intervention, the prudent utilization of preoperative embolization should be individually considered.

Learning Objectives

By the conclusion of this session, participants should be able to:

- 1) Understand the costs and benefits to preoperative embolization
- 2) Understand that not all patients undergoing surgical resection may benefit from prior adjunctive embolization
- 3) Understand that preoperative embolization should be used selectively