Clinical Outcomes Following Multi-modality Treatment of Pediatric Arteriovenous Malformations
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**Introduction**

Brain arteriovenous malformations (bAVMs) are rupture-prone dysplastic blood vessels with direct arterial-venous shunting. The optimal treatment strategy in children remains unclear because a greater life expectancy is believed to be associated with a greater cumulative hemorrhage risk. We describe our collaborative strategy of effective, yet safe treatment of bAVMs through coordinated multi-disciplinary care.

**Methods**

A retrospective analysis of a prospectively maintained database of treated and non-treated bAVMs at the University of California San Francisco from 1998-2016. Inclusion criteria include age = 18 and angiographically proven bAVM.

**Results**

In total, 172 patients were included for analysis. Mean age of diagnosis was 11.7 ± 4.5 years. With respect to Spetzler Martin grading, there were 38 (22.1%) grade I, 43 (25.0%) grade II, 53 (30.8%) grade III, 32 (18.6%) grade IV, and 6 (3.49%) grade V lesions. Twenty-nine patients (16.7%) had flow- related aneurysms. There were 9 hemorrhages over the period of follow-up. Nine (5.3%) patients were managed conservatively, and 163 patients underwent treatment – including 117 resections, 64 embolizations, and 61 stereotactic radiosurgery (SRS). Within the treated cohort, 75 (46%) patients underwent treatment with multiple modalities – including 49 embolization + resection, 12 volume staged SRS + resection, 6 SRS + embolization + resection, 5 resection + postoperative SRS. In those with angiographic follow-up (n=160), complete obliteration was achieved in 118 (73.8%). Peri-procedural strokes occurred in only 2 patients (1.2%). Mean pediatric mRS at last follow-up was 1.2 ± 1.2, and 164 (95.3%) patients neurologically improved or remained unchanged.

**Conclusions**

Coordinated multi-disciplinary care utilizing multiple treatment modalities facilitates individualization of treatment planning on a case-by-case basis and results in safe and effective obliteration of pediatric AVMs. In lesions not amenable to surgery, close follow-up or volume staged radiosurgery and/or embolization may facilitate eventual resection.

**Learning Objectives**

By conclusion of this session, participants should be able to: 1) describe indications and mechanisms for coordinated multi-modal treatments of brain AVMs; 2) Identify basic treatment guidelines regarding individualization of optimal AVM treatment; 3) Understand the importance of creating interdisciplinary teams for AVM management.