Angiographic “Blush” After Radiosurgery Ablation of a Residual Arteriovenous Malformation: Case Report and Literature Review

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Introduction

While surgical resection remains a primary treatment for accessible arteriovenous malformations (AVMs), stereotactic radiosurgery (SRS) has become thoroughly integrated into the AVM armamentarium. As more cases of long term follow up of AVMs treated by SRS become available, interesting delayed sequelae of radiosurgery continue to present themselves. We present the second report of local arterial angiographic blush without early venous drainage or an associated lesion following SRS treatment of an AVM.
Methods
An eight-year-old female presented to our institution with a ruptured 4 cm right medial frontal periventricular periventricular Spetzler-Martin (SM) grade 3 AVM with isolated intraventricular hemorrhage. She underwent subtotal resection followed by stereotactic radiosurgery. Six years later, catheter angiography demonstrated prominent arterial-phase filling microvasculature without early venous drainage in the region of the irradiated residual AVM nidus.
Results

AP and lateral right ICA injection angiography six years after SRS demonstrating the vascular blush without early venous drainage.

Oblique magnified ICA injection angiogram arterial (A), capillary (B), and venous (C) phases of the vascular blush without early venous drainage.
Results

Literature Review:

- Linqvist et al published a series of 48 AVM SRS patients that included three cases with equivalent angiographic findings to our patient, two noted on follow up angiography and one who represented with hemorrhage.

One of the three patient’s angiograms displaying (A) original AVM and (B and C) irregular vessels without early venous shunting.

Results

Although literature suggests that without early venous drainage these lesion do not pose significant threat, we plan to obtain a one year follow up diagnostic cerebral angiogram, and subsequent angiograms at progressively longer intervals, given the possibility of delayed arteriovenous shunt recanalization and the uncertainty of how this angiographic phenomenon will progress.

Four year post-SRS axial T1 post-contrast (A) and FLAIR (B) sequences demonstrating enhancement and edema at the site of irradiated residual AVM nidus, respectively.
Discussion

Although we speculate that the angiographic blush without early venous drainage is related to the SRS given the presented clinical history and the body of literature on the heterogeneous collection of delayed parenchymal and vascular findings, additional data must be gleaned from prospective cohorts to establish a verifiable link between the treatment and this rare sequela.
Summary Points

• SRS is an effective AVM treatment, but can result in delayed cerebral sequelae.
• Arterial blush without early venous drainage can be seen delayed after SRS for AVM.
• Isolated arterial blush after AVM treatment likely poses no notable hemorrhage risk, although long-term follow up vascular imaging may be indicated.