AbstractID: 3772 Title: Role of CT, and MR Angiographies in Accurate Target Volume Definition of Patients with Cerebral Arteriovenous Malformations (AVM) Treated with Stereotactic Radiosurgery

Conventional angiography used to delineate cerebral AVMs is an invasive technique, and associated with significant risks as well as costs. Numerous publications have proposed CTA, and MRA for stereotactic planning of AVM in place of conventional angiograms. The purpose of this study is to evaluate the role of CTA, MRA, and fused CTA and MRA images in accuracy of AVM target volume definition for patients treated with stereotactic radiosurgery.

Materials and Methods: 8 patients (12-58 years old) who underwent SRS treatments with a Brainlab Novalis SRS system for cerebral arteriovenous malformations (AVM) were retrospectively studied. The CTA was acquired using a GE dual slice CT, with 90 cc nonionic contrast injected to a peripheral vein at a rate of 3cc/sec, 15 seconds prior to the spiral CT acquisition. The MRA was acquired using a GE MRI system that includes vascular time of flight SPGR pulse sequences. The CTA was used for stereotactic localization as well as target volume definition. The CTA and MRA datasets were co-registered using the Brainlab's planning software. The AVM target volumes were contoured using the fused images by an expert reference observer. Three independent observers using CTA, MRA, and fused images independently contoured the nidus. The calculated average target volumes for each patient contoured by the 3 observers were plotted against AVM volume outlined by the reference observer. A linear regression analysis was performed on the curves.

Results: The linear regression analysis yielded a slope of 0.96, 0.96, and 1.03 using MRA, CTA, and fused images, respectively. The study showed accurate nidus definition is possible by using either CTA, or MRA. However, using the fused images yield more precise AVM target delineation.

Conclusions: Precise AVM target volume definition is possible by utilizing CTA, and MRA fused images for stereotactic radiosurgery.