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Institutional Experience of Linear Accelerator-Based Stereotactic Radiosurgery For Brain Arteriovenous Malformations

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Abstract

Purpose: The annual bleeding risk for an intracranial arteriovenous malformation (AVM) is 2-8%, but obliterating the nidus reduces the risk to near population levels. We evaluate the outcomes of linear accelerator (LINAC) based stereotactic radiosurgery (SRS) in an institutional AVM cohort.

Methods: Intracranial AVMs receiving LINAC SRS with follow-up care greater than 1mo from 2014-2021 were included. Baseline characteristics were compared between pediatric and adults. Time-to-event analyses were conducted using the Kaplan-Meier survival method. Statistical significance (P<0.05) involved two-tailed tests and simple/multiple logistic regression.

Results: Among the 29 qualifying patients with SRS-treated AVMs, mean nidus volume was 6.26cm3 (Range=0.13-40.2) and nidus max diameter was 24.8mm (Range=2-60). Mean target dose was 18.72 Gy (Range=13.5-22) for single-fraction (86.7%) and 19Gy (Range=18-20) for two fractions. Median time to follow-up was 23.6mos. Obliteration occurred in 53.33% of patients (median time to obliteration=27.1mos). Between adults and pediatric patients diagnosed with AVMs, significant factors affecting likelihood of SRS delivery were sex (p=0.05), race (p=0.0089), nidus max diameter (p=0.033), pre- treatment SRS (p=0.027) and neurological deficits at presentation (p=0.0169). Likelihood of obliteration decreased with increasing nidus volume with an estimated 10% for each additional cm3 (OR=0.90, 95% CI=0.82-0.99, p=0.027). AE were observed in 55.2% of patients with a median time to AE of 11.4mos. Nidus max diameter significantly affected rate of AE (HR=1.36, 95% CI=1.03-1.8, p=0.031).

Conclusion: LINAC SRS resulted in 53.3% of our cohort achieving obliteration (mean follow-up: 23.6mos). Adverse events occurred in 55.2% of patients, but most were mild and resolved.