

Stereotactic Radiosurgery for Sylvian Fissure Arteriovenous Malformations with Emphasis on Seizure Control

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Introduction

The frontal and temporal regions that surround the Sylvian fissure account for 9-11% of AVMs and present significant management challenges because of the critical adjacent blood vessels and functional brain[1]. Hemorrhage from a Sylvian fissure AVM may result in major neurological morbidity and warrant therapeutic intervention once recognized. Cortical regions in proximity to the Sylvian fissure are often associated with seizure activity. Seizures may be an initial presentation in 24-40% of intracranial AVMs[2,3]. In this report we sought to evaluate the response of Sylvian fissure AVMs to radiosurgery and the effect on patients with related seizure disorders.

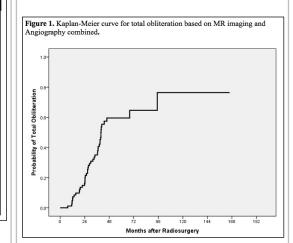
Characteristics	No. of Cases (%)
Patients	87
Age (yrs)	
median	38
range	9-77
Sex	
Male	40 (46)
Female	47 (54)
Presentation	
Bleed	40 (46)
Headache	15 (17)
Seizure	30 (34)
Incidental	2 (2)
Seizures	36 (41)
Prior Embolization	19 (22)
Prior Surgery	15 (16)
Varix Present	12 (14)
Coexisting Aneurysm	7 (8)
Spetzler-Martin Grade	
п	26 (30)
III	43 (49)
IV	16 (18)
VI	2 (2)

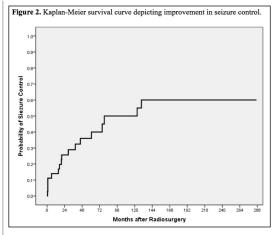
Methods

This retrospective single institution analysis examined our experience with Gamma Knife SRS for AVMs of the Sylvian fissure between 1987 and 2009. During this time, 87 patients with a median age of 38 years (range 9-77) underwent SRS for Sylvian fissure AVMs. Hemorrhage was the initial presentation in 40 patients (46%). Thirty-six patients (41%) had seizures prior to SRS. The median target volume was 3.85cm3 (range 0.1-17.7cm3) and 20 Gy (range 13-25Gy) was the median marginal dose. Expanded technical data is detailed in our previous publications[4].

Results

Forty-three patients had confirmed AVM obliteration on MRI or angiography over a median follow-up of 64 months (range 3–275 months). The actuarial rates of confirmed total obliteration were 35% at 3 years, 60% at 4 and 5 years, and 76% at 10 years (Fig. 1). The variables associated with total obliteration included a smaller AVM volume (p=0.041), and a higher margin dose (p=0.009).





Eighteen of 36 patients (50%) who had seizures prior to SRS were seizure free after treatment. The rate of seizure improvement was 29% at 3 years, 36% at 5 years, 50% at 10 years, and 60% at 15 years (Fig. 2). Patients with incomplete obliteration had a higher rate of improved seizure control (p=0.042). No patients who were seizure free prior to treatment developed seizures after SRS. Four patients had a hemorrhage during the latency period, and one patient died.

Variable	Seizures	Improvement
Age	0.019	0.531
Sex	0.018	0.793
Diameter	0.321	0.035
Volume	0.135	0.129
Margin Dose	N/A	0.876
Prior Bleed	0.0004	0.045
Neuro Deficit	0.409	0.117
Varix	0.983	0.543
Aneurysm	0.934	0.620
Diffuse Nidus	0.816	0487
Deep venous	0.752	0.132

The annual hemorrhage rate during the latency interval was 1% and no hemorrhages occurred after confirmed obliteration. Permanent neurological deficits due to adverse radiation effects developed in a single patient (1%).

Discussion

Patients with Sylvian fissure AVMs <4cm3 in volume and who received >20 Gy to the nidus margin had the highest rates of total obliteration. Sixty percent of patients with seizures had an improvement in seizure control after SRS based on Engel classification, and 50% of patients were seizure free on or off anticonvulsants. The annual hemorrhage rate during the latency interval after SRS was 1%, regardless of whether the patient had bled previously. After obliteration was confirmed no patients experienced a hemorrhage. Despite the unfavorable location of Sylvian fissure AVMs, no permanent neurological deficits occurred. This study indicates that SRS was a relatively safe and effective means of managing Sylvian fissure AVMs. Patients with seizures often had improved seizure control or even elimination. Patients without seizures prior to SRS did not develop a seizure disorder after SRS.

References

(1) Liu L, Li H,Zheng J, WangS, Zhao J, CaoY: Sylvianfissure