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Introduction

Large cerebral arteriovenous malformations (AVMs) remain a therapeutic challenge due to increased surgical morbidity and limitations of single-session stereotactic radiosurgery. Hypofractionated Gamma Knife radiosurgery (HF-GKRS) is a promising strategy to improve treatment efficacy with low adverse reactions. This study aims to evaluate the effectiveness and safety of HF-GKRS in the management of large AVMs.

Materials & Methods

- **Cohort:** 54 patients with AVMs $\geq 10 \text{ cm}^3$ treated with HF-GKRS between 2017 and 2022.
- **Follow-up:** Mean follow-up was 45,7 months (range: 36-110 months).
- **Analysis:** Complete obliteration(CO) was assessed using Kaplan–Meier analysis. Predictive factors for obliteration were identified using univariate and multivariate Cox regression models.

Results

- **Obliteration Outcomes:**
 - CO after 1st treatment: 26/54 (%48.1)(20 pt ≤ 36 months, 6 pt >36 months)
 - CO after 2nd treatment: 9 patients
 - Total CO: 35 patients (%64.8)
- **Factors associated with CO:** Univariate analysis identifies prior embolization was associated with decreased CO ($p=0.045$) and 5x6 had higher rate of CO compared to 10x3 Gy ($p=0.042$). Multivariate analysis including both variables was significant explaining the variances ($p=0.035$)
- **Adverse radiation effects:** 1 asymptomatic edema, 1 symptomatic edema and 2 radiation necrosis

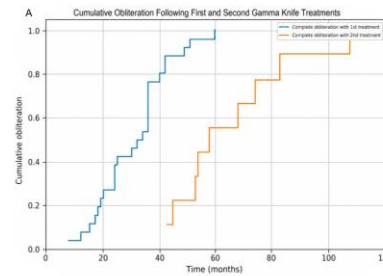


Fig. A Kaplan-Meier curves demonstrating time to complete obliteration after first and repeat radiosurgical treatments. Repeat radiosurgery significantly increased overall obliteration rates

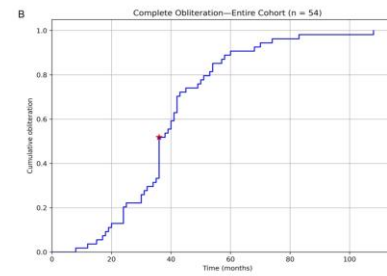
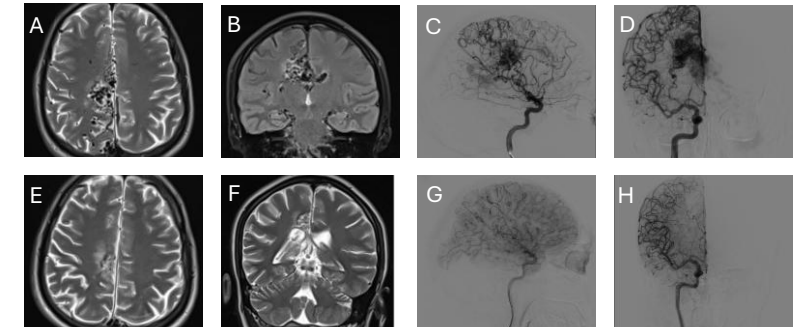


Fig. B Kaplan-Meier analysis showing cumulative probability of complete obliteration for the entire cohort following hypofractionated Gamma Knife radiosurgery, indicating the 36th month

Case Illustration

39 y/F, 21,3 cc, SM grade IV, 5x6 Gy HF-GKRS.



Imaging studies of patient with right pericallosal giant AVM . An axial view (A) and coronal T2 weighted magnetic resonance images (B). Lateral (C) and anteroposterior DSA images (D).the patient was treated with 5x6 Gy HF-GKRS. Follow-up images of MRI and DSA images with complete obliteration (E-H).

Conclusion

HF-GKRS results in high CO and low ARE for large and complex AVMs that are otherwise considered unsuitable for microsurgical or endovascular intervention