Outcomes of Stereotactic Radiosurgery for Foramen Magnum Meningiomas: An International Multicenter Study

Gautam Mehta; Georgios Zenonos; Mohana Patibandla; Chung Jung Lin; Amparo Wolf; Inga Grills; David Mathieu MD; Brendan McShane; John Lee; Kevin Blas; Douglas Kondziolka; Cheng-Chia Lee; L. Dade Lunsford; Jason Sheehan

Introduction

Meningiomas are the most common benign extramedullary lesions of the foramen magnum. Given their location, foramen magnum meningiomas (FMM) can cause significant morbidity, and complete microsurgical resection can be challenging. Anterior and anterolateral FMM carry greater risks with surgery, but comprise the majority of these lesions. Stereotactic radiosurgery (SRS) has been reported for FMM in small case series. To more clearly define the outcomes of SRS and to delineate a rationale management paradigm for these lesions, we analyzed safety and efficacy in an international, multicenter trial.

Methods

Seven medical centers participating in the International Gamma Knife Research Foundation (IGKRF) provided data for this retrospective, cohort study. Patients treated with Gamma Knife SRS, with clinical and radiologic follow-up greater than 6 months were included.

Results

Fifty-seven patients met inclusion criteria for the study. Thirty-two percent had undergone prior microsurgical resection. Patients most frequently presented with cranial neuropathy (39%), headache (35%), numbness (32%), and ataxia (30%). Median pre-SRS volume was 2.9 cm3. Median SRS margin dose was 12.5 Gy (range 10 -16 Gy). At last follow-up after SRS, 49% of tumors were stable, 44% had regressed, and 7% had progressed. Progression free-survival at 5 and 10 years was 97 and 92%, respectively. Greater margin dose was associated with a significantly increased likelihood of tumor

Learning Objectives

1) Understand the efficacy of SRS for foramen magnum meningiomas

2) Understand the safety profile of SRS for foramen magnum meningiomas

3) Discuss management options for foramen magnum meningiomas

References

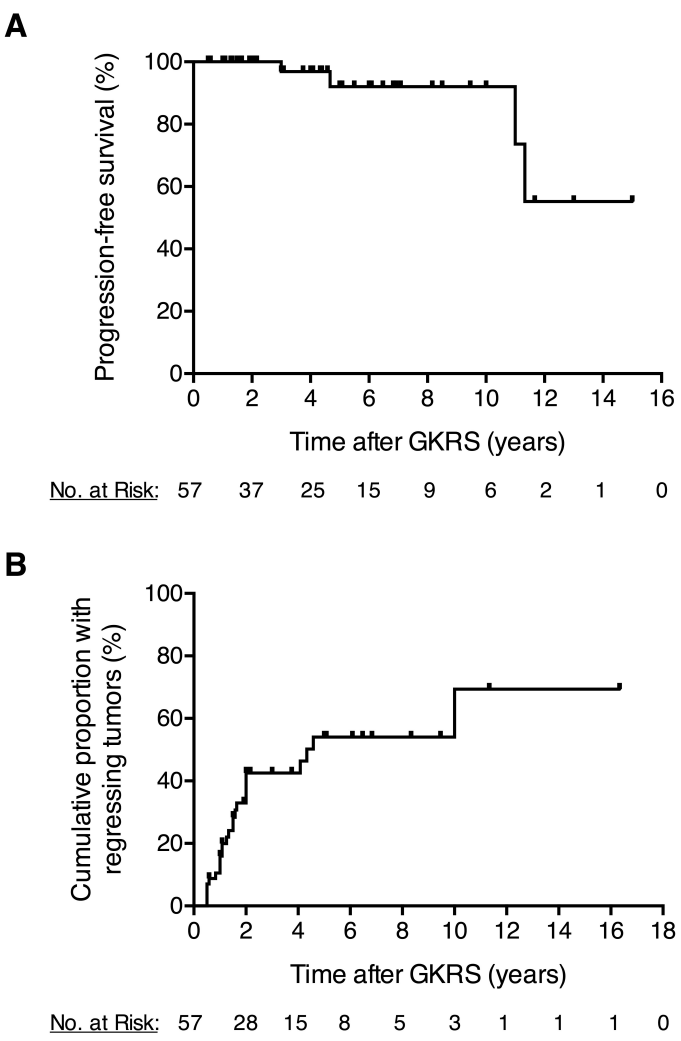
1) George B, Lot G, Boissonnet H: Meningiomas of the Foramen Magnum: A Series of 40 Cases. Surg Neurol 47:371–9, 1997

2) Zenonos G, Kondziolka D, Flickinger JC, Gardner P, Lunsford LD: Gamma Knife surgery in the treatment paradigm for foramen magnum meningiomas. J Neurosurg 117:864–873, 2012

Conclusions

SRS for FMM frequently results in tumor control or regression, as well as symptom improvement. Margin doses > 12 Gy were associated with increased rates of tumor regression. SRS was generally safe and well-tolerated. Given this risk-benefit profile, SRS may be particularly useful in the management of small- to moderate-volume anterior and anterolateral FMM.

Figure



Kaplan Meier analysis of 57 patients treated with SRS for foramen magnum meningiomas. A) Progression-free survival B) Cumulative proportion of patients with regressing tumors.