

Stereotactic radiosurgery in the treatment of parasellar meningiomas: long-term volumetric evaluation.

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Introduction

Stereotactic radiosurgery (SRS) has played a central role in the treatment of parasellar meningiomas. Evaluation of tumor control rates at this location using simplified single-dimension measurements may prove misleading. The authors report the influence of SRS treatment parameters and volumetric changes of benign WHO Grade I parasellar meningiomas after SRS on long-term outcome.

Methods

A total of 189 patients (22.2% males, $n = 42$) form the cohort. SRS was performed as a primary upfront treatment for 44.4% ($n = 84$). Median tumor volume 5.6 cm³ (0.2-54.8 cm³). Median margin dose 14 Gy (5-35 Gy). The volumes of the parasellar meningioma were computed by segmenting the meningioma on a slice-by-slice basis with numerical integration using the trapezoidal rule.

Results

Median follow-up was 71 months (6-298). Tumor volume control achieved in 91.5% ($n = 173$). Post-SRS, new or worsening CN deficits were observed in 54 instances (19 trigeminal nerve and 18 optic nerve). Of these, 90.7% ($n = 49$) were due to tumor progression. Overall, this translates to a 2.64% incidence of SRS-related complications. For patients treated with a margin dose =16 Gy, the 2-, 4-, 6-, 8-, 10-, 12-, and 15-year actuarial progression-free survival rates are 100%, 100%, 95.7%, 95.7%, 95.7%, 95.7%, and 95.7%, respectively. Patients treated with a margin dose < 16 Gy, had 2-, 4-, 6-, 8-, 10-, 12-, and 15-year actuarial progression-free survival rates of 99.4%, 97.7%, 95.1%, 88.1%, 82.1%, 79.4%, and 79.4%, respectively. This difference was significant ($p = 0.043$). Reviewing the volumetric patient-specific measurements, the early follow-up volumetric measurements (at the 3-year follow-up) reliably predicted long-term volume changes and tumor volume control ($p = 0.029$).

Conclusions

SRS is a durable and minimally invasive treatment modality for benign parasellar meningiomas. Volumetric regression or stability during short-term follow-up of 3 years after SRS was shown to be predictive of long-term tumor control.

Learning Objectives

report the influence of SRS on long-term outcome.

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