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Stereotactic radiosurgery: a meta-analysis of current therapeutic applications in neuro-oncologic disease.

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Abstract

Stereotactic radiosurgery (SRS) represents an important tool in neurosurgery and radiotherapy for addressing a multitude of diseases, most notably in the field of neuro-oncology. The pathologies for which it is employed vary significantly, and few controlled studies exist to evaluate its efficacy. We aimed to provide a quantitative meta-analysis of SRS applications in neuro-oncology, providing benchmarks for expected outcomes. The meta-analysis was conducted in accordance with established standards for evaluating observational data. Specific inclusion criteria were utilized, search terms recorded, and data extracted to summarize demographic and outcome statistics. Meta-analysis was conducted where statistically appropriate, and clinical outcomes summarized as tumor stability, survival, and complications in a pathology-specific manner. For vestibular schwannoma, 37 studies with a total 3,677 patients were included. Overall disease stabilization rate after adjustment for significant publication bias was 91.1%. Non-cranial nerve complication rate after publication bias adjustment was 5.6%. Accounting for publication bias, rate of hearing preservation was with 59.3%. For 456 glioblastoma multiforme (GBM) patients in 11 studies receiving SRS, median survival from diagnosis was 13.5-26 months, while overall complication rate was 11.4%. For meningioma, 15 studies with a total 2,734 patients were included; 77.1% were classified as skull base. Overall disease stabilization rate was 89.0, while overall complication rate was 7.0%. For metastatic disease, 27 studies with a total of 2,679 patients were included. Overall median survival from time of SRS was 5-14 months, overall 1-year survival rates were 15-54.9%, while reported local disease control rates were 59.6-96.8%. Stereotactic radiosurgery is an increasingly important tool in the management of neuro-oncologic diseases. While there is a pathology-specific role for SRS, current data show excellent results in treating several pathologies. As such, SRS adds significantly to the neurosurgical armamentarium for treating neuro-oncologic processes.

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