

Gamma Knife® radiosurgery

Post-surgical Pituitary Adenomas



Introduction

Pituitary adenomas represent one of the most common types of intracranial tumors. While their macroscopic appearance and anatomical location are relatively homogeneous, pituitary tumors have the potential to generate a wide variety of clinical sequelae. Treatment options for pituitary tumors include medical therapy, microscopic or endoscopic surgical resection, radiosurgery, radiation therapy, or observation depending on the biochemical profile and clinical status of the patient

Clinical Results

Nonfunctioning Pituitary Adenomas

In a recent multicenter trial evaluating the role of Gamma Knife® radiosurgery (GKRS) for 512 patients with nonfunctioning pituitary adenomas, the authors observed an overall tumor control rate of 93%. Hypopituitarism following GKRS was noted in 21% of patients.

Cushing's Disease

Invasion of the surrounding dura or neighboring cavernous sinus by many of these tumors decreases the likelihood of cure with surgery alone. Radiosurgery therefore plays a crucial role in the treatment of persistent Cushing's disease refractory to surgical management. Most series demonstrated endocrine remission for the majority of patients after radiosurgery but the reported rates varied widely from 0-100% with a mean of 51.1%.

Acromegaly

Due to the significant resultant morbidities associated with untreated acromegaly, surgical resection is the initial treatment of choice for these patients. Endocrine remission was achieved in 0-82% of patients with a mean of 44.7% whereas post-radiosurgery hypopituitarism occurred in 0-40% of patients with a mean of 16.4%.

Prolactinomas

Prolactinomas are the most common type of secretory pituitary adenomas. However, unlike ACTH- or GH-secreting adenomas, the initial management of prolactinomas is with medical therapy. Endocrine remission off antiseecretory medications following radiosurgery ranged from 0-100% with an average of 34.7%.

Complications

Delayed pituitary insufficiency is, by far, the most common adverse effect of radiosurgery for pituitary adenomas, occurring in up to 40% of patients with nonfunctioning lesions and up to nearly 70% of patients with functioning lesions with wide variation across different radiosurgery series. While an ideal radiosurgical dose plan has a steep gradient index which minimizes the dose to normal pituitary tissue and therefore reduces the risk of treatment-induced hypopituitarism, a true 'safe dose' below which the patient is not afflicted with hypopituitarism does not practically exist. The clinical consequences of macroscopic tumor progression or recurrence or persistent hormone hypersecretion far outweigh those of radiosurgery-induced hypopituitarism which is readily managed with medical therapy by neuroendocrinologists.

Conclusion

Radiosurgery and, to a lesser extent, EBRT play important roles in the contemporary management of patients with a pituitary adenoma. Both treatment modalities are typically utilized in patients with substantial residual tumor or recurrence after surgical resection of nonfunctioning adenomas. They are also employed for patients with functioning adenomas that fail to achieve endocrine remission after prior resection. Neurological function after radiosurgery or EBRT is usually preserved or, at times, improved even when the treated adenoma extends into the cavernous sinus. Delayed post-treatment hypopituitarism is the most common complication but is manageable with appropriate hormone replacement. Lifelong neuro-imaging and endocrine follow-up is recommended for pituitary adenoma patients treated with radiosurgery or EBRT.

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