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Patterns of response following gamma knife radiosurgery for tectal plate gliomas

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Abstract

Purpose: Tectal plate gliomas are slow-growing brainstem tumors often causing obstructive hydrocephalus. This study evaluates radiological response patterns and clinical outcomes of Gamma Knife radiosurgery (GKRS), a minimally invasive alternative for tumor control with lower risks than surgery.

Methods: A retrospective analysis was conducted on 10 patients treated with GKRS for tectal plate gliomas between January 2014 and November 2023 at a tertiary Gamma Knife Centre. Inclusion criteria required a minimum follow-up of one year with radiological assessment. Tumor volume, dose parameters, radiological responses, and clinical outcomes were documented.

Results: The cohort comprised six females and four males, with a median age of 13 years (range: 2-31 years). Hydrocephalus was managed with endoscopic third ventriculostomy (50%) or ventriculoperitoneal shunting (40%). Histopathological confirmation, available in 40% of cases, revealed WHO Grade 2 diffuse astrocytoma. The median tumor volume was 2.18 cc, and a marginal dose of 12 Gy was delivered at a 50% isodose line. Radiological follow-up (median: 24 months) demonstrated a gradual reduction in tumor size in 90% of cases, with a median volume reduction of 56.7%. One patient exhibited pseudoprogression, and no cases of cystic degeneration or sustained tumor growth were observed. Clinically, 80% of patients reported symptomatic improvement, while 20% remained stable. Minor adverse effects, primarily headaches, were noted in four patients.

Conclusion: GKRS is a safe, effective treatment for tectal plate gliomas, offering significant tumor control with minimal complications. It primarily results in gradual tumor shrinkage, making it a viable alternative when surgery is not feasible.

Keywords: Gamma knife radiosurgery; Radiological response; Tectal plate glioma; Tumor control.

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