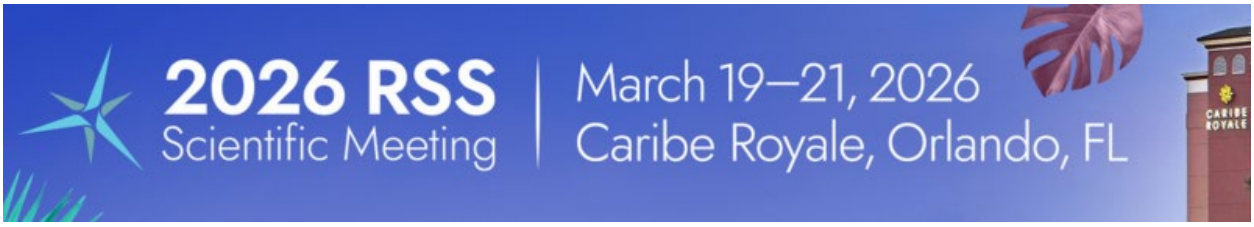

Early Volumetric Reduction After Gamma Knife Radiosurgery in Newly Diagnosed Cystic Vestibular Schwannoma of Koos Grade III–IV

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Objectives: The role of Gamma Knife radiosurgery (GKRS) for large vestibular schwannomas (VS) classified as Koos grade III–IV remains controversial, particularly for patients with cystic VS, which can grow rapidly and are often managed by microsurgical resection. This study aimed to evaluate the volumetric response of cystic VS compared with solid VS following GKRS in patients with newly diagnosed, non-surgically treated Koos grade III–IV tumors.

Methods: This retrospective study included patients with newly diagnosed Koos grade III–IV VS treated with GKRS between January 2014 and December 2024, with > 6 months of radiological follow-up. Local control (LC) was defined as the absence of need for additional treatment (surgical resection or second GKRS). Tumors were categorized as cystic or solid based on MRI characteristics. Volumetric analysis using Leksell Gammaplan was performed at early (3–6 months), intermediate (12–18 months), and late (>24 months) follow-up. Volumetric changes relative to pre-GKRS volume were compared between cystic and solid VS using the Mann–Whitney U test, with $p < 0.05$ considered significant.

Results: Of 265 GKRS-treated VS patients, 57 (14 cystic, 43 solid) met inclusion criteria. The mean follow-up period was 35.3 months. The LC rate was 100% in cystic VS and 97.7% in solid VS. Two solid VS patients required ventriculoperitoneal shunt placement after GKRS. Cystic VS demonstrated significantly greater tumor volume reduction than solid VS at early (median −8.1%, range −28.8 to +26.2%; $p = 0.03$) and intermediate follow-up (median −25.6%, range −50.4 to −3.9%; $p = 0.01$), while no significant difference was observed at the late scan ($p = 0.18$). At the last follow-up, the cystic VS showed a significantly higher proportion of tumors with volume reduction from their pre-GKRS volume compared with the solid VS ($p = 0.04$, Fisher's exact test; odds ratio = 8.5, 95% CI = 1.2–95.3).

Conclusion(s): Large cystic VS showed earlier and greater volumetric reduction following GKRS. GKRS could be considered a less invasive option for large cystic VS often surgically resected.