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## Abstract

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## Five-Fraction Stereotactic Radiation for Head-and-Neck Paragangliomas

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## Abstract

### Objectives:

Paragangliomas of the head and neck (HN) are benign, slow-growing neoplasms that are rarely functional. Treatment is often indicated for patients presenting with progressive enlargement with mass effect, cranial neuropathies, or pulsatile tinnitus. Radiotherapy, traditionally conventionally fractionated, is often utilized for primary, post-operative, and salvage therapy given its established excellent control rates and reduced risks to adjacent neurovascular structures. Stereotactic ablative radiation (SAbR) offers shorter treatment time and the potential for improved organ-at-risk avoidance with modern techniques and the absence of margins, and fractionated SAbR may offer additional radiobiological sparing of normal structures over single-fraction SAbR. We aimed to evaluate symptom response, acute and late toxicity rates, tumor response, and patterns of recurrence in patients with HN paragangliomas treated with 25 Gy in 5 fractions.

### Methods:

Retrospective chart review collected baseline patient and tumor information, treatment and dosimetry details, acute and long-term toxicity grades according to the Common Terminology Criteria for Adverse Events version 5, symptom and tumor response, and survival outcomes. Local control was estimated using the Kaplan-Meier method.

### Results:

Thirty-eight patients, of whom 17 were diagnosed with hereditary paraganglioma-pheochromocytoma syndrome, received 25 Gy in 5 fractions every other day to 47 HN paragangliomas between December 2009 and March 2020. Fourteen targets were post-operative recurrent or residual tumors. Twenty-eight tumors were jugulotympanic; 3 were jugular, 1 was tympanic; 8 were vagal; 5 were carotid body; and 1 was either jugulotympanic or vagal. Median follow-up time from SAbR was 3.3 years (range 0-11.4 years), and 20 targets had at least 4 years of follow-up. Two-year local control was 100%. Three patients had four recurrent tumors within the post-operative bed, but outside of the radiation field, at 6.1, 7.1, and 8.4 years, one of whom also developed metastatic disease.

The most common grade 1-2 acute toxicities were headache and fatigue; the most common grade 1-2 late toxicities were dysphagia and otalgia. There were no grade 3-5 acute or subacute toxicities. One patient, who had an impaired gag reflex and paralyzed vocal cord at presentation and who underwent multiple medialization laryngoplasties, experienced a late grade 3 aspiration event. Within 6 months of SAbR, 18% of symptoms or toxicities were improved or resolved, and a further 34% were improved or resolved more than 6 months after SAbR.

### Conclusion(s):

This is the largest series of HN paragangliomas treated with SAbR, detailing a 10-year experience with a 5-fraction regimen that is well-tolerated and achieves excellent local control. Post-SAbR recurrences occurred outside of the radiation field but within the post-operative bed, suggesting that some post-operative patients may benefit from expanded radiation volumes or close surveillance for salvage therapy.

