

# Long-term Outcomes for Vestibular Schwannoma Patients Treated with Hypofractionated Stereotactic Radiotherapy

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## Introduction

To evaluate long-term treatment response and toxicities among vestibular schwannoma (VS) patients treated with hypofractionated stereotactic radiotherapy (HSRT).

## Methods

A total of 446 patients with unilateral VS were treated at our institution between 1995-2007. HSRT regimens were hypofractionated (25Gy in 5 fractions) or single-fraction (12-14Gy in 1 fraction).

Treatment failure was defined as requiring salvage microsurgery. Post-treatment new/progressive clinical symptoms or increases in baseline tumor volume (BTV) due to treatment effect or tumor progression were noted. Symptom outcomes were reported as baseline and post-treatment +/- improvement, respectively. Symptoms were recorded and grouped by CNVII or CNVIII. Audiometric analysis using the Gardner Robertson (GR) scale assessed baseline and post-treatment hearing. Patients were stratified as > serviceable hearing (GR 1-2) or < non-serviceable hearing (GR 3-5).

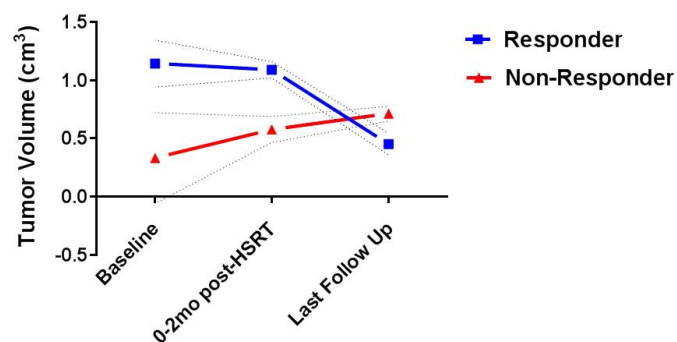


Figure 1. Change in Median Tumor Volume (cm<sup>3</sup>) over time by treatment outcome; baseline (pre-HSRT), 0-2 months post-HSRT, and last follow up.

## Results

Median follow up was 70 months. Overall 14 (3.1%) patients experienced treatment failure. At last follow up, 29 (6.5%) patients had new/progressive symptoms. Median BTV was 0.9cm<sup>3</sup>, significant BTV differences noted among patients with (0.3cm<sup>3</sup>) and without (1.2cm<sup>3</sup>) treatment failure (P < .001).

Pre-HSRT CNVII and CNVIII symptoms were present in 8% and 98% of all patients. 16 (4%) patients had facial weakness and 32% improved after treatment. 211 (47%) patients presented with imbalance and 12% improved after treatment. Regarding post-treatment symptoms, 43 (10%) patients reported any CNVII symptom (53% transient) and 42 (9%) reported any CNVIII symptom (50% transient).

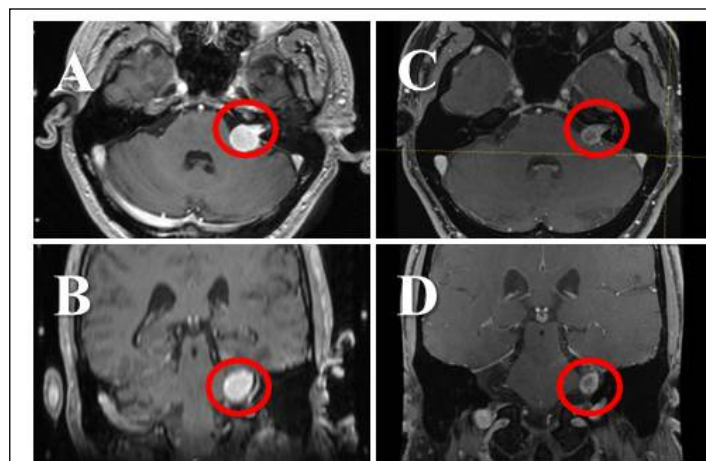


Fig 2. (A,B) Pre- and (C,D) post-HSRT T1-weighted gadolinium-enhanced MRI demonstrating left-sided VS with central necrosis and decreased contrast uptake suggestive of treatment effect.

## Results (cont)

Evaluable audiograms were available in 234 patients. Median baseline and post-treatment GR scores were 2 and 3, respectively, indicating a significant trend from serviceable to non-serviceable hearing (P < .001). Among 156 patients with serviceable hearing at baseline, 52% had a decline to non-serviceable hearing at last follow up.

One possible HSRT-related secondary malignancy and two HSRT-induced brainstem injuries were noted. 11 patients developed hydrocephalus.

## Conclusions

- HSRT is an effective option with treatment success in 97% and an acceptable toxicity profile.
- ~50% of patients with serviceable hearing at baseline maintain hearing function.
- Smaller median BTV was associated with increased risk of treatment failure and larger median BTV is more likely to cause clinical/radiologic progression.
- 50% of symptoms are transient and ~75% occur in patients with treatment success.
- Improved methods to differentiated treatment effect and tumor progression are needed.

## Learning Objectives

(1) Long-term treatment response and outcomes for patients treated with HSRT

(2) HSRT is an alternative approach to single-fraction radiosurgery in the non-microsurgical management of vestibular schwannoma with the aim to reduce toxicities.