

Introduction

- **Vestibular Schwannoma (VS)** is a benign tumor and the most common lesion of the cerebellopontine angle^{1,2}
- **Stereotactic radiosurgery (SRS)** is frequently used for VS (high rates of tumor control)³
- Most common presenting symptom: **unilateral, progressive hearing loss**⁴
- Other potential symptoms include⁴:
 - Tinnitus
 - Balance disturbance/disequilibrium
 - Cranial nerve (CN) V and VII deficits (due to proximity to CN VIII)
- While SRS generally provides adequate symptom management, it may cause toxic effects on adjacent neural structures (e.g. CNs V, VII, VIII)⁵
- Incidence of post-SRS **symptom progression** or **new neurologic deficits** remains **underexplored**⁶
- **No current guidelines** that are standardized and link pre-treatment clinicopathologic factors to short or long-term SRS outcomes⁷
- Further investigation is needed to clarify the relationship between **age-related hearing loss** and **iatrogenic vestibulocochlear injury** following treatment with SRS

Objective

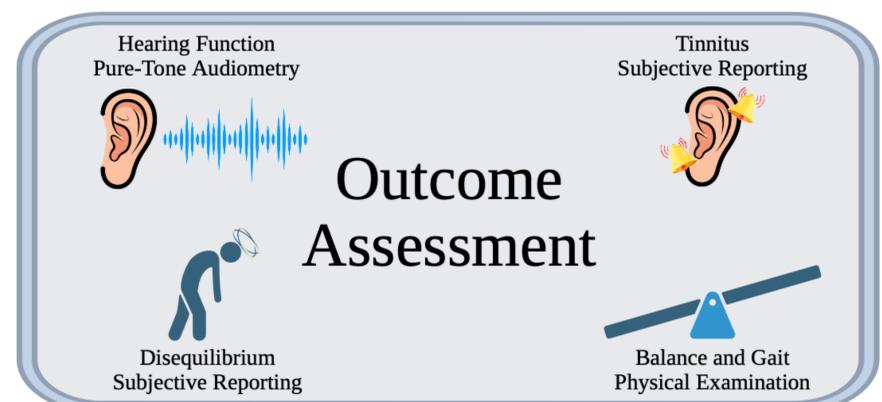
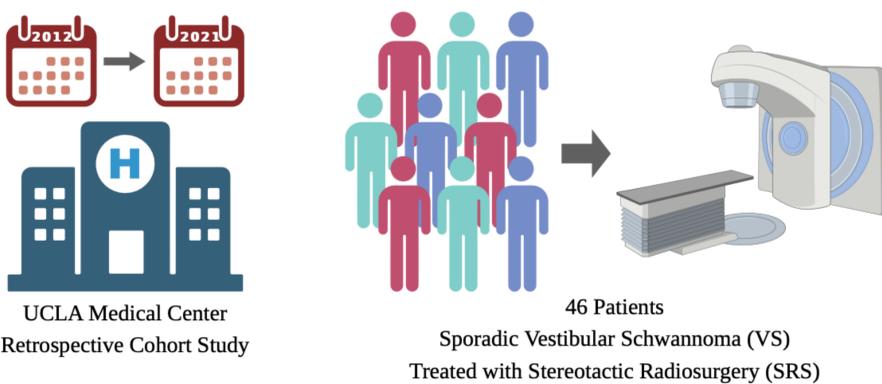
Evaluate the **development** and **prevalence** of clinical outcomes secondary to SRS for patients with VS.

Characterize the **long-term progression** of symptoms following SRS (with a specific focus on **neurologic** and **functional** outcomes).

Assess for the impact of **patient frailty** on outcomes, including **symptom development, progression**, and overall **tolerance** to treatment.

Explore **frailty** as a potential **predictor** of both short- and long-term clinical outcomes following SRS in VS patients.

Methods and Materials



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Results

Clinical Outcomes Highlighting Frailty*:

• Symptom Improvement:

Patients ≥ 60 years (proxy for increased frailty) demonstrated significantly lower rates of non-improvement in tinnitus ($p = 0.001$) and dizziness ($p = 0.004$)

• Symptom Persistence:

Less frequent in older patients for tinnitus ($p = 0.026$) and balance dysfunction ($p = 0.042$)

• Delayed Symptom Onset:

Less often in patients ≥ 60 years, including dizziness ($p = 0.003$) and balance impairment ($p = 0.0001$)

*All rates were adjusted for tumor location, patient gender, preoperative tumor volume, and patient follow-up

Table 1. Patient and Tumor Demographics.

Patient Demographics	
Male/Female (n)	28/18
Mean Age (years, SD)	59.6 (14.2)
Median follow-up (years)	3.5
Prevalence of Pre-Treatment Unilateral Hearing Loss (%)	89
Prevalence of Pre-Treatment Same-Sided Unilateral Tinnitus (%)	63
Prevalence of Pre-Treatment Loss of Balance/Disequilibrium (%)	63
Tumor Demographics	
Average Pre-Treatment Tumor Volume (cm ³)	3.28
Average Post-Treatment Tumor Volume (cm ³)	3.74
Hyperfractionated Radiation/Hypofractionated/Single Fraction (n)	19/5/22
Left-Sided/Right-Sided/Bilateral (n)	26/18/2

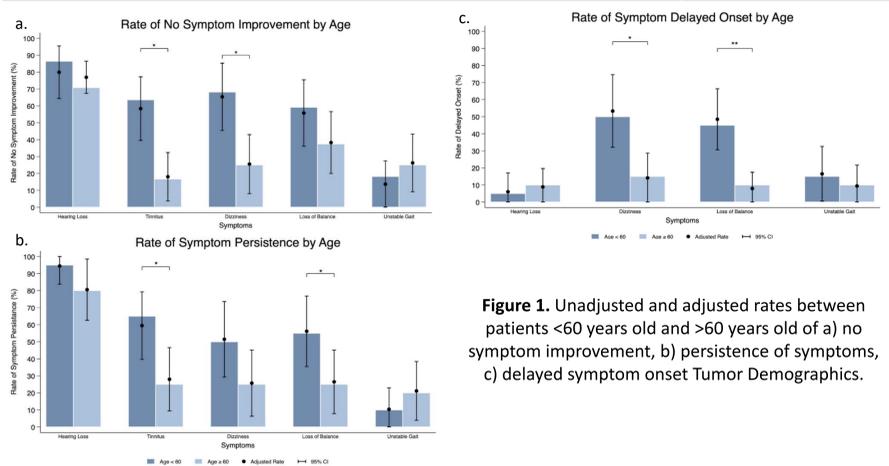


Figure 1. Unadjusted and adjusted rates between patients <60 years old and >60 years old of a) no symptom improvement, b) persistence of symptoms, c) delayed symptom onset Tumor Demographics.

Discussion

- Most patients experience stable or improved CN function after SRS
- Delayed or persistent CN dysfunction occurs in a subset, primarily affecting:
 - CN VIII: hearing, tinnitus, balance
 - CN VII: facial sensation and strength
- Symptom persistence (>1 year) and delayed onset (>6 months) suggest evolving post-SRS morbidity
- Frailty may influence persistence and delayed CN dysfunction
 - Findings support frailty-informed risk stratification, CN-sparing strategies, and tailored follow-up

Conclusions

- SRS effectively treats CN V, VII, and VIII dysfunction in vestibular schwannoma
- Delayed or persistent auditory and vestibular symptoms occur in a subset of patients
- Patient frailty may modify long-term symptom progression

Contact

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References

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