AUDIO-VESTIBULAR PROFILE AND REHABILITATION EFFICACY IN VESTIBULAR SCHWANNOMA PATIENTS UNDERGOING LINAC-BASED RADIOSURGERY

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Objective: Vestibular schwannoma (VS) management increasingly emphasizes functional preservation. While hearing outcomes after stereotactic radiosurgery (SRS) are well documented, **the relationship between vestibular deficits, dizziness, and rehabilitation efficacy remains under-investigated**. We evaluated audio-vestibular function before and after LINAC-based SRS and the clinical benefit of dynamic posturography-based vestibular rehabilitation.

Materials and Methods: This study enrolled ten patients (P1-P10) diagnosed with unilateral VS. The comprehensive assessment battery included pure-tone and impedance audiometry, Otoacoustic Emissions (OAE), Videonystagmography (VNG) with caloric and oculomotor testing, and static/dynamic posturography. Subjective symptom severity was quantified using the Dizziness Handicap Inventory (**DHI**) and the Vertigo Symptom Scale-Short Form (**VSS-SF**). **A subset of five patients (P1, P3, P5, P6, P10) with significant uncompensated deficits underwent targeted rehabilitation using a dynamic posturography (CDP) program.** This consisted of **five 45-minute sessions with real-time center of gravity (COG) visual biofeedback**, involving manipulation of the support surface and visual surround (Fig. 1). The protocol aimed to promote central compensation through neuroplasticity using habituation exercises that induced controlled balance challenges.

Fig. 1. *Dynamic posturography system; habituation exercises.*

Results:

- **High baseline prevalence of vestibular dysfunction**: 90% showed canal paresis (14–100%) despite low DHI scores → suggests partial compensation
- After SRS: hearing largely preserved; **gradual vestibular deafferentation in VS enables central compensation, often masking significant peripheral deficits. SRS may destabilize this compensatory balance**
- Rehabilitation group (n=5):
  - Improved postural stability (objective measures)
  - Reduced symptom burden (mean DHI −21 points)
- **Significant post-rehabilitation improvements**:
  - **DHI: p = 0.042**
  - **VSS-SF: p = 0.041**
- Weak baseline correlation between canal paresis and DHI
- **Post-rehabilitation: functional stability emerged as key determinant of perceived disability**

Conclusions: Patients undergoing SRS for VS often exhibit significant, frequently subclinical, vestibular impairment best detected by instrumental diagnostics. **Early posturography-based rehabilitation may reduce symptoms and improve QoL, but long-term follow-up is needed to evaluate durability and SRS effects on vestibular function.**

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