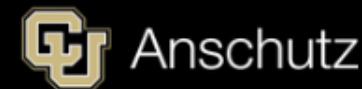


Factors Affecting Speech Discrimination after Vestibular Schwannoma Resection

Olivia Kalmanson, Madeline Olson, Olivia Ovard, Lindsey Freeman, Timothy H Ung, Elizabeth Hogan, Stephen Cass, A Samy Youssef, Samuel Gubbels



Objective

Investigate the relationship between word recognition score (WRS) and pure tone average (PTA) after hearing preservation surgery for vestibular schwannomas (VS) as well as evaluate the consistency of hearing classification systems.

Introduction

Hearing preservation after vestibular schwannoma (VS) surgery is variable. Outcomes are measured using pure tone average (PTA) and word recognition score (WRS), often grouped into classification systems (AAO-HNS, Gardner-Robertson, WRSC). Increasingly, PTA and WRS are reported separately, as they may diverge clinically, with preserved PTA but reduced WRS suggesting neural injury. This study examines the relationship between PTA and WRS and compares hearing outcomes across classification systems.

Methods

An IRB-exempt retrospective review was performed on 784 patients with mucosal HNC who underwent RT/CRT for HNC at a tertiary academic center. Social disparity variables included age, sex, race and ethnicity, insurance status, number of hospitals in a 25-mile radius from home zip code, social vulnerability index (SVI), and distressed community index (DCI) scores. GT placement prior to RT/CRT, during, and post-treatment was also collected. The primary endpoint was GT use 1 year post RT/CRT. Comparison and regression analysis was performed to examine what social variables were associated with long-term GT use, while controlling for tumor size, treatment, and RT side effects.

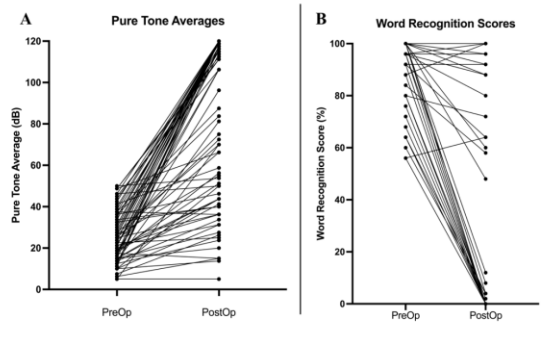
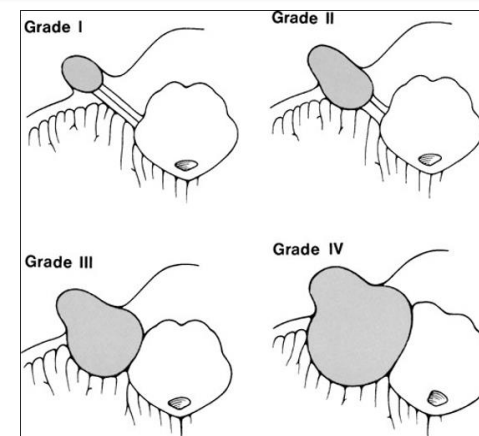


Figure 1. Postoperative changes to pure tone averages (A) and word recognition scores (B) after hearing preservation surgery (n=62). Each data point represents one patient. The pure tone averages are distributed broadly across the testable decibel range, while the word recognition scores exhibit a sudden drop-off after ~50%.



Results

Seventy-five patients were included. Average preop and postop PTA and WRS were 26 ± 12 dB, 79 ± 39 dB, $92 \pm 12\%$, and $33 \pm 43\%$, respectively. Postop PTAs were distributed along the complete testable decibel range, while the postop WRS displayed a bimodal distribution, with WRS $>50\%$ or $<20\%$. Worsening intraop ABR changes were significantly associated with poorer hearing outcomes ($p = 0.005$). With increasing Koos grades, intraop ABRs were significantly more likely to exhibit changes ($p = 0.005$). AAO-HNS and GR classified patients nearly identically, while the WRSC resulted in more class I and fewer class II. The cutoff of serviceable hearing was comparable across all classification systems.

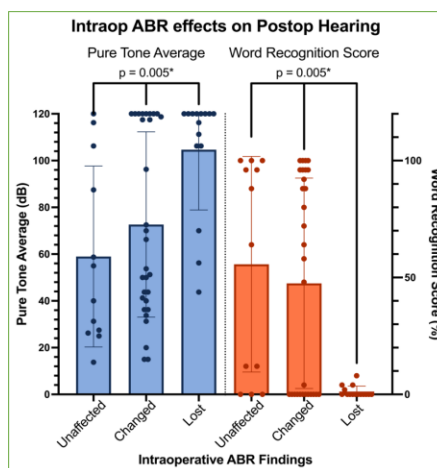


Figure 2. Effect of intraoperative auditory brainstem response changes on postoperative pure tone average (left) and word recognition score (right). Both are significantly correlated. Each data point represents one patient. Error bars are one standard deviation. ABR: Auditory Brainstem Response.

Conclusion

Effects on the brainstem component of Koos 3-4 tumors may particularly disturb speech processing. This effect seems amplified by surgical dissection. AAO-HNS, GR, and WRSC hearing classifications are comparable in describing serviceable hearing in vestibular schwannoma patients.