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Facial Nerve Function and Hearing Preservation Outcomes
After Vestibular Schwannoma Resection with the Middle Fossa and Retrosigmoid Approaches Using the Subcapsular Dissection Technique

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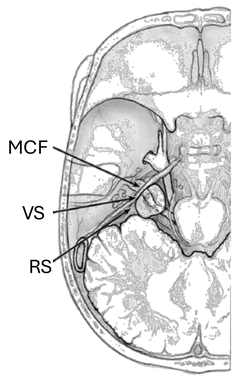
BACKGROUND

Vestibular schwannomas (VS) are the most common intracranial tumors of the cerebellopontine angle. Facial nerve function and hearing preservation are of paramount concern in surgery. We compared facial nerve outcomes and hearing preservation rates following VS resections via the middle cranial fossa (MCF) and retrosigmoid (RS) approaches using the subcapsular dissection technique.



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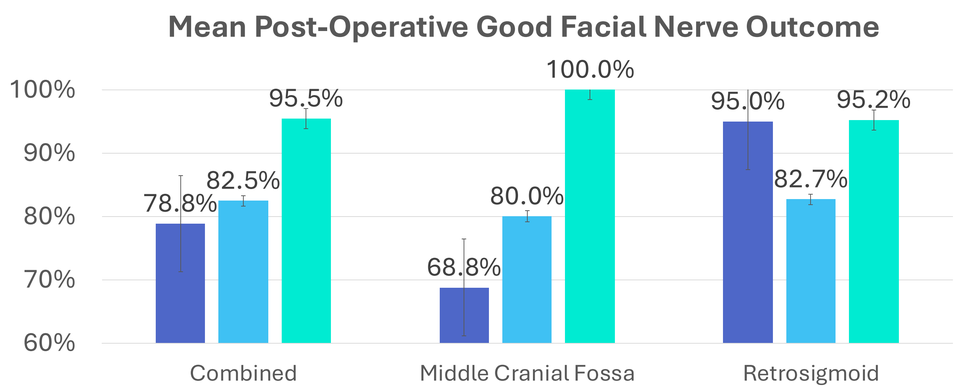
METHODS

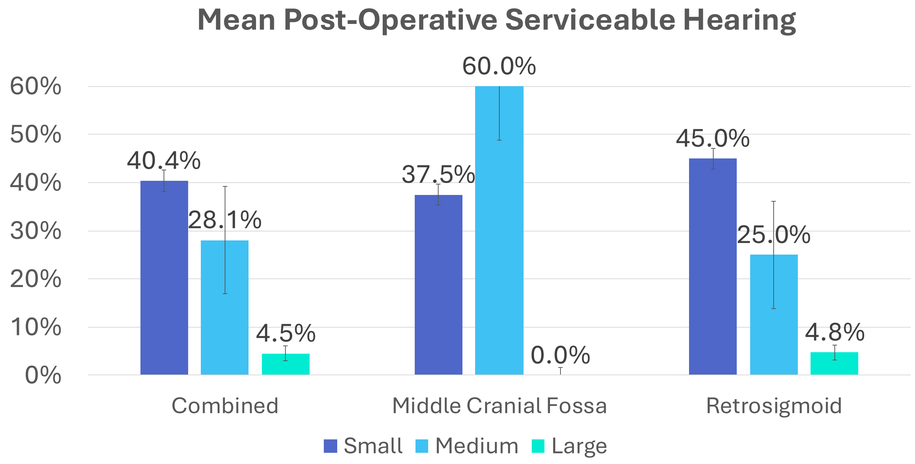
Retrospective analysis of 132 VS resected at the University of Washington Medical Center (2010 to 2023) via the MCF or RS approaches using the subcapsular dissection method.

- Exclusion criteria: Pre-operative nonserviceable hearing and patients without pre- and post-operative audiometric data.
- Hearing Classification: Serviceable (1995 AAO-HNS Class A or B) or non-serviceable (Class C or D).
- Post-Operative Facial Nerve Function Classification: House-Brackmann (HB) score - good (HB 1-2) or poor (HB 3-6).
- Chi-square tests were used to compare outcomes among these groups.

Tumor Stratification	MCF	RS	Total
Large (>25mm)	1	22	23
Medium (25mm-15mm)	5	52	57
Small (<15mm)	32	20	52
Total	38	94	132

RESULTS





Plain Language Summary

We studied hearing and facial nerve function after removal of a tumor of the hearing nerve. We found that the retrosigmoid approach had a higher likelihood of good facial nerve outcomes but had no significant advantage over the middle cranial fossa approach for hearing outcomes. In general, the larger the tumor, the more likely a patient was to lose their hearing and facial nerve function. Overall, both the middle cranial fossa and retrosigmoid approaches using the subcapsular technique for the hearing nerve tumor removal can achieve good facial nerve outcomes and hearing preservation.

DISCUSSION

- The surgical approach was significantly associated with tumor size (Chi-Square statistic: 45, p-value < .0001).
- Good Postoperative Facial Nerve Function:
  - Small tumors: 78.8% (68.8% MCF and 95.0% RS)
  - Medium tumors: 82.5% (80.0% MCF and 82.7% RS)
  - Large tumors: 95.5% (100% MCF and 95.2% RS)
- A significant association between tumor size and facial nerve outcomes was not identified (Chi-square statistic: 3.09, p-value= 0.21).
- The RS approach was associated with a higher rate of a good facial nerve outcome (Chi-square statistic: 5.6, p-value= 0.017).
- Hearing preservation rates:
  - Small tumors: 40.4%(37.5% MCF and 45.0% RS)
  - Medium tumors: 28.0% (60.0% MCF and 25.0% RS)
  - Large tumors: 4.5% (0% MCF and 4.7% RS)
- Tumor size was associated with hearing preservation rates (Chi-square statistic: 9.96, p-value = 0.008).
- No significant difference was found in hearing preservation rates between MCF and RS approaches (Chi-square statistic: 2.8, p-value = 0.09).

This study was limited by the number of large and medium sized tumors resected via the MCF approach. Future studies could examine the use of the MCF approach for larger tumors using the subcapsular technique to provide better comparisons to the RS approach.

CONCLUSIONS

The RS approach was associated with a higher rate of facial nerve preservation, especially for small tumor resections. A difference in hearing preservation rates was not found between the MCF and RS approaches. Larger tumors were associated with lower hearing preservation rates. Using the subcapsular technique, both approaches can achieve good facial nerve function and hearing preservation with tumor size as a significant modulating factor.