Intraoperative Facial Movement Predicts Postoperative Outcomes in Vestibular Schwannoma Resection

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Objective

To examine whether short and/or long-term facial nerve status after vestibular schwannoma (VS) resection may be reliably predicted by objective facial movement intraoperatively.

Introduction

Intraoperative facial electromyography (EMG) is universally used during resection of VS to preserve physiologic facial nerve function. Previous literature shows facial nerve stimulation at 0.05 mA with >240 uV return predicts that 85% of patient will have good postoperative facial nerve function, defined as House-Brackmann grade of I-II/VI. We routinely expose the ipsilateral hemiface to evaluate for visible facial movement with stimulation at 0.05 mA after VS resection. Here we evaluate the predictive value of intraoperative objective facial movement with long-term good facial nerve function.

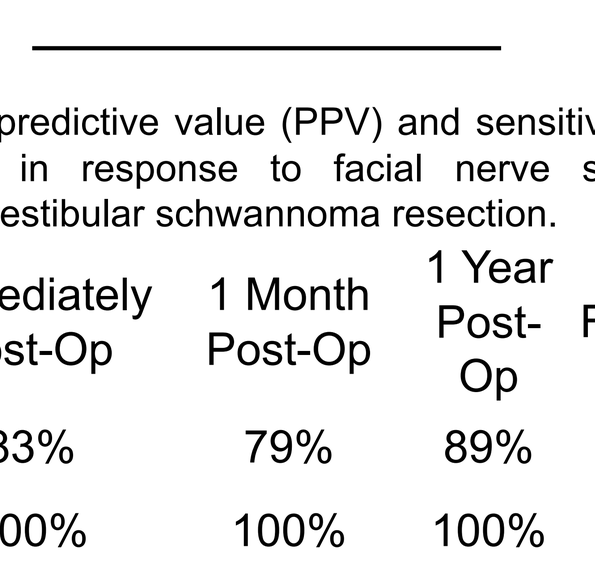
Methods

Patients who underwent translabyrinthine vestibular schwannoma resection from 2011-2021 were included. Patient records were reviewed retrospectively to assess pre-operative facial nerve function, resection approach, extent of resection, and visible facial movement when the facial nerve was stimulated at 0.05 mA at the conclusion of the case. Positive predictive value (PPV) of facial movement for a good facial nerve outcome immediately postoperatively and after one year were assessed. Amplitudes for patients with poor facial nerve outcomes and good facial nerve outcomes were compared with a t-test.

Table 1. Positive predictive value (PPV) and sensitivity for observed facial movement in response to facial nerve stimulation after translabyrinthine vestibular schwannoma resection.

	Immediately Post-Op	1 Month Post-Op	1 Year Post-Op	Final Recorded
PPV	83%	79%	89%	89%
Sensitivity	100%	100%	100%	100%

Figure 1. (A&C) Preoperative MRI images of large vestibular schwannoma with size measurement along petrous ridge (dotted line). (B&D) Postoperative MRI example of gross total resection (GTR) and subtotal resection (STR) from patients in A & C, respectively.



Results

66 patients (50% female) with an average age of 58 (standard deviation 15) had documented intraoperative facial nerve stimulation. Intraoperative visible facial movement with 0.05 mA stimulation at the root exit zone was observed in 64 (97%) patients. Positive predictive value (PPV) of intraoperative facial movement with stimulation was 83% postoperatively and 89% at one year. Postoperatively, negative predictive value (NPV) and sensitivity were 100% at all time points through one year. Patients with poor initial facial nerve outcomes had significantly lower response amplitudes (264 mV) than patients with good outcomes (479 mV, p=0.001).

Figure 2: Example of patient draping with exposure of ipsilateral hemiface, thereby enabling objective determination of facial movement in response to facial nerve stimulation.

Discussion

Facial nerve stimulation at 0.05 mA with 240 uV return is a well-known predictor for good (HB I-II/VI) facial nerve outcomes. This study demonstrates that objective visualization of facial movement in response to FN stimulation at 0.05 mA provides an additional and reliable predictive factor in projecting both short and long-term facial nerve outcomes after translabyrinthine VS resection. Sensitivity and PPV of visible movement are similar to an often-used minimum stimulation threshold of 240 μV, which has been shown to have 88% specificity and 89% sensitivity for long-term facial nerve function.. Surgeons routinely performing translabyrinthine VS resection may consider utilizing this technique as an adjunct in addition to standard-of-care neuromonitoring.

Conclusion

Intraoperative facial nerve stimulation with visual confirmation of facial movement reliably predicts postoperative facial nerve outcomes with similar efficacy as a minimum stimulation threshold of 240 μV.

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