Comparison of Facial Nerve Function Results After Translabyrinthine and Retrosigmoid Approach in Medium-Sized Tumors

Bulent Mamikoglu, MD; Carlos R. Esquivel, MD; Richard J. Wiet, MD

Objective: To compare postoperative facial nerve function results according to surgical approach.

Study Design: Retrospective case review study.

Setting: All surgical procedures were conducted in collaboration with a neurosurgery team in teaching hospitals with an academic affiliation.

Patients: Patients with medium to large vestibular schwannomas, with the tumor size ranging from 2 to 3 cm. Ninety-eight patients were identified from an “Acoustic Neuroma Database” (date range of search, 1983-2000).

Main Outcome Measures: The House-Brackmann scale was used for grading facial function in the immediate postoperative period and 1 year after. Guidelines of the American Academy of Otolaryngology–Head and Neck Surgery were used for classification of hearing preservation.

Results: Of the 98 patients, 17 were operated on through a retrosigmoid approach and 81 through the translabyrinthine route. The mean±SD ages of these 2 groups of patients were 46±13 and 51±14 years, respectively; mean±SD tumor sizes were 2.5±0.27 and 2.6±0.28 cm, respectively. One year after tumor removal via translabyrinthine approach, 10 (59%) of the 17 patients had good (grade I-II) facial functions and 2 (12%) had poor (grade V-VI) function. In the translabyrinthine group, 54 (68%) of 79 patients (2 patients had subtotal total tumor removal) had good facial nerve function at the end of the 1-year follow-up, and 13 (17%) continued to have poor facial function. The difference between these groups was not statistically significant (P > .05). Hearing was preserved in 4 (24%) of the 17 patients in the retrosigmoid group.

Conclusion: Although the translabyrinthine approach may offer better long-term facial function compared with the retrosigmoid approach in patients with medium-sized tumors, the difference between these 2 groups was not significant enough to favor one approach over the other.


G OALS OF MODERN vestibular schwannoma surgery are total tumor removal with minimal morbidity to the patient. The surgical management of vestibular schwannomas is divided into hearing preservation and non–hearing preservation approach. The selection of cases for hearing preservation is largely determined by hearing levels, patient age, tumor size, and patient preferences.

The retrosigmoid (RS) approach offers identification of the facial nerve at the brainstem with possible preservation of hearing. However, only the medial two thirds of the internal auditory canal (IAC) can be reliably exposed without damaging the otic capsule. Therefore, in hearing preservation cases it is possible that some of the tumor has to be removed without direct visualization, and the incomplete exposure increases risks of leaving residual tumor. Additionally, the possibility of surgical removal of the tumor with preservation of hearing in medium-sized tumors is low.

The translabyrinthine (TL) approach offers the surgeon a shorter operative depth to the tumor via a similar-sized craniotomy with superior visualization by virtue of a wider angle of surgical access and minimal cerebellar retraction. The facial nerve can be identified at the IAC and brainstem. The purpose of this article is to compare the postoperative facial function after removal of medium-sized vestibular schwannoma in 2 surgical approaches. We hypothesized that postoperative facial nerve functions will be better after the TL approach compared with the RS approach.

This is a retrospective, observational study. All surgical procedures were conducted by...
the senior author (R.J.W.) between the years 1983 and 2000 in collaboration with a neurosurgery team in a suburban hospital or at a teaching hospital with academic affiliations. Ninety-eight patients with vestibular schwannomas 2 to 3 cm in size were divided into 2 groups (hearing preservation surgery through the RS approach and non–hearing preservation surgery through the TL approach) and analyzed. The tumors were disclosed by preoperative imaging studies, and measurement of tumor size was made by the maximal transverse diameter. Tumor within the IAC was not included in measurements. Data were collected from the patients’ medical records and an “Acoustic Neuroma Database” (date range of search, 1983-2000) regarding the patients’ preoperative and operative hearing levels. Nonparametric Mann-Whitney and Fisher exact tests were used for statistical analysis. A detailed summary of all TL and RS cases is presented in Table 1. Immediately after surgery, facial nerve function results were reported for the RS group (Table 1). At 1 year after surgery, grade I and II results had become higher in the TL group compared with the RS group (Table 1). Good facial function (House-Brackmann facial nerve grade I or II) was present in 54 (68%) of 79 patients in the TL group and in 10 (59%) of the 17 RS patients at 1 year after surgery. The comparison of difference of postoperative facial nerve function both at immediate and after 1 year results using Fisher exact and Mann-Whitney tests did not reach statistical significance (P > .05 in all calculations).

FACIAL NERVE FUNCTION RESULTS

The facial nerve was preserved anatomically in 79 (98%) of the 81 patients in TL group and in 16 (94%) of the 17 patients in RS group. Of the 81 TL patients, 79 were available for analysis of long-term facial nerve function (2 patients were excluded due to poor postoperative follow-up). A detailed summary of all TL and RS cases is presented in Table 1. Immediately after surgery, facial nerve function results were better in the RS group (Table 1). At 1 year after surgery, grade I and II results had become higher in the TL group compared with the RS group (Table 1). Good facial function (House-Brackmann facial nerve grade I or II) was present in 54 (68%) of 79 patients in the TL group and in 10 (59%) of the 17 RS patients at 1 year after surgery. The comparison of difference of postoperative facial nerve function both at immediate and after 1 year results using Fisher exact and Mann-Whitney tests did not reach statistical significance (P > .05 in all calculations).

PREOPERATIVE HEARING LEVELS AND HEARING PRESERVATION

Of the 17 RS patients, 10 (59%) had preoperative hearing levels at class A and B according to AAO-HNS hearing classification criteria. Hearing was preserved in 4 (23%) of the 17 cases; however, preservation of hearing in class A levels only occurred in 1 patient (6%). Of the 81 TL patients, 23 (28%) had useful preoperative hearing (combination of class A and B) (Table 2). Preoperative hearing levels were significantly better in RS group compared with the TL group (Mann-Whitney test, U TL=275, z=3.95, P < .01).

CEREBROSPINAL FLUID LEAK AND TUMOR RECURRENCE

In this series, the cerebrospinal fluid leak rate for the TL group was 9% (7 of 81 patients). There were no cases of cerebrospinal fluid leak in the RS group. There was 1 tumor recurrence in each group; therefore, recurrence rates were 1% (1 of 79 patients) in the TL group and 6% (1 of 17 patients) in the RS group.

**Table 1. Facial Nerve Function Results After the Removal of the Tumor**

<table>
<thead>
<tr>
<th>Grade of Facial Nerve Function According to H-B</th>
<th>Immediately After Surgery</th>
<th>≥1 y After Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RS Group (n = 17)</td>
<td>TL Group (n = 81)</td>
</tr>
<tr>
<td>I</td>
<td>7 (41)</td>
<td>28 (35)</td>
</tr>
<tr>
<td>II</td>
<td>2 (12)</td>
<td>8 (10)</td>
</tr>
<tr>
<td>III</td>
<td>0</td>
<td>5 (6)</td>
</tr>
<tr>
<td>IV</td>
<td>0</td>
<td>5 (6)</td>
</tr>
<tr>
<td>V</td>
<td>2 (12)</td>
<td>4 (5)</td>
</tr>
<tr>
<td>VI</td>
<td>6 (35)</td>
<td>31 (38)</td>
</tr>
</tbody>
</table>

Abbreviations: H-B, House-Brackmann facial nerve function classification; RS, retrosigmoid; TL, translabyrinthine.

* Data are number (percentage) of patients.
† Two patients had subtotal total tumor removal.

There were 81 patients in the TL group and 17 patients in the RS group. The mean ± SD age of patients in the TL group was 46 ± 13 years and the mean ± SD tumor size was 2.6 ± 0.28 cm. The mean age of patients in the RS group was 51 ± 14 years and the mean ± SD tumor size was 2.5 ± 0.28 cm. There was no significant difference in tumor size between these 2 groups (t test, P = .3).

TUMOR REMOVAL

Subtotal total tumor removal was planned preoperatively and performed in 2 of the 81 cases because the general health of these patients was not good enough to tolerate long periods under general anesthesia. Therefore, 79 of 81 patients experienced total tumor removal in the TL group.
The primary goal of surgery is safe, complete removal of the tumor before significant morbidity occurs with in ceasing size. Our second goal is preservation of facial function and, lastly, hearing preservation. Facial nerve function can be reliably preserved in most patients with medium-sized tumors using either the RS or TL approach. In this study, the facial nerve was anatomically preserved in 95% of the cases with both approaches.

The data obtained in this study indicated that facial nerve function results 1 year after surgery were better in the TL group compared with the RS group (68% vs 59%). On the other hand, this 9 percentage point difference was not statistically significant. In fact, facial nerve results were better in the RS group compared with the TL group (53% vs 45%) immediately after surgery. Although we could not prove our hypothesis, these data suggest a prognostic value in patients undergoing TL removal, indicating that the recovery of immediate postoperative facial paresis is more likely to occur in TL patients than in RS patients.

The higher recovery rate in the TL group was probably due to the existence of more tumor in the IAC in TL patients compared with the RS patients. We presume that this caused added manipulation of the facial nerve during tumor removal from the total length of the IAC. In addition, preoperative hearing levels were notably worse in TL group compared with the RS group, which may indicate more tumor in the IAC in the TL group than in the RS group. As mentioned previously, the TL approach was favored if there was considerable amount of tumor in the lateral extent of the IAC.

Reports from other centers also confirm the higher chance of temporary postoperative facial dysfunction after the TL approach, which then recovers over the following year. Further studies should address the extent of tumor involvement in the IAC in correlation with postoperative facial nerve function and tumor reoccurrence.

Hearing preservation for tumors larger than 1.5 cm is poor.1,3,5 Our results confirm these findings, since the hearing preservation rate for tumors between 2 and 3 cm in size was 24%. This is further emphasized when only 1 patient’s hearing was preserved within the limits of class A levels according to AAO-HNS hearing classification criteria.

In this series, the recurrence rate was 1% for TL patients and 6% for RS patients. During RS removal, the lateral IAC is usually cleared of tumor with an angled instrument in a blind fashion. This slight increased risk of recurrence associated with the RS approach can provide added information when counseling patients before starting the treatment.

### Table 2. Hearing Levels According to AAO-HNS Criteria Before the Surgery*

<table>
<thead>
<tr>
<th>Preoperative Hearing Levels†</th>
<th>RS Group (n = 17)</th>
<th>TL Group (n = 81)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>9 (53)</td>
<td>16 (20)</td>
</tr>
<tr>
<td>B</td>
<td>1 (6)</td>
<td>7 (9)</td>
</tr>
<tr>
<td>C</td>
<td>4 (24)</td>
<td>9 (11)</td>
</tr>
<tr>
<td>D</td>
<td>3 (18)</td>
<td>49 (60)</td>
</tr>
</tbody>
</table>

Abbreviations: AAO-HNS, American Academy of Otolaryngology–Head and Neck Surgery; PTA, pure-tone average; SD, speech discrimination score.

*Data are number (percentage) of patients. Total percentage may not add up to 100% due to rounding.
†AAO-HNS criteria: level A (PTA<30 dB and SD<70%); level B (PTA≤50 dB and SD<50%); level C (PTA>50 dB and SD<50%); and level D (PTA>50 dB and SD<50%) (Committee on Hearing and Equilibrium guidelines for the evaluation of hearing preservation in acoustic neuroma [vestibular schwannoma]).6

#### CONCLUSIONS

There are numerous factors in treating patients with acoustic neuroma, including size of tumor, hearing status, patient health, patient age, and patient preferences. Although the postoperative facial nerve function results were better in the group of patients whose medium-sized tumors were removed through the TL approach compared with patients operated through the RS approach, the difference between these 2 groups was not statistically significant enough to favor one approach over the other.

Accepted for publication September 5, 2002.

Corresponding author: Bulent Mamikoglu, MD, 2655 Thomasville St, Pocahontas, AR 72455.

#### REFERENCES