Intratemporal Grafting of the Facial Nerve following Lateral Skull Base Tumor Resection

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ABSTRACT

Intratemporal skull base tumors may invade the facial nerve in the horizontal (tympanic) or descending (vertical) segments, while parotid malignancies typically infiltrate the facial nerve at the stylomastoid foramen. This article will describe our results following intratemporal facial nerve grafting in 44 patients. Methods: This was a retrospective analysis of 44 patients requiring intratemporal facial nerve repair following lateral skull base tumor resection at our tertiary care, academic medical center. Results: Tumor histology included 17 parotid cancers, 13 temporal bone malignancies, 9 glomus tumors, 3 facial neuromas, and 2 endolymphatic sac tumors. The greater auricular nerve was used in 25 patients and the sural nerve was used in 19 cases. Forty patients were available for facial function assessment at 2 years. Using the House-Brackmann (H-B) recovery scale, the breakdown of patients by facial function was as follows: Grade I, 0 patients; Grade II, 4 patients; Grade III, 29 patients; Grade IV, 4 patients; Grade V, 3 patients; and Grade VI, 0 patients. Conclusions: Facial paralysis may occur from intrinsic or external lateral skull base invasion of the facial nerve. Intratemporal interposition grafting resulted in favorable facial function (H-B II or III) in 33 of the 40 (82.5%) patients at the 2-year assessment.

KEYWORDS: Facial nerve, lateral skull base surgery, interposition grafting

The facial nerve is usually preserved in patients requiring lateral skull base approaches for benign tumors or low-grade malignancies with nor-

mal presenting facial function.^{1,2} Malignant tumors of the parotid gland or temporal bone, however, may necessitate facial nerve resection to obtain an

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oncologically safe tumor margin.³⁻⁵ This article presents our long-term facial function results following intratemporal facial nerve grafting in 44 patients who underwent lateral skull base tumor resection.

METHODOLOGY

The medical records of 44 patients who underwent lateral skull base surgery, facial nerve resection, and intratemporal interposition grafting were retrospectively reviewed. All procedures were performed at our tertiary care, academic medical center between July 1988 and July 2003. Pertinent data were collected from patient records following approval from our institutional research and education review board.

RESULTS

Patient Data

Of 44 patients reviewed, 24 males and 20 females ranged in age from 16 to 82 years with a mean age of 61.8 years. Thirty-two tumors were on the right and 12 lesions were on the left. Only 40 patient records were available for a 2-year facial function assessment.

Presenting Facial Function

Only 2 of the 44 patients presented with normal facial function, while 29 individuals had complete, ipsilateral facial paralysis (Fig. 1). Ten patients demonstrated facial paresis and 3 patients had facial twitching or spasm at the time of presentation.

Site of Tumor Origin

The tumor originated in the parotid gland in 17 cases and in the temporal bone in 15 patients (Fig. 2). Of the remaining 12 tumors, 9 occurred

Figure 1 Left facial paralysis caused by adenoid cystic carcinoma of the parotid gland.

in the jugular foramen and 3 were facial nerve tumors.

Tumor Histology

There were 32 malignant tumors including 16 squamous cell carcinomas, 8 mucoepidermoid carcinomas, 5 adenoid cystic carcinomas, and 3 adeno-carcinomas. Of the 12 benign tumors, 9 were paragangliomas and 3 were facial neuromas.

Surgical Technique

A subtotal petrosectomy with parotidectomy was used in 17 cases, the infratemporal fossa approach

Figure 2 Axial CT scan showing a left parotid tumor, which caused ipsilateral facial paralysis.

in 15 patients, and temporal bone resection in 12 individuals. Defect reconstruction was simple-primary closure in 6 patients and abdominal adipose packing in 5 cases. A temporalis rotational

flap was used in 25 patients. Larger, complex surgical defects were reconstructed through microvascular, free-tissue transfer using the rectus abdominus muscle in 4 patients and the serratus muscle in another 4 cases.

Facial Nerve Repair

All 44 patients underwent interposition intratemporal facial nerve grafting. The greater auricular nerve was used in 25 patients (Fig. 3) and the sural nerve in 19 individuals. Tension-free anastomosis was achieved in all cases and each neurorrhaphy required three or four sutures of 9-0 or 10-0 monofilament nylon. When possible, the bony trough of the vertical segment was preserved to enhance the nerve graft stability within the temporal bone.

The length of the graft was determined by the extent of the facial nerve segment resection. The interposition graft bridged the vertical segment to the extratemporal segment in 17 patients, the geniculate ganglion to the extratemporal facial nerve in 16 cases, and the geniculate ganglion to the stylomastoid foramen in 9 individuals (Fig. 4).

Figure 3 Greater auricular nerve prior to harvesting for intratemporal facial nerve grafting.

Figure 4 Greater auricular interposition graft from the geniculate ganglion (proximal) to the pes anserinus (distal) following a temporal bone cancer resection.

Treatment

Surgical resection alone was employed in 13 patients and postoperative radiotherapy was used in 30 cases. Surgery, radiotherapy, and chemotherapy were combined in 1 patient with advanced squamous cell carcinoma of the temporal bone.

Facial Nerve Results

A 2-year assessment of facial nerve function was available in 40 of the 44 patients reviewed. Using the House-Brackmann recovery scale,⁶ there were no patients with either normal function (Grade I) or no function (Grade VI). Favorable function was

Figure 5 Postoperative facial function 2 years after a left malignant parotid tumor resection with intratemporal interposition facial nerve grafting.

noted in 4 patients with Grade II and in 29 patients with Grade III recovery (Fig. 5). Less favorable results were seen in 4 patients with Grade IV and 3 patients with Grade V function.

The 2-year facial function results did not appear to be related to surgical approach, tumor histology, or length of the interposition graft. Likewise, there was no difference in facial function related to the use of postoperative radiotherapy.

DISCUSSION

The successful management of a variety of tumors of the parotid gland, infratemporal fossa, temporal bone, and jugular foramen usually mandates the identification, mobilization, and protection of the facial nerve.⁷⁻⁹ Benign, and more often, malignant neoplasms of these regions may cause facial twitching, paresis, or paralysis by neural compression or invasion.^{10,11} The latter intraoperative finding is generally managed with resection of the involved facial nerve, resection with primary end-to-end repair, or interposition facial nerve grafting.^{12,13} Short segment replacement can be accomplished with the greater auricular nerve while longer defects may require using the sural nerve.¹⁴

The purpose of this article was to analyze our results in intratemporal facial nerve grafting following lateral skull base tumor resection. Using meticulous microsurgical technique, tension-free anastomosis, and the bony trough of the vertical segment when possible, 33 of 40 patients or 82.5% attained Grade II or III facial recovery at 2 years. No patients were Grade I or VI, therefore, the remaining 7 patients (17.5%) showed less-favorable Grade IV or V recovery.

SUMMARY

Facial weakness or paralysis at initial presentation signifies facial nerve compression or invasion in

patients with lateral skull base tumors. When tumor-free proximal and distal facial nerve margins are available, interposition intratemporal grafting should be considered. A 2-year facial function assessment showed favorable recovery (Grade II or III) in 82.5% of the patients reviewed in this series.

PAPER PRESENTED

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Commentary

This a nice and concise report by the authors describing the results of facial nerve reconstruction with interposition grafting in a variety of tumors at the skull base. It is interest-

ing to note that 29 of the patients already had complete facial palsy at presentation. It would have been useful for the reader to know the duration of the facial palsy before the operation and whether this affected the ultimate facial function outcome. It would also have been important to know if the facial recovery was more to the lower or upper face and if additional procedures were needed to augment eye closure in this group of patients. The overall results are in keeping with the experience of other authors with such patients. The present conclusions are important in that the length of the graft or postoperative radiation did not impact on the outcome. This type of facial nerve reconstruction should be the treatment option of choice whenever the facial nerve is sacrificed at the skull base.

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