Editorial

Facial nerve and acoustic neuromas

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The authors provide a comprehensive assessment of facial nerve function outcomes after using a multimodality approach to vestibular schwannoma (VS) management.¹ For larger tumors, they performed either a gross-total resection (GTR) or a subtotal resection (STR)—with a “facial nerve-sparing paradigm”—followed by Gamma Knife surgery (GKS) if recurrence was identified. For smaller tumors, GKS was performed. One hundred fifty-one patients had an initial “nerve-sparing” resection via a retrosigmoid approach, with the goal of > 90% resection without facial nerve compromise; hearing preservation was not the primary goal. Intraoperative electrophysiological monitoring was used to determine the need for an STR. When > 0.3 mA of stimulation or an increase of ≥ 0.1 mA above baseline stimulation occurred, then resection was stopped. If the facial nerve was in the porous acusticus and thought to be at risk, then the auditory canal was not drilled out. In other patients, GTR was performed. Within this group, 55 patients had complete removal of the tumor with no residual lesion. In the remaining 96 patients, an STR (> 90% volume) was achieved. Significant regrowth was defined as residual tumor fragment expansion by at least 5 mm on the postoperative side. These authors studied a cohort of 20 patients from this group who received GKS.

From the complete group of 232 patients who underwent GKS, 3 (1.3%) required further tumor management, which is in line with other series. Interestingly, 8 patients had tumors that varied in size between 1.8 and 2.1 cm, and underwent resection due to what they described as severe symptoms such as vertigo. The authors believed that resection was a better option than GKS, despite the fact that matched cohort studies do not support this conclusion. Outcomes for vertigo or tinnitus in patients treated using either the microsurgical or radiosurgical approach have been similar in several matched cohort studies.² Of the 20 patients who had GKS after resection, facial nerve function (House-Brackmann Grade I or II) was preserved in 19 (95%).

The authors contend that this multimodal approach can lead to improved facial nerve preservation rates, as opposed to attempting GTR in all patients with larger tu-

mors. I agree with this conclusion. Indeed, many centers have begun to use a staged resection followed by radiosurgery in cases in which the intraoperative findings argue against a more aggressive resection along the course of the facial nerve. This report shows that this concept can be associated with good facial nerve functional outcomes. It is important, however, to know that hearing preservation was not the primary management goal, and thus conclusions related to hearing cannot be gleaned from this report.

There are several remarks made in this report that warrant some discussion. First, the authors describe waiting for 5 mm of growth before recommending radiosurgery for a “recurrent tumor” after the first resection. Many surgeons would use radiosurgery much earlier, as part of a planned approach several months after the resection for the residual remnant. Although the authors may think that in some cases the remnant has been devascularized or biologically altered in some way, most of these remnants, when truly nodular in shape, do regrow. This is clearly different from the appearance of linear enhancement left along the auditory canal, which may not be viable tumor.

Second, in their conclusions they noted that “Stereotactic radiosurgery is inadequate for controlling large tumors, and surgery is often necessary.” This statement is quite broad and not completely supported by the literature. Our own data on tumors between 3 and 4 cm showed that surgery was sometimes necessary, typically for persistent symptoms, but that radiosurgery could indeed be an acceptable approach for individual patients with specific goals.³ The authors state that their facial nerve-sparing technique provides a low incidence of tumor regrowth requiring treatment (13.2%). It is important to know that this was not with long-term follow-up and was based on an extremely conservative definition of “growth.” The second procedure was performed at an average of 3.9 years following resection (range 0.5–7.7 years).

In summary, this excellent article from an experienced surgical team under Dr. Sisti clearly delineates the benefits of multimodality surgical management for lesions in patients with larger VSs when intraoperative findings argue against GTR.

Disclosure

Dr. Kondziolka serves as a consultant for Elekta.

References

1. Haque R, Wojtasiewicz TJ, Gigante PR, Attiah MA, Huang

- B, Isaacson SR, et al: Efficacy of facial nerve-sparing approach in patients with vestibular schwannomas. Clinical article. **J Neurosurg** [epub ahead of print August 19, 2011. DOI: 10.3171/2011.7.JNS101921]
2. Pollock BE, Driscoll CL, Foote RL, Link MJ, Gorman DA, Bauch CD et al: Patient outcomes after vestibular schwannoma management: a prospective comparison of microsurgical resection and stereotactic radiosurgery. **Neurosurgery** **59**: 77–85, 2006
 3. Yang HC, Kano H, Awan NR, Lunsford LD, Niranjan A, Flickinger JC, et al: Gamma knife radiosurgery for larger volume vestibular schwannomas. Clinical article. **J Neurosurg** **114**:801–807, 2011

Response

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We thank Dr. Kondziolka for his thoughtful comments on our article. Dr. Kondziolka questions the decision to treat patients with small, symptomatic tumors by using microsurgery. Patients with smaller tumors (1.8–2.1 cm) comprised 5.3% of patients treated with microsurgery (8 of 151). These patients presented with severe symptoms related to cranial nerve compression, including vertigo, facial spasm, or facial pain. Because of these symptoms, we chose to treat these patients with microsurgery, although their tumors were small enough to be eligible for GKS by our paradigm (tumors < 2.2 cm were eligible for GKS). We decided to treat these patients with microsurgery, based on the concept that microsurgical excision of the VS would mimic the short-term results of microvascular decompression surgery for relief of symptoms, which was frequently the case.²

Hearing preservation was not the primary goal of our therapeutic approach, and thus we cannot make conclusions on the efficacy of this approach for hearing preservation. The intent of our article was to examine facial nerve outcomes, not hearing outcomes, because only 51% of patients treated with initial microsurgery presented with functional hearing, probably due to the large average size of tumors treated with microsurgery (3.3 cm). However, we did attempt hearing preservation whenever possible; all patients were treated via the retrosigmoid approach. Of patients with functional preoperative hearing, only 25% of them retained functional hearing at last follow-up. Although hearing preservation was not the primary goal of the treatment described in this article, we appreciate that this is an interesting area for further study.

We agree with Dr. Kondziolka's point that some surgeons advocate planned GKS for tumor remnants after microsurgery. We considered any postmicrosurgical residual tumors as "remnants," including those that might be considered insignificant "tumor scraps." All patients with any residual tumor were monitored for expansion of the remaining tumor. Planned GKS only for patients with larger tumor remnants would not eliminate the possibility of recurrence; even very small fragments of tumor visible only as minimal enhancement on the brainstem, 7th nerve, or 8th nerve have the potential to regrow. Planned GKS for all patients with the possibility of tumor expansion, including patients with very small tumor fragments, would seem to be unnecessary in the short term, because clinical symptoms of the tumor fragments are minimal and the rate of regrowth is slow on average. Later radiosurgical treatment may thus leave time for the radiographic identification of tumor regrowth, resulting in a more effective and complete radiosurgical result. Of 96 patients in our series who had any residual tumor, only 20 of them (20.8%) required retreatment with GKS for control of their tumor. Although planned GKS after microsurgery may be an effective strategy, we were able to achieve excellent tumor control with GKS for selected patients who experienced regrowth of residual tumor.

In our series, we chose not to use GKS to treat patients with tumors ≥ 2.2 cm. We began our facial nerve-sparing approach for patients with VSs in 1998, coincident with the publication of radiosurgical results in the treatment of VSs and the installation of a GK unit at our institution.¹ Since then, techniques in stereotactic radiosurgery have improved and, although more recent studies may show that GKS is effective for larger VSs, we continued to treat patients according to our conservative size criteria to complete a consistent accrual of patients over the 10-year period.

In this study, we report that 13.2% of patients treated with microsurgery for VSs, performed using a facial nerve-sparing treatment paradigm, later required GKS for tumor control. We agree that longer-term follow-up will be useful in verifying the results that we report here.

References

1. Kondziolka D, Lunsford LD, McLaughlin MR, Flickinger JC: Long-term outcomes after radiosurgery for acoustic neuromas. **N Engl J Med** **339**:1426–1433, 1998
2. McLaughlin MR, Jannetta PJ, Clyde BL, Subach BR, Comey CH, Resnick DK: Microvascular decompression of cranial nerves: lessons learned after 4400 operations. **J Neurosurg** **90**:1–8, 1999

Please include this information when citing this paper: published online August 19, 2011; DOI: 10.3171/2011.6.JNS11961.