EDITORIAL COMMENT

Outcomes after gamma knife radiosurgery in solitary acoustic tumors and neurofibromatosis Type 2

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The paper by Kondziolka and associates is both interesting and provocative. They may be correct in their contention; however the data they have obtained to date do not support the conclusions of the paper. The authors are correct in indicating that the significant facial and trigeminal nerve injuries sustained by the patients in this series are unacceptable. For tumors of similar size in my own series of more than 1000 patients, the mortality rate for those undergoing microsurgery by any approach has been zero; the recurrence rate over a 12-year mean follow-up period is less than 1%. Normal facial function is present in 98.5%. Only one patient sustained a complete facial palsy during the course of translabyrinthine surgery, and that patient's function recovered to Grade 3. No patient has a trigeminal nerve deficit. There were no complications with lasting consequences. The rate of useful hearing preservation has been approximately 50%, and the average adjusted costs after 1992 were \$15,867 per patient.

Another issue with this study is the way the authors present their data. In an attempt to improve these unacceptable neurological deficits the authors reduced the radiation dosage. The data suggest that the new dosage regimen has significantly reduced the deficit rate for cranial nerves five and seven. However, it is inappropriate statistically to meld the outcome data for tumor control of the patients treated earlier with higher dosage radiation with the cranial nerve outcomes for patients treated later with the lower dosage. These latter patients should be followed separately to determine the recurrence rate before it can be stated that the lower dose produces equivalent results with regard to tumor growth.

These comments should not be construed to suggest that I do not use focused radiation in the management of acoustic tumors. The modality has been available at my institution for many years. We routinely use focused radiation in the elderly patients, those at high risk, those with small recurrences, and in selected patients with neurofibromatosis Type 2. Other patients prefer the technique and we honor their decisions. We discuss the three surgical approaches and focused radiation options with all patients; however, when most of them view the cranial nerve data, they opt for surgery and I believe that currently this is the correct decision. Obviously if an individual surgeon's outcome data are not substantially better than those achieved with focused radiation, then the argument is reversed.

The authors may be correct in their treatment choice of focused radiation for these tumors. We will know when we have adequate 5- and 10-year follow-up evaluations in patients treated using the more recent dosage modifications. At present, I am unconvinced by the data. It is my belief that stereotactic radiosurgery remains an option for all patients with small acoustic tumors and is preferable for the majority of patients at high risk for surgery or those with anxieties over surgery. However, the data from

the best stereotactic radiosurgery series do not match those reported by the best surgeons in this field. Microsurgical removal of these small tumors can obviously be accomplished with virtually no mortality or serious morbidity unrelated to the seventh and eighth cranial nerve complex. Normal facial function will be achieved in virtually all patients undergoing surgery via this route. Hearing will be preserved equally by both modalities currently. Improvement in our ability to preserve and restore hearing remains the major challenge for this surgery and for focused radiation as well.

There is a philosophical issue of some interest that goes beyond choice of therapeutic modality. One of the striking things in this review and other reviews of surgical outcomes is the enormous disparity in the data between centers and between surgeons. Acoustic tumors are relatively rare and only a few surgeons have experience with large series. Much of this disparity in outcome data may be due to lack of surgical experience. These issues raise the question of what we as neurosurgeons should do to provide the largest number of patients with the best possible outcomes. Referral has been one answer, but the relatively small number of acknowledged master surgeons cannot possibly perform all of the cerebellopontine angle surgery, and not all patients are able to travel to the referral centers. Regionalization of subspecialized services is another possibility, but it remains fairly controversial. Regionalization implies concentration of these rare tumors in the care of a few designated surgeons who would then gain the requisite experience. The acoustic tumor, with the wide diversity of results reported in the world's literature, seems to me to be a perfect microcosm for the development of a management model that will provide the best possible outcomes for the largest numbers of patients.

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[Return to article #2](#)