Long-Term Outcomes after Radiosurgery for Acoustic Neuromas

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Background

Acoustic neuromas are benign tumors that arise along the eighth cranial nerve (also called the acoustic nerve because it innervates the ear and is responsible for hearing.) These tumors are benign tumors, which means that they do not spread to other parts of the body; however, due to their location in the brain, acoustic neuromas can cause severe morbidity. If left untreated acoustic neuromas will cause unilateral hearing loss, facial weakness and numbness, swallowing difficulties and other debilitating symptoms.

The treatment of acoustic neuromas has traditionally been surgery. The first such report dates back to the 19th century. Since this time the surgical technique has been greatly refined and most modern series report excellent results following surgical extirpation. However, surgery is not without morbidity that can include total loss of hearing on the affected side, facial weakness and numbness and the usual risks of undergoing general anesthesia. In addition, surgery does not always remove the entire tumor and, if not, these tumors can grow back. The rate of tumor recurrence in modern surgical series ranges from 0-25%.

Radiosurgery is a new treatment technique that was pioneered by Leksell in the 1980s. This technique uses high energy x-rays focused with millimeter accuracy at the tumor to kill the tumor cells. Although the term 'surgery' is in the word radiosurgery, this procedure is much different from traditional surgery. Radiosurgery does not require incisions - the high energy x-rays are delivered through the head to the tumor by way of a machine called a linear accelerator (or gamma knife). The patient comes into the hospital in the morning, is fitted with a head frame, receives the radiation, and is discharged the same day or the following day. The risks attendant with conventional (open) surgery are avoided.

These obvious advantages of radiosurgery created great excitement in the late 1980s and early 1990s and many centers began programs to evaluate the efficacy of this new treatment. However, the long-term results using radiosurgery have yet to be reported. Therefore, the report in the November 12, 1998 issue of the New England Journal of Medicine by Kondziolka and colleagues which reports on patients with over five years of follow-up is much needed.

Methods

Between 1987 and 1992 162 patients underwent radiosurgery for unilateral acoustic neuromas at the University of Pittsburgh. One quarter of these patients had previously undergone surgery only to have their tumor recur. The patients received on
average 16 gray of radiation, administered in one session. Tumor control was achieved in 98% of patients. The safety of radiosurgery is clearly demonstrated in this study. The most troubling acute side effect was headache and all patients were discharged to home the following day. Patients were encouraged to resume normal activities upon discharge, and the authors make special note of one patient who completed a marathon two days after undergoing radiosurgery.

Eight percent of patients retained facial nerve function (the nerve which controls the muscles in the face) and 50% had no change in hearing levels. Compared to surgery, these results are excellent. A written questionnaire was sent to patients and returned by 77 percent. Of those who had previously undergone surgery, all said that radiosurgery was successful. Of the eighty-one patients who had not had surgery, 95% described radiosurgery as successful. Ninety-five percent of respondents said they would recommend this procedure to a friend.

**Conclusion**

The authors conclude the radiosurgery provides long-term control of acoustic neuromas while preserving neurologic function.