Penn Medicine

CLINICAL BRIEFING™

Department of Neurosurgery • Department of Otorhinolaryngology-Head and Neck Surgery • Center for Cranial Base Surgery

Comprehensive Management of Acoustic Neuromas

Specialists at the Center for Cranial Base Surgery at Penn Medicine are treating acoustic neuromas (vestibular schwannomas) with the most advanced modalities, including: 1) sophisticated microsurgery with and without endoscope assistance and 2) precision stereotactic radiosurgery (Gamma Knife® Perfexion™ and CyberKnife). The Center is comprised of cranial base neurosurgeons, otorhinolaryngologists and radiation oncologists who together develop comprehensive treatment plans for these complex tumors.

Acoustic neuromas are benign tumors that generally arise inside the internal auditory canal, a bony passage shared by the seventh (facial) and eight (auditory) cranial nerves. Expanding in a confined region of the skull, these indolent tumors can cause pressure on both nerves, resulting in unilateral hearing loss, vertigo, tinnitus, headaches and balance problems.

The objectives for neuroma treatment are maintenance of quality of life, complete removal or stabilization of tumor growth, preservation of hearing and preservation of facial nerve function (a normal smile). Factors influencing the decision for desired procedure include patient age, size of tumor, health status, risk tolerance and desired outcome.

Small to medium-sized tumors (<2.5cm) can be treated with either surgical resection or Gamma Knife Perfexion radiosurgery with excellent results. Surgical resection has the advantage of complete removal of the tumor with little likelihood of recurrence, and remains the gold standard for benign tumors. However, surgery has higher risks of complications than Gamma Knife radiosurgery.

By contrast, Gamma Knife controls (rather than removes) brain tumors, halting their growth with close to 200 beams of targeted gamma ray energy. The benefits of Gamma Knife include a low side effect profile and high quality of life after the procedure. Unfortunately, a small percentage of tumors can continue to grow after radiosurgery.

For larger tumors (>2.5cm), microsurgical resection is the best option. At Penn Medicine, the cranial base team uses three microsurgical approaches. The retrosigmoid approach is the most versatile, as it allows both small and large tumors to be removed and provides the ability to preserve hearing. The translabyrinthine approach does not require significant brain retraction and is also quite versatile, but is only for patients in whom hearing cannot be preserved. The middle fossa approach is used only for small tumors confined to the internal acoustic canal. In addition to conventional surgical approaches, John Y. K. Lee, MD, of Penn Neurosurgery, has pioneered the use of the endoscope in the cerebellopontine angle to provide angled views and minimally invasive options.

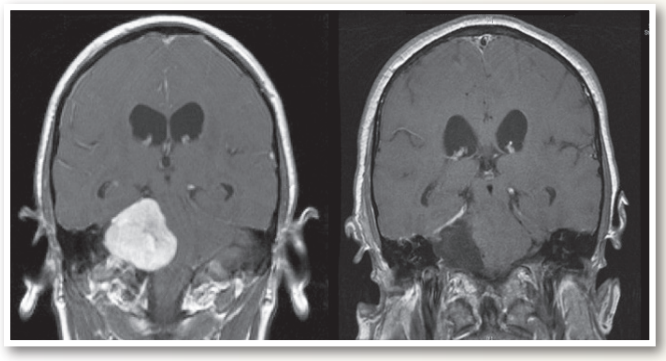

Figure 1: (Left) Coronal MRI scan with contrast demonstrates a large acoustic neuroma in a 38-year-old patient. (Right) One day after microsurgery, demonstrating complete resection with no complications and complete preservation of the facial nerve.

Case Study 1

Mr. M, a 38-year-old man, was referred to John Y. K. Lee, MD, of Penn Neurosurgery, with right-sided hearing loss, tinnitus and progressive gait ataxia. An MRI revealed a large acoustic neuroma measuring 3.4 cm anteroposteriorly, and 3.0 cm superoinferiorly with significant brainstem compression (Figure 1). Because of the tumor's large size, Mr. M underwent retrosigmoid craniotomy. Both microscopy and endoscopy were used to obtain an optimal result. The tumor was completely resected; the facial nerve was anatomically preserved, and his gait improved. By his three-month visit, Mr. M had normal facial function and had returned to work without any restrictions. He has remained well at several years follow-up.

(Case Study 2 continued on back page)

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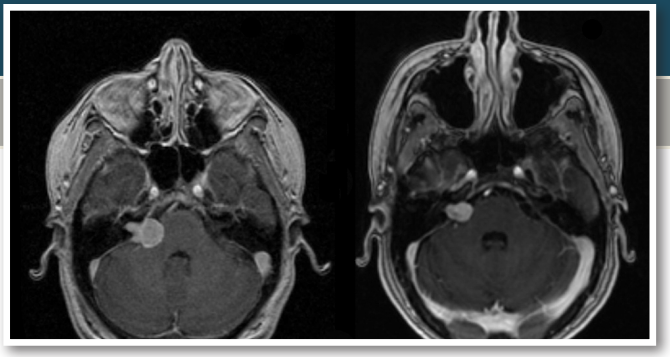

Figure 2: (Left) Axial MRI scan with contrast demonstrates right acoustic neuroma at the time of Gamma Knife radiosurgery. (Right) Five years post-Gamma Knife Perfexion radiosurgery, the patient has preservation of functional hearing, and no change in facial function.

Case Study 2

Mrs. G, a 67-year-old woman, was referred to the Center for Cranial Base Surgery at Penn Medicine after her personal physician confirmed a moderate loss of hearing in her right ear. An MRI at Penn showed a tumor at the right auditory canal consistent with an acoustic neuroma (Figure 2, left) with a total volume of 3 cc. Mrs. G chose the less invasive option of Gamma Knife surgery for her therapy. Her Gamma Knife treatment involved a single outpatient session, during which she received a 12 Gy prescription to the 50% isodose line. Her recovery was unremarkable and she has since enjoyed an improved quality of life without side effects. Five years after her treatment (Figure 2, right), Mrs. G retains moderate hearing in her right ear and normal facial function.

Access

Penn Neurosurgery
Hospital of the University of Pennsylvania
3400 Spruce Street
3rd Floor, Silverstein Building
Philadelphia, PA 19104

Pennsylvania Hospital
Washington Square West Building
235 South 8th Street
Philadelphia, PA 19106

Department of Otorhinolaryngology — Head and Neck Surgery
Hospital of the University of Pennsylvania
3400 Spruce Street
5th Floor, Silverstein Building
Philadelphia, PA 19104

Pennsylvania Hospital
811 Spruce Street
Philadelphia, PA 19107

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Faculty Team

The Center for Cranial Base Surgery at Penn Medicine specializes in the evaluation and treatment of tumors of the head, neck and face. Currently, the Center treats ~100 patients/year for acoustic neuroma, employing an individualized algorithm for treatment approach.

Treating Acoustic Neuromas at Penn Medicine Neurosurgery

John Y. K. Lee, MD
Medical Director, Gamma Knife Center
Associate Professor of Neurosurgery

M. Sean Grady, M.D.
Charles Harrison Frazier Professor and
Chairman, Department of Neurosurgery
Co-Director, Cranial Base Center

Otorhinolaryngology–Head and Neck Surgery

Bert O'Malley, Jr., MD
Chair, Department of Otorhinolaryngology-Head and Neck Surgery
Gabriel Tucker Professor of Otorhinolaryngology

Douglas Bigelow, MD
Director, Division of Otology/Neurotology
Associate Professor of Otorhinolaryngology–Head and Neck Surgery

Michael J. Ruckenstein, MD, MSc, FACS
Vice Chairman, Department of Otolaryngology
Professor of Otorhinolaryngology–Head and Neck Surgery

Radiation Oncology

Michelle Alonso-Basanta, MD, PhD
Helen Blum Assistant Professor

James Kolker, MD
Clinical Associate Professor of Radiation Oncology

Suneel Nagda, MD
Assistant Professor of Clinical Radiation Oncology