

Acoustic Neuroma

Overview

An acoustic neuroma is a benign (non-malignant) tumor that originates on the hearing or balance nerve. These nerves are located deep in the skull and are near important structures. Because the tumor involves the nerves of balance and hearing, patients will usually present with hearing loss, ringing in the ear, or problems with balance. Larger tumors will cause facial numbness, headaches, and the accumulation of fluid around the brain that can be fatal if left untreated.

The average rate of growth for an acoustic neuroma is 1-2mm per year. Sometimes, small tumors do not appear to grow, or grow at an extremely slow rate. Rarely, tumors will show rapid growth, sometimes doubling in size over 12 months.

The primary goal of treatment is the preservation of life. The secondary goals are to maintain as normal function as possible after treatment. The most important secondary goal is preservation of facial movement. Since these tumors stretch the facial nerve, the facial nerve is at risk for injury with treatment. Intraoperative facial nerve monitoring has improved facial nerve outcomes. As surgical techniques have continued to improve, hearing preservation is often the goal with small tumors. In addition, the function of the hearing nerve can be monitored intraoperatively to improve results.

Because of the complexity of the anatomy and patients' individual circumstances, a team approach involving a neurotologist (ear specialist) and a neurosurgeon are used to remove tumors. By combining the expertise of both specialties, surgical outcomes are greatly improved. Postoperative care involves a team of audiologists and physical therapists as needed.

Tumor size

Tumors can be roughly divided into small, medium, or large. Larger tumors make treatment more difficult and result in increased complications. However, regardless of the size of the tumor, surgery has the possibility of serious complications, including death.

Small tumors

Small tumors involve the internal auditory canal. This is the bony canal where the hearing, facial, and balance nerve pass from the brainstem to the inner ear. If hearing is normal or near normal, hearing preservation in the form of surgery or radiosurgery may be considered. Sometimes small tumors are observed with serial MRI scans.

Medium tumors

Medium tumors involve the internal auditory canal and extend into the brain cavity, but they do not place pressure on the brainstem.

Large tumors

Large tumors extend into the brain cavity and place pressure on the brainstem.

Treatment options

Observation

Small tumors and some medium tumors can be observed with serial MRIs. If no tumor growth is seen, an annual MRI is required to make sure the tumor does not show growth. If the tumor has grown, further treatment is indicated.

Observation is not recommended for young patients or in patients with large tumors. Hearing loss is possible during the observation period and can be sudden in some cases.

Radiosurgery

Radiosurgery is the use of radiation in a very precise manner. The goal of treatment is to stop tumor growth. Generally, the tumor should show signs of growth by repeat MRI before the tumor is treated with radiosurgery. The procedure is performed as an outpatient and is well tolerated. The risks of radiosurgery include continued tumor growth, facial numbness, hearing loss, dizziness, ringing in the ear, facial paralysis or twitching (rare), and fluid buildup around the brain. If the tumor needs to be removed after radiosurgery because of continued tumor growth, complications (including facial weakness) tend to be more common. Also, there is a small risk of the tumor turning

malignant (cancer) that is estimated to be 1 in 1000 cases over a 30-year period.

Surgery

Because of the complex anatomy involved with the surgical removal of an acoustic neuroma, a team approach is used consisting of a neurotologist and a neurosurgeon. Hearing preservation may be attempted in patients with normal or near-normal hearing and small tumors. The choice of surgical approaches is determined by multiple factors including tumor size, tumor location, and hearing status. Facial nerve monitoring and, in hearing preservation surgery, hearing nerve monitoring is used during the surgery.

Translabyrinthine approach

This is the most common approach utilized to remove an acoustic neuroma. An incision is made behind the ear and the bone behind the ear is removed. Next, the labyrinth is removed allowing a wide view of the tumor. Because the labyrinth is removed, total hearing loss is expected. On the other hand, the brain does not require retraction and the largest tumors can be removed through this approach. Fat from the abdomen is used to fill in the surgical defect.

Middle fossa approach

The middle fossa approach is used with small tumors with good hearing. An incision is made above the ear and a small piece of the skull is removed that will be placed back with small titanium plates. The temporal lobe of the brain is retracted and the bone over the internal auditory canal is removed. This allows access to the tumor that is then removed. The goal of the middle fossa approach is hearing preservation which is achieved in approximately 60% of cases.

Retrosigmoid approach

The retrosigmoid approach is also used for small to medium tumor where most of the tumor is in the brain cavity rather than in the internal auditory canal. An incision is made behind the ear and a small piece of the skull is removed. This allows a wide view of the brain cavity. The tumor is then removed.

Total versus partial removal

Total removal of tumor is always the initial goal of surgery, however, sometimes a small piece of tumor will be left behind. If the tumor is very stuck to the facial nerve or other vital structures, a small piece of tumor will be left behind to prevent complications. These small pieces of tumor rarely grow, however, it is important to get an annual MRI to make sure this small remnant of tumor does not grow.

Hearing impairment

The natural course of an untreated acoustic neuroma is hearing loss in the affected ear. Surgery or radiosurgery can also result in hearing loss. Many patients adjust well to hearing in only one ear. Other patients are more bothered with hearing loss and can consider a few options.

One options is to wear a CROS (contralateral routing of sound) hearing aid which consists of a hearing aid in the poor ear that will transmit sounds to a hearing aid in the better ear.

A BAHA (bone anchored hearing aid) is a surgically implanted abutment that attaches to an external sound processor. The sounds is then routed through the bones of the skull into the good ear. The surgical procedure takes about 45 minutes and is performed as a day surgery.

Risks and complication of surgery

Facial weakness or paralysis

The facial nerve, which controls the movement of the face, is intimately involved with the tumor and may be stretched very thin over larger tumors. In addition, swelling may occur around the nerve resulting in a temporary weakness. Because of this, there is potential for facial weakness or permanent paralysis after the removal of an acoustic neuroma. The use of intra-operative monitoring of the facial nerve has decreased the incidence of facial nerve problems. Sometimes, the facial weakness will begin a few days after surgery.

Most cases of facial weakness are temporary and resolve in 6-12 months. If facial nerve function is not returning during this time, additional procedures can be used to improve facial movement.

Rarely, the facial nerve may be going through the tumor or the tumor may be coming from the facial nerve and the nerve is removed with the tumor. In this case, the nerve can be reattached or if gap in the nerve exists, a small sensory nerve from the upper neck can be used to connect the two nerve endings. This will leave the patient with permanent weakness but some movement usually returns over the next 6-12 months.

Spinal fluid leak

The bone around the tumor and ear are removed to gain access to the acoustic neuroma. This bone is connected by small air-containing chambers. With removal of the tumor, the spinal fluid can flow through these small air-containing chambers into the middle ear and out the nose. Rarely, spinal fluid can drain out of the surgical incision or ear canal. Fat from the abdomen is used to fill-in the surgical defect to decrease the chance of a spinal fluid leak. If a spinal fluid leak still occurs, a leak usually stops with a spinal drain. Rarely, the wound may need to be reopened to stop a spinal fluid leak.

Infection

Despite sterile technique and antibiotics, infection is always a possibility with surgery. Since the surgery involves areas around the brain, an infection may lead to meningitis. This can be a serious and even fatal infection if not identified and treated promptly. Treatment consist of prolonged intravenous antibiotics.

Hearing loss

The translabyrinthine approach always results in total hearing loss in the operated ear. With the middle fossa and retrosigmoid approaches, hearing loss (including total hearing loss) is a risk.

Ringling in the ear

Ringling in the ear, or tinnitus, may results after surgery.

Change in taste

A small percentage of patients may notice a change of taste. This is usually temporary.

Dizziness

Most patients experience significant vertigo for 2 to 3 days after the acoustic neuroma is removed. Dizziness and problems with balance may persist for a few months. Rarely a patient may have long-term problems with balance. A very unusual problem is decreased blood supply to the part of the brain that controls coordination (the cerebellum). This may result in dizziness in the form of ataxia where coordination of the arms and legs is difficult.

Eye care

If facial weakness occurs after surgery, closing the eye may be difficult. It is important to keep the eye moist and lubricated until facial function returns. Without eye closure, serious infection may occur that could rarely lead to blindness. If return of facial function is expected to take quite some time, a procedure may be needed to help the eye close. Patients are encouraged to call immediately if they experience any eye symptoms after surgery.

Other nerve problems

Rarely, the nerves controlling eye movement, facial feeling, the vocal cords, and swallowing may be injured. These deficits are usually temporary but can be permanent.

Postoperative headache

Postoperative headache is most common with the retrosigmoid approach, but may occur with any approach and can be prolonged.

Brain swelling and bleeding

The patient is observed in the intensive care unit for 1 to 2 nights to monitor for signs of brain swelling or bleeding. These complications can be life-threatening and may require additional surgery to removed blood or relieve swelling.

Summary

The options for the treatment of an acoustic neuroma include observation, radiosurgery, or surgical removal. The decision is based on multiple factors and patient preference. The content here is based on

our philosophy and experience. Please feel free to call one of the physicians at the UT Southwestern Comprehensive Skull Base Program to answer any questions.

Making an Appointment

Primary care physicians typically refer new patients to UT Southwestern Medical Center. If an individual does not need a referral, they may make an appointment through the following options:

- Complete an online [Request an Appointment Form](#).
- Call 214-645-6455 or 866-645-6455 (toll free).

Physicians referring a patient may use the above options or the following:

- Complete an online [Physician Referral Form](#).
- Call our Comprehensive Skull Base Program referral line 214-645-3400
- Call 866-645-5455 (toll free).

After-Hours Care

Current UT Southwestern patients who need urgent care outside of normal business hours may call 214-648-3111 to leave a page for our on-call physician.

Emergency Care

If an individual is experiencing a life-threatening problem, they should call 911 immediately or go to the nearest emergency room. UT Southwestern's emergency room is located at UT Southwestern University Hospital, 5909 Harry Hines Blvd. (corner of Harry Hines Boulevard and Inwood Road).