

## **Acoustic Neuromas (Patient Brochure) - SENSITIVE**

### ACOUSTIC TUMOR

The diagnosis of an acoustic (cerebellopontine angle) tumor has been established as the most probable cause of your symptoms.

### GENERAL COMMENTS

Acoustic tumors are non-malignant fibrous growths, originating from the balance or hearing nerve, that do not spread (metastasize) to other parts of the body. They constitute six to ten percent of all brain tumors.

These growths are located deep inside the skull and are adjacent to vital brain centers, the first signs or symptoms one notices usually are related to ear function and include ear noise and disturbances in hearing and balance. As the tumors enlarge, they involve other surrounding nerves having to do with more vital functions. Headaches may develop as a result of increased pressure on the brain. If allowed to continue over a long period of time, this pressure on the brain is ultimately fatal.

In most cases these tumors grow slowly over a period of years. In others, the rate of growth is more rapid. In some the symptoms are mild, and in others, severe multiple symptoms develop rather rapidly.

The patient with an acoustic tumor has a serious problem, one which involves life and death. Therefore, many diagnostic procedures are used to be as certain as possible of an accurate diagnosis.

Great care is exerted before, during and after surgery in these cases in order to preserve life. The preservation of life is the most important objective of surgery in these most difficult cases. A secondary objective of surgery is to preserve for future life as many vital structures as possible. For some, a completely normal life results following surgery. For others, minimum or at times even maximum degrees of physical handicap may persist.

To accomplish the preservation of life with a minimum of future physical disturbance, this surgery with pre and postoperative care is performed and assisted by a team. This team includes an internist, an audiologist, an anesthesiologist, a specially trained surgical nurse, a neurosurgeon and an otologist (ear specialist). The neurosurgeon is co-surgeon with the otologist.

## RISKS AND COMPLICATIONS OF ACOUSTIC TUMOR SURGERY

It is not possible to list every complication that might occur before, during or following a surgical procedure. The following discussion is included to indicate some of the risks and complications peculiar to acoustic neuroma surgery.

In general, the smaller the tumor at the time of surgery, the less chance of complications. As the tumor enlarges, the incidence of complication becomes increasingly greater.

### Hearing Loss

In small tumors it is sometimes possible to save the hearing by removing the tumor. Most tumors are larger, however, and the hearing is lost in the involved ear as a result of the surgical procedure. Therefore, following surgery the patient hears only with the remaining good ear.

### Tinnitus

Tinnitus (ear noise) remains the same as before surgery in most cases. In 10% of the patients the tinnitus may be more noticeable.

### Taste Disturbance and Mouth Dryness

Taste disturbance and mouth dryness are not uncommon for a few weeks following surgery. In 5% of patients this disturbance is prolonged.

### Dizziness and Balance Disturbance

In acoustic tumor surgery it is necessary to remove part or all of the balance nerve and, in most cases, to remove the inner ear balance mechanism. Because the balance nerve usually has been damaged by the tumor, its removal frequently results in improvement in any preoperative unsteadiness. Dizziness may occur, nonetheless, following surgery and may be severe for days or a few weeks. Imbalance is prolonged in 30% of the patients until the normal balance mechanism in the opposite ear compensates for the loss in the operated ear. Some patients notice unsteadiness when fatigued for several years.

At times the blood supply to the portion of the brain responsible for coordination (cerebellum) is decreased by the tumor or the removal of the tumor. Difficulty in coordination with arm and leg movements (ataxia) may result.

## Facial Paralysis

Acoustic tumors are in intimate contact with the facial nerve, the nerve which controls movement of the muscles which close the eyelids as well as the muscles of facial expression. Temporary paralysis of the face and muscles which close the eyelids is common following removal of an acoustic tumor. Weakness may persist for six to twelve months and there may be permanent residual weakness.

Facial paralysis may result from nerve swelling or nerve damage. The facial nerve is usually compressed and distorted by the tumor in the internal auditory canal. Careful tumor removal, with the help of an operating microscope, usually results in preservation of the nerve but nerve stretching may result in swelling of the nerve with subsequent temporary paralysis. In these instances facial function is observed for a period of months following surgery. If it becomes certain that facial nerve function will not recover, a second operation may be performed to connect the facial nerve to a nerve in the neck (facial hypo-glossal anastomosis).

In 5% of cases the facial nerve passes through the interior of the acoustic tumor. On occasions the tumor may even originate from the facial nerve (facial neuroma). In either instance it is necessary to remove all or a portion of the nerve to accomplish tumor removal. When this is necessary it may be possible to immediately reconnect the facial nerve or to remove a skin sensation nerve from the upper part of the neck to replace the missing portion of the facial nerve. If this is not possible a second operation may be performed to help reanimate the face.

## Eye Complications

Should facial paralysis develop the eye may become dry and unprotected. Care by an eye specialist may be indicated. It may be necessary to apply artificial tears or tape the eye shut. When prolonged facial nerve paralysis is expected, implantation of a gold weight or spring into the eyelid helps keep the eye moistened as well as providing comfort and improved appearance.

## Other Nerve Weaknesses

Acoustic tumors may contact the nerves which supply the eye muscles, the face, the mouth and throat. These areas may be injured with resultant double vision, numbness of the throat, weakness of the face and tongue, weakness of the shoulder, weakness of the voids and difficulty swallowing. These problems may be permanent.

## Brain Complications and Death

Acoustic tumors are located adjacent to vital brain centers which control breathing, blood pressure and heart function. As the tumor enlarges it may become attached to these brain centers and usually becomes intertwined with the blood vessels supplying these areas of the brain.

Careful tumor dissection, with the help of an operating microscope, usually avoids complications. If the blood supply to vital brain centers is disturbed, serious complications may result: loss of muscle control, paralysis, even death. In our experience death occurs rarely as the result of the removal of small acoustic tumors and occurs in less than 1% of the larger tumors.

## Postoperative Spinal Fluid Leak

Acoustic tumor surgery results in a temporary leak of cerebrospinal fluid (fluid surrounding the brain). This leak is closed prior to the completion of the surgery with fat removed from the abdomen. Occasionally this leak reopens and further surgery may be necessary to close it.

## Postoperative Bleeding and Brain Swelling

Bleeding and brain swelling may develop after acoustic tumor surgery. If this occurs a subsequent operation may be necessary to reopen the wound to arrest bleeding and allow the brain to expand. This complication can result in paralysis or death.

## Postoperative Infection

Infection occurs in less than 15% of the patients following surgery. This infection is usually in the form of meningitis, an infection of the fluid and tissue surrounding the brain.

When the complication occurs, hospitalization is prolonged. Treatment with high doses of antibiotics is often indicated. These antibiotics can cause allergic reactions, may suppress the body's blood-forming tissues or may produce hearing loss in the good ear. Fortunately these antibiotic complications are rare.

## Transfusion Reaction

It may be necessary to administer blood transfusions during acoustic tumor surgery. Immediate adverse reactions to transfusions are uncommon. A late complication of a transfusion is viral infection of the liver (hepatitis). This occurs in less than 5% of transfused patients. When this complication occurs, medical treatment is necessary, at times requiring rehospitalization. Many patients will consider banking their own blood in advance of surgery. Please ask your doctor for details of such "auto-donations".

## SIZE OF TUMOR

We classify tumors as large, medium or small. Risks and complications of acoustic tumor surgery vary with the size of the tumor; The larger the tumor, the more serious the complications, and the more likelihood of complications.

The removal of an acoustic tumor, whether large or small, is a major surgical procedure, with possibilities of serious complications, including death. The risk involved in the removal of these tumors must never be minimized.

## SMALL TUMOR

A small acoustic tumor is still confined within the bony canal that extends from the inner ear to the brain. Through this canal pass the hearing, balance and facial nerves and the blood vessels which supply the inner ear.

The operation for removal of a small tumor is performed under general anesthesia using the operating microscope. The surgical approach is through an incision in front of and above the ear (middle fossa approach) or behind the ear (retrosigmoid).

The tumor is totally removed in most cases. On rare occasions only partial removal can be accomplished. Every effort is made to preserve the hearing and still remove the tumor. In about 50% of cases the tumor involves the hearing nerve or the artery leading to the inner ear and total loss of hearing results in the operated ear.

## MEDIUM TUMOR

A medium sized acoustic tumor is one which has extended from the bony canal into the brain cavity but has not yet produced pressure on the brain itself.

The operation for a medium sized tumor is performed under general anesthesia using an operating microscope. The surgical approach (translabyrinthine-suboccipital approach) is made through an incision behind the ear overlying the mastoid bone. The mastoid and the inner ear structures are removed to expose the tumor. The tumor is then removed totally. Occasionally only partial removal is accomplished. The mastoid bone defect is closed with fat taken from the abdomen.

The translabyrinthine suboccipital approach sacrifices the hearing and balance mechanism of the inner ear. Consequently, the ear is made permanently deaf. Although the balance mechanism has been removed on the operated ear, the balance mechanism of the opposite ear usually provides stabilization for the patient in one to four months.

## LARGE TUMOR

A large acoustic tumor is one which has extended out of the bony canal into the brain cavity and is sufficiently large to produce pressure on the brain and disturb the vital brain centers.

Operations for large acoustic tumors require extensive removal of bone to properly expose the tumor and control the large blood vessels which obstruct access to the tumor. For this reason special vascular studies (arteriograms) may be required along with other procedures necessary to diagnose and establish the size of the acoustic tumor.

The operation for a large tumor is performed under general anesthesia using the operating microscope. The surgical approach (translabyrinthine suboccipital approach) is through an incision behind the ear overlying the mastoid bone. The mastoid, inner ear structures and a portion of the skull are removed to expose the tumor. The tumor is then totally removed unless vital sign changes occur. If there are changes in blood pressure, pulse rate or respiration rate the surgery must be terminated before the tumor is totally removed. (In this case a second operation to complete the tumor removal is usually necessary).

The mastoid bone defect is closed with fat taken from the abdomen.

In large tumors it is often necessary to monitor the patient's general status by inserting a small tube (arterial line) into an artery in the arm or leg. When this is necessary there be pain in the hand or foot following surgery. Occasionally a blood clot forms in the artery following surgery. Should this complication occur further surgery may be necessary to remove the clot. A very rare complication of this arterial line monitoring is loss of a finger, toe or even a hand or foot.

The translabyrinthine suboccipital approach sacrifices the hearing and balance mechanism of the inner ear. Consequently, the ear is made permanently deaf. Although the balance mechanism has been removed from the operated ear the balance mechanism of the opposite ear usually provides stabilization for the patient in one to four months.

## PARTIAL VS TOTAL REMOVAL OF AN ACOUSTIC NEUROMA

Total removal of an acoustic tumor, without complications, is the goal of the management of these tumors. If large, the tumor may be removed in two stages.

Partial removal of the tumor, regardless of its size, may be necessary if the patient's responses during surgery indicate disturbance of the vital brain centers that control respiration, blood pressure, or heart function. If signs of vital brain center disturbance develop during surgery, it is sometimes necessary to terminate the operation before the tumor can be totally removed. This will often allow these vital brain center functions to be restored. Once they are disturbed, however, they sometimes do not recovery.

If premature termination of the operation is necessary in the judgement of the operating surgeons, the remaining portion of the tumor may gradually enlarge to again produce symptoms. In this event, a subsequent operation might be necessary. This subsequent operation can often be accomplished without significant changes in vital signs.

In the event your tumor is partially removed, you will be so informed. Usually the first operation reduces the size of the tumor sufficiently so that it has a chance to separate away from the vital brain centers. It can, therefore, be successfully removed at a later date. In most cases we wait four to six months and then electively operate again for tumor removal.

In other cases, a course of continued observation is recommended. In this instance the tumor will be evaluated from time to time for possible regrowth and accordingly a decision made regarding its removal.

## HEARING IMPAIRMENT FOLLOWING SURGERY

Following acoustic tumor surgery the patient is usually deaf in the operated ear. When the hearing has deteriorated prior to surgery the patient already has become aware of problems: location of the direction of sound, hearing a person on the deaf side and, the major problem, understanding speech in difficult situations.

The patient must learn to watch a speaker carefully in difficult listening situations, using his eyes to help the brain understand words which may sound very much the same, but appear different on the lips (example: pope, coke, soap, dope, cope). Considerable help also may be obtained with a CROS aid.

The CROS aid (contralateral routing of sound) is an instrument that receives sound on the deaf side, amplifies it, then routes it to the good hearing ear. A small aid is worn on each ear. Although not everyone will find this type of amplification system helpful, with sufficient need, and motivation, the patient usually will realize improved hearing performance with a CROS aid.

## CONCLUDING REMARKS

The earlier acoustic tumors are diagnosed and removed, the less likely the possibility of serious complications.

Many patients have unilateral hearing loss, head noise, and balance difficulties. Rarely are these symptoms due to an acoustic tumor. Unfortunately, a very careful check of all patients with these symptoms does not always result in an early diagnosis of acoustic tumors. In some cases, the tumor becomes relatively large before a definite diagnosis can be established. The problem must be faced as it exists at the time of diagnosis and acceptance made of whatever risks are necessary to remove these tumors. The risks of surgery are less than the risk of leaving the tumor untreated.

The statements made in this booklet are based on our personal experiences in managing a large series of acoustic tumor cases.

If you have any questions about yourself and a possible acoustic tumor, please discuss them with your otologist.

Feel free to consult a second otologist or neurotologist regarding your situation. Your medical records can be sent to any consultant you desire.