

ACOUSTIC NEUROMA RISKS OF TREATMENT

by: Gil Lederman, M.D.

Surgery has been used since 1895 for treatment of a benign brain tumor called acoustic neuroma. This is a tumor that is nearly always benign arising from a delicate little nerve that runs to the ear from the brain stem. The nerve's position and function make symptoms like hearing loss, imbalance and ringing especially frequent. Surgery has such a long track record that its risks and benefits are so well known.

Most patients undergoing surgery become deaf in the treated ear and many have facial paralysis. Many have other complications including spinal fluid leak, bleeding in the brain and other neurologic adverse events.

Competing treatment is radiosurgery - where beams of pinpoint radiation converge on the tumor. Usually, the tumors stop growing and then slowly shrink with time. Some surgeons like to remind acoustic neuroma patients that there will be a shadow remaining on MRI scans after successful radiosurgery. Often not spoken is the fact that this dormant or receding shadow is usually of no consequence and allows the patient to live quite normally and quite fully compared to surgery with after effects.

Some suggest possibility of cancers induced by radiosurgery although there have been no definitive reports after 150,000 patients with a variety of diseases - most with benign conditions - having been treated world-wide. Rumors of a few cases persist, yet in numbers to be considered, nearly zero. Some researchers in the field believe that eventually about 0.1% may develop a malignancy in the treated field although even this number hasn't been manifested.

A seldom-discussed point is the mortality or death rate. Major centers report about one-half to 1% of acoustic neuroma patients undergoing surgery succumb to the effects of surgery. This number seems small and distant - however, at times it is quite palpable and painful.

This week a colleague came to me to describe a 42 year old Massachusetts Institute of Technology trained Ph.D. married father of three who traveled to a major American institution on the West Coast for acoustic neuroma surgery.

The man had neurofibromatosis II, a disease that had affected both nerves. His prior surgery had apparently left him deaf in one ear and the progressive opposite tumor left him nearly deaf in the second ear. Yet, he was very functional and worked at a high tech firm in New Jersey. Now several weeks after the Bas Mitzvah (a religious confirmation) of his child he returned to the scene of the prior surgery for a second acoustic neuroma resection. The man seemed to be active and fully involved at this happy event. By report, the patient had surgery and shortly thereafter began bleeding in the brain. He lost consciousness and became comatose dying about five days later.

The pain obviously is great even to an acquaintance who knew this man not closely since he had recently moved to the man's neighborhood. The patient having lost nearly all his hearing had difficulty acquiring new friends.

Several years ago, another man called me up at home having heard about fractionated radiosurgery and the results. He said he was very intrigued but as the surgical resection was scheduled for the next day, he felt embarrassed to cancel the operation. He related that he had established a relationship with the surgeon and "couldn't let the surgeon down."

About ten days later I found his name and phone number on my dresser and decided to call back to see how the surgery had gone. A woman answered the phone at home and identified herself as the patient's wife. When asked about the outcome she replied that "he had died on the operating table."

These kinds of events to me drive home the revolution that is going on in the treatment of acoustic neuromas and indeed many brain tumors. Many with brain and indeed, tumors of other parts of the body that I see choose non-invasive approaches over older operations. One patient recently reminded me how he, about thirteen years ago, had undergone an open removal of his gallbladder when a neighbor shortly thereafter had a laparoscopic cholecystectomy - having the gallbladder removed through small incisions with high tech approach.

After convalescing for months he compared himself to his neighbor who went back to work the next day. Only then did he decide to approach his newly diagnosed brain tumor in a less invasive fashion than historically one might have predicted.

What is the basis for this confidence in non-invasive treatment of acoustic neuromas? Our group has now treated 177 people with acoustic neuromas. We have the largest series of fractionated radiosurgery worldwide and indeed the longest group continually treated at the same dose of radiation.

While many other centers are lowering their dose in an attempt to match our results, it is doubtful based upon current information they will get to that point. In the ultimate form of flattery, a major researcher using gamma knife is switching over to a similar method of fractionation that we pioneered.

We have treated both small (less than 3cm) as well as larger than 3cm acoustic neuromas using fractionated or divided radiation dose. Small tumors have been treated using 500 rad daily for four days while larger tumors received a 400 rad dose over five treatment days. Rad is a dose of radiation absorbed.

Specially designed techniques at our institution are made to minimize the dose to brain stem. This fractionation schema from a biological point is quite low especially compared to single shot radiosurgery (for example Gamma knife style) which uses 1200 to 2000 rad - more commonly lower doses in this era.

Other centers are using a protracted fractionation scheme over about six weeks consisting of 5400 rad.

We see no reason for the extensive period or the higher dose of radiation exposure.

At this time no patient has required surgery or radiosurgery for failure. One patient had a transient facial weakness, which resolved. Several patients have improved facial function, having come to us with weakness prior to radiosurgery and regained strength after fractionated treatment.

Compared to surgery where about 85% of the patients are deaf after treatment, in our hands 85% have maintained or actually improved hearing. We have a documented improved hearing rate of 15%.

There are many reasons for us to be optimistic about treatment of patients with acoustic neuromas. Patients are followed diligently with hearing tests and gadolinium enhanced MRI's. Data managers as well as physicians track the outcome of patients and compare results to other major centers.

Our data is presented at national and international meetings and as well published, most recently in letterform in the April 8, 1999 New England Journal of Medicine. There we compared our outcome to the Gamma knife experience where 31% of patients were unable to work after treatment. Nearly 20% of their patients had combined surgery and Gamma knife radiation as a combined initial treatment strategy compared to our approach avoiding invasive surgical resection in 100% of patients. We mean the avoidance of surgery both before radiosurgery as well as after. No patient has received invasive surgery for resection of the acoustic neuroma at any time.

Also, because there are no pins in the head, no patient receives medication, sedation or hospitalization for this fractionated out patient therapy. Each of the four or five treatments takes about 20 minutes and patients carry on their normal activities throughout this treatment course.

There can be fluctuation in symptoms, which are well known to patients with acoustic neuromas. Many report alteration in the level of hearing, tinnitus, balance, aches and pains. These symptoms, in general, subside after treatment. Most patients - about 75% - tell us their balance is subjectively better and many report similarly on other symptoms.

Fortunately for patients newly diagnosed with acoustic neuroma there is much work to evaluate. Options that just a decade ago was totally unknown today seem most appealing. We believe our strategy will be one that will be the standard of care in the next century based upon work and diligent follow-up of these fractional radiosurgery treated patients by our group. Other facilities worldwide are following our approach.

What makes our experience so remarkable? Fractionation allows normal healthy tissues like the brain stem, fifth or trigeminal in the seventh or facial nerve to repair the radiation effects. Single shot radiosurgery, which administers the entire dose in one maximal impact, doesn't allow for radiation repair.

Fractionation has been well known throughout this century and is the reason that radiation elsewhere in the body, for example, tumors of the breast, lung, prostate and other sites receive divided dose treatment rather than the single knock out blow. The rationale is simply fractionation allows for normal tissue repair. The other pillar in our program is the low dose and the experience with great number of patients over a relatively long period. Technical expertise is crucial, as we have performed more than 15,000 radiosurgery.

Postscript: The surgeon responsible for the death of the 42 year old M.I.T. graduate just told another prospective acoustic neuroma patient - as related by the patient that the death did occur, but was due to the patient being blind and comatose at the time of surgery. Remarkable, since those who saw this man a few days before at his synagogue noted he was neither blind nor comatose. The most severe complication - death - at acoustic neuroma surgery and the surgeons' failure to recognize, minimize and inform subsequent patients, will ultimately condemn acoustic neuroma surgery to the footnotes of medical history. Surgery has had its day.

Post-post-script: Currently our physicians have treated 500 acoustic neuromas. Our success rate - meaning avoidance of surgical resection for tumor growth is 99%. Furthermore, our hearing preservation rates are 80% with 20% having better hearing and 20% less good hearing. The remainder have stable hearing. Our physicians are happy to speak with each person inquiring. Please contact us at 212-CHOICES or 212-995-6700. E-mail questions to GIL.LEDERMAN@RSNY.org.