

## Published Findings

*"The growing body of recent literature suggests that low rates of complications of Gamma Knife radiosurgery, coupled with high success rates and patient satisfaction, allow it to be increasingly used as primary intervention for trigeminal neuralgia for appropriate patients."*

Azar M, Yahyavi ST, Bitaraf MA, Gazik FK, Allahverdi M, Shahbazi S, et al: Gamma Knife radiosurgery in patients with trigeminal neuralgia: quality of life, outcomes, and complications. Department of Neurosurgery, Iran University of Medical Science, Iran. Clin Neuro Neurosurg 111:174-178, 2009

*"Trigeminal neuralgia patients benefit from Gamma Knife radiosurgery in terms of initial pain relief, reported zero rate of operative mortality, a low rate of major complication risk, and only minor complications."*

*"Gamma knife surgery has a reported zero rate of operative mortality and a reported zero rate of disabling neurologic morbidity such as stroke when compared to the surgical techniques, particularly microvascular decompression."*

Lin JNW, Ayiku L: the clinical efficacy and safety of stereotactic radiosurgery (Gamma Knife) in the treatment of trigeminal neuralgia. University of Sheffield; Review Body for Interventional Procedures.

*"In a report of 220 trigeminal neuralgia patients treated with Gamma Knife radiosurgery, most patients responded to radiosurgery within six months (median, two months). Because radiosurgery is the least invasive procedure for trigeminal neuralgia, it is a good treatment for patients with co-morbidities, high-risk medical illness, or pain refractory to prior surgical procedures."*

**Trigeminal Neuralgia Treatment. 2001-2011. Department of Neurological Surgery, Center for Image-Guided Neurosurgery, University of Pittsburgh, Pa.**

## Who Determines If Gamma Knife Radiosurgery Is Appropriate?

Any doctor or dentist who sees patients with facial, gum or jaw pain should be alert to the possibility that the condition is trigeminal neuralgia. Patients should be referred to a neurosurgeon who has experience treating trigeminal neuralgia.

## San Diego Gamma Knife Center

San Diego Gamma Knife Center began as a Center of Excellence on the campus of Scripps Memorial Hospital La Jolla in 1994. We are a leading radiosurgery resource for neurosurgeons, radiation oncologists and neurotologists from Southern California and Nevada and the only Gamma Knife radiosurgery facility in San Diego County.

The Center has treated more than 4,000 patients with various brain disorders and continues to advance its technology with the addition of the Perfexion model Gamma Knife.



## San Diego Gamma Knife Center

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**Trigeminal Neuralgia**  
(Tic Douloureux)

## Trigeminal Neuralgia (Tic Douloureux)

Trigeminal neuralgia (TN) is an extremely painful condition that causes brief, electrical shock-like jolts of pain in the face. Trigeminal neuralgia is also known as Tic Douloureux (tic) because of the facial twitching that may accompany the shocks of pain. This pain is almost always one-sided and occurs in the cheek, jaw, or less often, the forehead. There often is a trigger point. For example, touching the upper lip, nose, or gums can cause a brief jolt of extreme pain.

Individuals may have weeks or months of pain-free remission only to have the pain return. Another feature of this disorder is its response to anti-seizure medications such as Tegretol (carbamazepine) and Neurontin (gabapentin).

In most patients, trigeminal neuralgia is caused by compression of the trigeminal nerve as it exits the brainstem. The trigeminal nerve is the nerve of facial sensation. Compression of this nerve causes the electrical shock-like pain.

A rare cause of TN is a compression of the nerve by a benign tumor. Another unusual cause of TN is multiple sclerosis.



Most TN surgical treatments are outpatient procedures and have so few side effects that they may be used instead of treatment by medications, and not just after the failure of medication management. High doses of the medications commonly used for treating TN can cause difficulty with memory, balance, walking, concentration and thinking. Effective surgical treatment avoids these continuing side effects and the costs of long-term medication use. Unfortunately, no surgical treatment can permanently cure TN, but patients can obtain significant relief and become pain free most of the time.

About one-half of patients report some minor tingling in the face after treatment. This tingling usually dissipates over time. Significant and continuing numbness in the face is extremely rare. San Diego Gamma Knife Center has treated over 800 patients with TN, some a second time and a few patients a third time after years of follow up.

We are so positive about the results of Gamma Knife radiosurgery that we have successfully treated the mother of our physicist, one of our radiation oncologists, and the sister-in-law of one of our neurosurgeons!



### Treatment Options

It is important to make an accurate diagnosis of TN to differentiate it from other painful conditions. The reason is that treatments available for TN often fail to relieve other painful conditions of the face such as post herpetic neuralgia, trigeminal neuropathy and atypical facial pain. Outpatient surgical treatments for TN include radiofrequency rhizotomy, glycerol injection, balloon compression, and Gamma Knife radiosurgery. Microvascular decompression, an open operation to decompress the trigeminal nerve, is also effective. This operation involves a general anesthetic, several days stay in the hospital, and of course, the potential complications of brain surgery.

### Gamma Knife Radiosurgery

Gamma Knife radiosurgery is a treatment with little or no discomfort that is delivered in a single session on an outpatient basis. It is the least invasive of all outpatient procedures. Radiosurgery is an alternative to high dose medication management, and certainly indicated when medicines fail to relieve pain. With this technique, highly-focused gamma rays (x-rays) are used to treat the trigeminal nerve. The treatment itself is painless and the whole process occurs in a few hours with patients discharged to home and a return to normal activities. The TN pain decreases over several weeks and patients may reduce or stop their medications. In general, 60% of our patients become pain free, and 35% become pain free while taking some medications.

### Gamma Knife Radiosurgery Benefits

- Long term pain control
- Rapid return to normal activities
- Can be used when other methods have failed to control pain
- No incisions or general anesthesia
- Delivers significantly lower dose of radiation to surrounding healthy tissue than CyberKnife, linear accelerator, or fractionated radiation therapy
- Utilizes stereotactic frame technology that defines the standard for radiosurgery accuracy (especially vital for small targets like the trigeminal nerve)
- Imaging, planning and treatment performed on the same day as an outpatient procedure
- No mortality