



American  
Association of  
Neurological  
Surgeons

# TRIGEMINAL NEURALGIA

## PATIENT INFORMATION

This resource, developed by neurosurgeons, provides patients and their families trustworthy information on neurosurgical conditions and treatments.

For more patient resources from the American Association of Neurological Surgeons (AANS), visit [www.aans.org/Patients](http://www.aans.org/Patients).

**Trigeminal neuralgia**, also known as tic douloureux, sometimes is described as the most excruciating pain known to humanity. The pain typically involves the lower face and jaw, although sometimes it affects the area around the nose and above the eye. This intense, stabbing, electric shock-like pain is caused by irritation of the **trigeminal nerve**, which sends branches to the forehead, cheek and lower jaw. It usually is limited to one side of the face.

Although trigeminal neuralgia cannot always be cured, there are treatments available to alleviate the debilitating pain. Normally, **anticonvulsive medications** are the first treatment choice. Surgery can be an effective option for those who become unresponsive to medications or for those who suffer serious side effects from the medications.

## The Trigeminal Nerve

The trigeminal nerve is the fifth of 12 pairs of cranial nerves in the head. It is the nerve responsible for providing sensation to the face. One trigeminal nerve runs to the right side of the head, while the other runs to the left. Each of these nerves has **three distinct branches**. ("Trigeminal" derives from the Latin word "tria," which means three, and "geminus," which means twin.) After the trigeminal nerve leaves the brain and travels inside the skull, it divides into three smaller branches, controlling sensations throughout the face:

- The first branch controls sensation in a person's eye, upper eyelid and forehead.
- The second branch controls sensation in the lower eyelid, cheek, nostril, upper lip and upper gum.
- The third branch controls sensations in the jaw, lower lip, lower gum and some of the muscles used for chewing.

## Prevalence and Incidence

It is reported that 150,000 people are diagnosed with trigeminal neuralgia every year. While the disorder can occur at any age, it is most common in people over the age of 50. The National Institute of Neurological Disorders and Stroke (NINDS) notes that trigeminal neuralgia is more common in women than in men. Additionally, there is evidence that the disorder runs in families, likely as a result of an inherited blood vessel formation. **Hypertension** and **multiple sclerosis** (MS) also are risk factors.

## Causes

The pain associated with trigeminal neuralgia represents an irritation of the nerve. The cause of the pain usually is due to contact between a healthy **artery** or **vein** and the **trigeminal nerve** at the base of the brain. This places pressure on the nerve as it enters the brain and causes the nerve to misfire.

Other causes of trigeminal neuralgia include pressure of a **tumor** on the nerve or MS, which damages the **myelin sheaths**. Development of trigeminal neuralgia in a young adult suggests the possibility of MS.

## Symptoms

Most patients report that their pain begins spontaneously and seemingly out of nowhere. Other patients say their pain follows a car accident, a blow to the face or **dental surgery**. Most physicians and dentists do not believe that dental work can cause trigeminal neuralgia. In these cases, it is more likely that the disorder was already developing, and the dental work caused the initial symptoms to be triggered coincidentally.

Pain often is first experienced along the upper or lower jaw, so many patients assume they have a **dental abscess**. Some patients see their dentists and actually have a **root canal** performed, which inevitably brings no relief. When the pain persists, patients realize the problem is not dental-related.

The pain of trigeminal neuralgia is defined as either Type I (sometimes also referred to as "classic") or **Type II** (may also be called "**atypical**"). With classic pain, there are definite periods of **remission**. The pain is intensely sharp, throbbing and shock-like and usually triggered by touching an area of the skin or by specific activities. **Type II** pain often is present as a constant, burning sensation affecting a more widespread area of the face. With atypical trigeminal neuralgia, there may not be a remission period, and symptoms are usually more difficult to treat.

Trigeminal neuralgia tends to run in cycles. Patients often suffer long stretches of frequent attacks followed by weeks, months or even years of little or no pain. The usual pattern, however, is for the attacks to intensify over time with shorter pain-free periods. Some patients suffer less than one attack a day, while others experience a dozen or more every hour. The pain typically begins with a sensation of electrical shocks that culminates in an excruciating stabbing pain within less than 20 seconds. The pain often leaves patients with uncontrollable **facial twitching**, which is why the disorder is also known as tic douloureux.

Attacks of trigeminal neuralgia may be triggered by the following:

- Touching the skin lightly
- Washing
- Shaving
- Brushing teeth
- Blowing the nose
- Drinking hot or cold beverages
- Encountering a light breeze
- Applying makeup
- Smiling

- Talking

The symptoms of several pain disorders are similar to those of trigeminal neuralgia. **Temporal tendinitis** involves cheek pain and tooth sensitivity, as well as headaches and neck and shoulder pain. This condition is called a "migraine mimic" because its symptoms are similar to those of a **migraine**. Ernest syndrome is an injury of the **stylomandibular ligament**, which connects the base of the skull with the lower jaw, producing pain in areas of the face, head and neck. **Occipital neuralgia** involves pain in the front and back of the head that sometimes extends into the facial region.

## Diagnosis

**Magnetic resonance imaging (MRI)** can detect if a tumor or MS is irritating the trigeminal nerve. However, unless a tumor or MS is the cause, imaging of the brain will seldom reveal the precise reason why the nerve is being irritated. The vessel next to the nerve root is difficult to see even on a high-quality MRI. Tests can help rule out other causes of facial disorders. Trigeminal neuralgia usually is diagnosed based on the description of the symptoms provided by the patient.

## Treatment

There are several effective ways to alleviate the pain, including a variety of medications.

- **Carbamazepine**, an anticonvulsant drug, is the most common medication that doctors use to treat trigeminal neuralgia. In the early stages of the disease, carbamazepine controls pain for most people. When a patient shows no relief from this medication, a physician has cause to doubt whether trigeminal neuralgia is present. However, the effectiveness of carbamazepine decreases over time. Possible side effects include **dizziness, double vision, drowsiness** and **nausea**.
- **Baclofen** is a **muscle relaxant**. Its effectiveness may increase when it is used with either carbamazepine or phenytoin. Possible side effects include **confusion, depression** and drowsiness.
- **Phenytoin**, an anticonvulsant medication, was the first medication used to treat trigeminal neuralgia. Possible side effects include gum overgrowth, balance disturbances and drowsiness.
- **Oxcarbazepine**, a newer medication, has been used more recently as the first line of treatment. It is structurally related to carbamazepine and may be preferred because it generally has fewer side effects. Possible side effects include dizziness and double vision.

Other medications include **gabapentin, clonazepam, sodium valproate, lamotrigine** and **topiramate**.

There are drawbacks to these medications other than side effects. Some patients may need relatively high doses to alleviate the pain, and the side effects can become more pronounced at higher doses. Anticonvulsant drugs may lose their effectiveness over time. Some patients may need a higher dose to reduce the pain or a second anticonvulsant, which can lead to adverse drug reactions. Many of these drugs can have a toxic effect on some patients, particularly people with a history of **bone marrow suppression** and **kidney** and **liver toxicity**. These patients must have their blood monitored to ensure their safety.

## Non-medical & Surgical Treatments

If medications have proven ineffective in treating trigeminal neuralgia, there are several surgical procedures that may help control the pain. Surgical treatment is divided into two categories: 1) open cranial surgery or 2) lesioning procedures. In general, open surgery is performed for patients found to have pressure on the trigeminal nerve from a nearby blood vessel, which can be diagnosed with imaging of the brain, such as a special MRI. This surgery is thought to take away the underlying problem causing the trigeminal neuralgia, and is thus often the treatment of choice for most patients. In contrast, lesioning procedures include interventions that injure the trigeminal nerve on purpose, in order to prevent the nerve from delivering pain to the face. The effects of lesioning are often short-lived, lasting months to years, and results in numbness to the face. Lesioning procedures are often considered for the following patients: those who have recurrent pain after open surgery, those without evidence of a blood vessel pushing on the nerve, and those are poor surgical candidates.

### Open Surgery:

**Microvascular decompression** involves **microsurgical** exposure of the trigeminal nerve root, identification of a blood vessel that may be compressing the nerve and gentle movement of the blood vessel away from the point of compression. Decompression may reduce sensitivity and allow the trigeminal nerve to recover and return to a more normal, pain-free condition. While this generally is the most effective surgery, it also is the most invasive, because it requires opening the skull through a **craniotomy**. There is a small risk of **decreased hearing**, facial weakness, facial numbness, double vision, **stroke** or death. The risk of facial numbness, however, is less likely with procedures that involve damaging the trigeminal nerve.

### Lesioning Procedures:

**Percutaneous stereotactic rhizotomy** treats trigeminal neuralgia through the use of **electrocoagulation** (heat). It can relieve nerve pain by destroying the part of the nerve that causes pain and suppressing the pain signal to the brain. The surgeon passes a hollow needle through the cheek into the trigeminal nerve. A heating current, which is passed through an **electrode**, destroys some of the nerve fibers.

**Percutaneous glycerol rhizotomy** utilizes **glycerol** injected through a needle into the area where the nerve divides into three main branches. The goal is to damage the nerve selectively in order to interfere with the transmission of the pain signals to the brain.

**Percutaneous balloon compression** utilizes a needle that is passed through the cheek to the trigeminal nerve. The neurosurgeon places a balloon in the trigeminal nerve through a **catheter**. The balloon is inflated where fibers produce pain. The balloon compresses the nerve, injuring the pain-causing fibers. After several minutes, the balloon and catheter are removed.

**Stereotactic radiosurgery** (through such procedures as **Gamma Knife, Cyberknife, LINAC**) delivers a single highly concentrated dose of **ionizing radiation** to a small, precise target at the trigeminal nerve root. This treatment is noninvasive, and avoids many of the risks and complications of open surgery and other treatments. Over a period of time and as a result of radiation exposure, the slow formation of a lesion in the nerve interrupts transmission of pain signals to the brain.

Overall, the benefits of surgery or lesioning techniques should always be weighed carefully against its risks. Although a large percentage of trigeminal neuralgia patients report pain relief after procedures, there is no guarantee that they will help every individual.

### Deafferentation Pain:

Sometimes, lesioning procedures can result in too much injury to the trigeminal nerve, such that the nerve does not recover and the face becomes permanently numb with a different, more difficult to treat type of pain, called deafferentation pain. In these situations, another surgical procedure can be done, that includes placement of one or more electrodes underneath the skull over the covering of the brain, or sometimes directly on the brain, to deliver electrical stimulation to the part of the brain responsible for sensation of the face. This procedure is called motor cortex stimulation; it can be very effective in some patients, and less so in other patients. Since this condition is so rare, motor cortex stimulation is not FDA approved, thus the procedure is considered off-label.

### How to Prepare for a Neurosurgical Appointment:

1) Write down your symptoms. This should include: What your pain feels like (for example, is it sharp, shooting, aching, burning, or other), where exactly is your pain is located (lower jaw, cheek, eye/forehead), is it accompanied by other symptoms (headache, numbness, facial spasms), duration of pain (weeks, months, years), pain-free intervals (longest period of time without pain or in between episodes), severity of pain (0=no pain, 10=worst pain)

-Note any triggers of pain (eg brushing teeth, touching face, cold air)

-Make a list of medications (prior medications, did they work, were there side effects), current medications (duration and dose)

-Write down questions in advance

## Additional Information

The following websites offers additional helpful information on trigeminal neuralgia and its causes, treatment options, support and more (*Note: These sites are not under the auspice of AANS, and their listing here should not be seen as an endorsement of the sites or their content*).

- TNA The Facial Pain Association
- The Facial Pain Research Association

*The AANS does not endorse any treatments, procedures, products or physicians referenced in these patient fact sheets. This information is provided as an educational service and is not intended to serve as medical advice. Anyone seeking specific neurosurgical advice or assistance should consult his or her neurosurgeon, or locate one in your area through the AANS' Find a Board-certified Neurosurgeon online tool.*