

# Columbia Neurosurgery's Reflections on the Facial Pain Patient Journey and Treatment Options



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## When Lightning Strikes

### Most patients remember the day their pain began

– **it's that bad.** Many patients report that “it's the worst pain you've ever imagined.” That statement is sobering and drives our intentions to help as many patients with facial pain as possible. At Columbia University's Center for Brainstem and Cranial Nerve Disorders, we have joined experts in neurosurgery, neurology, radiology, anesthesia, oromaxillofacial surgery, pain management, and a variety of other distinguished researchers to develop a true center of excellence for facial pain sufferers.

**Our research begins with our patients.** We actively follow over 1,500 patients undergoing one or more surgical treatments for trigeminal neuralgia (TN). We also have an active preclinical (i.e., research conducted typically on laboratory animals) research program funded through the National Institutes of Health. Currently, we are investigating areas ranging from dysfunction of specific ion channels to abnormal electrical currents within cells of small animals and humans with trigeminal neuralgia. This work is fundamentally directed toward discovering new drugs for various facial pain syndromes. In the clinic, we are working to better understand which patients with trigeminal neuralgia can benefit from surgical intervention. We know that patients with classical

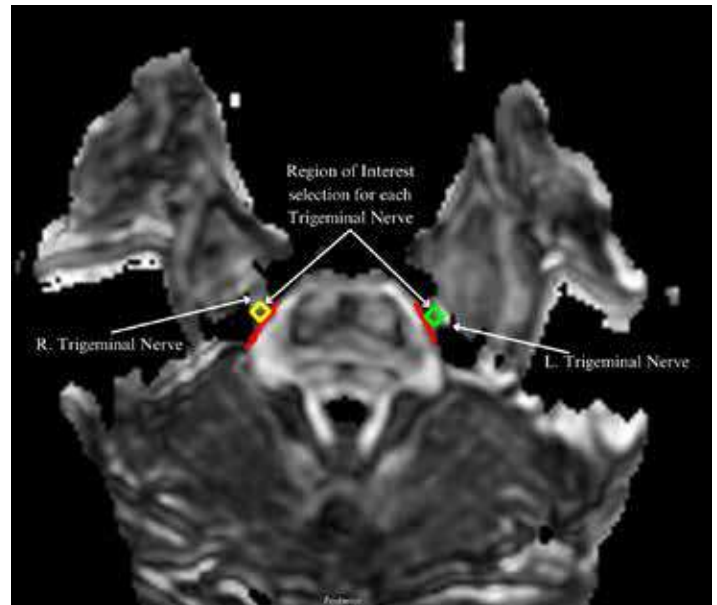
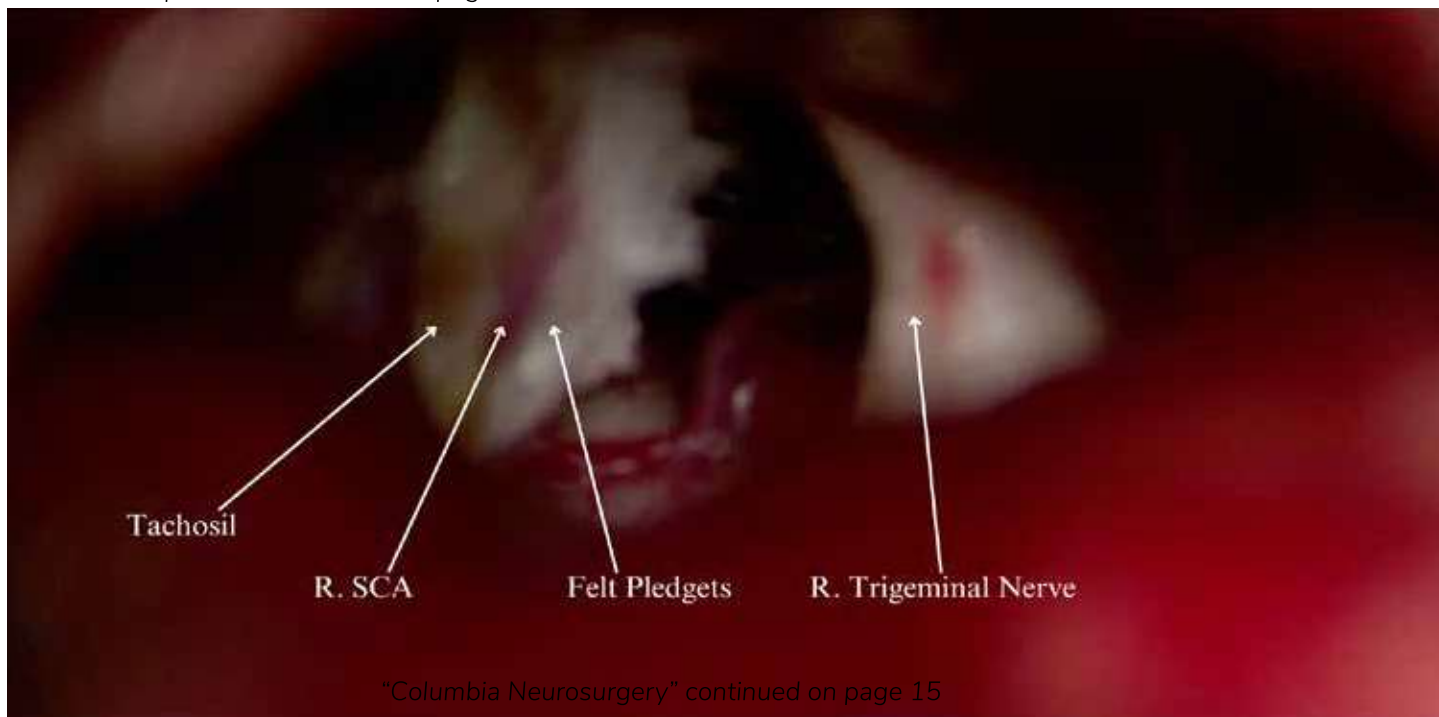


Figure 1

trigeminal neuralgia (CTN) fare better with most of the available surgical treatments than those with other types of TN. Information gleaned from a detailed history (i.e., a conversation between patient and physician) allows the physician to diagnose classical trigeminal neuralgia. Patients with CTN describe sharp, intermittent facial pain usually lasting seconds or less and never longer than a minute. This pain does not encompass the posterior third of the scalp or the ear. Triggers include innocuous stimuli such as light touch, wind, or chewing. Attacks may occur numerous times daily with periods (i.e., days to months) of remission. Sensory deficit (i.e., orofacial numbness) is not a related symptom.

**Most patients with CTN will wince** (i.e., the so-called “tic doloieux” or painful spasm) with pain. All patients with CTN will benefit from a neurosurgical consultation. Approximately 85% of patients with CTN will have evidence of vascular compression of the trigeminal nerve by high-resolution magnetic resonance imaging (MRI) T2 (transverse relaxation time) images. In our Center, we perform high-resolution imaging (Fig. 1) on a higher MRI magnet

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Figure 2

(i.e., 3T or 3 Tesla, which is a unit of measurement quantifying the strength of the magnet) than found in community hospital MRI machines. Perhaps more important than magnet strength is the “recipe” used to visualize the trigeminal nerve and adjacent vasculature. Too often, we review scans that have not been performed so that the clinician can determine vascular compression of the trigeminal nerve.

**Why is this important?** If a scan is interpreted as negative for vascular compression by the radiologist, the treating neurologist is led to believe that a referral to neurosurgery is unwarranted. We also know that the degree of vascular compression of the trigeminal nerve is essential. Patients with more compression of the nerve do better with surgery. In some patients (as many as 15%) with classical trigeminal neuralgia, there is no neurovascular compression. These patients do poorly with microvascular decompression surgery (MVD). This is similar to someone with tooth pain but no structural problem of the tooth who undergoes a root canal. It doesn’t work and often worsens the pain. Those patients with CTN without evidence of neurovascular conflict, or an inability to tolerate a general anesthetic, are referred for ablative procedures to the trigeminal nerve.

#### **A patient’s response to the antiseizure drug**

carbamazepine or oxcarbazepine also provides helpful information for the clinician. Many patients report rapid facial pain relief within minutes of taking the first tablet or two. While we do not fully understand why the response to the drugs is a significant predictor of response to neurosurgical intervention, we do know that it is crucial. For the past ten years, we have been performing diffusor tensor imaging (DTI) (Fig. 2) on all patients with various types of TN. Until recently, however, we have struggled to understand the significance of the powerful MRI sequence. This year, we will publish our first analysis of TN patients who have undergone DTI, and we hope this tool will further our understanding of the condition. A few years ago, we developed a readily applicable, quantitative grading (or scoring) system to aid patients and referring clinicians in understanding if microvascular decompression is the optimal choice. For some patients, an ablative procedure (i.e., one that purposefully injures the trigeminal nerve) may be warranted and valuable. These procedures include injury (i.e., using blunt trauma, chemicals, or radiation) to the nerve. We also have some very good surgical treatments for patients with TN due to multiple sclerosis (5% of MS patients have TN).

## When It Is Not Classical TN

**Although many effective pharmacologic,** interventional, and surgical strategies are available to treat classic trigeminal neuralgia, many patients have facial pain that does not so readily respond to these treatments. Many types of facial pain syndromes are quite different from classical trigeminal neuralgia. Because of this, they have different treatments than trigeminal neuralgia.

**Some patients have constant facial pain.** These patients can have pain that is always present, perhaps burning or numbing in nature. Sometimes patients with classical trigeminal neuralgia develop a continuous burning pain after destructive procedures are used to treat the lancinating pain. In many cases, the lancinating pain disappears, but is unfortunately replaced by a different, constant pain syndrome. This type of pain is called trigeminal deafferentation pain. Some patients describe this pain as worse than the original trigeminal neuralgia lancinating pain, since the pain is relentless and never goes away.

**Some patients have facial pain that persists** after a zoster outbreak in the face. This pain is often associated with severe itching, numbness, and burning. Although the pain usually fluctuates in severity, it is almost always present to some degree. This type of pain is known as trigeminal postherpetic neuralgia.

**Some patients develop severe neuropathic facial pain** following injuries to the trigeminal nerve or one of its branches. These nerve injuries can occur with trauma to the face, surgery to the face, or dental procedures. The patients often describe numbness in part of the face following the procedure or injury. Patients often report burning pain that develops in the numb area several weeks after the injury. This pain syndrome is called trigeminal neuropathic pain (TNP).

**Patients with these constant facial pain** syndromes may benefit from some combination of anticonvulsants, antidepressants, baclofen, medical marijuana, and topical medications. Sometimes nerve blocks and Botox injections can be helpful. Patients

who do not obtain sufficient pain relief with these strategies are often referred to a neurosurgeon for more definitive management of their pain syndrome.

**It is essential to remember that the constant** neuropathic facial pain associated with these syndromes does not typically respond well to the traditional surgical treatment for classical trigeminal neuralgia. Microvascular decompression is usually ineffective and destructive procedures may make the pain worse. You and your physician must be aware of the different treatments available to treat these constant pain syndromes and avoid unhelpful surgical treatments that may worsen the pain.

**Neuromodulation, which is the application** of electricity or medication to the nervous system to alter its activity, may be an effective option for patients with these constant facial pain syndromes. Peripheral nerve stimulation is a type of neuromodulation where one or more electrodes are placed next to the nerve, innervating the painful area. Commonly, a needle is used to insert each wire into position with a local anesthetic, without requiring an incision or any surgical dissection. Once in place, the electrode administers a weak electrical current to the nerve to block the pain signals. When the electrode is activated, the patient may feel a tingling sensation, depending on the exact type of stimulation used. Sometimes the stimulation is not felt by the patient. The electrode is left in place for one week, during which time the patient determines whether the stimulation helps relieve the pain. At the end of the week, the electrode is removed. If the patient has sufficient pain relief, then the patient may undergo permanent implantation of one or more electrodes connected to an implantable battery pack that is also placed under the skin. This therapy, also called trigeminal branch stimulation, is typically used to treat pain within the supraorbital and infraorbital nerve distributions.

**Sometimes, electrical stimulation of nerves does** not provide sufficient pain relief for the patient. In these cases, the distribution of pain is not amenable to treatment with peripheral nerve stimulation,

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AP view - peripheral nerve stimulator

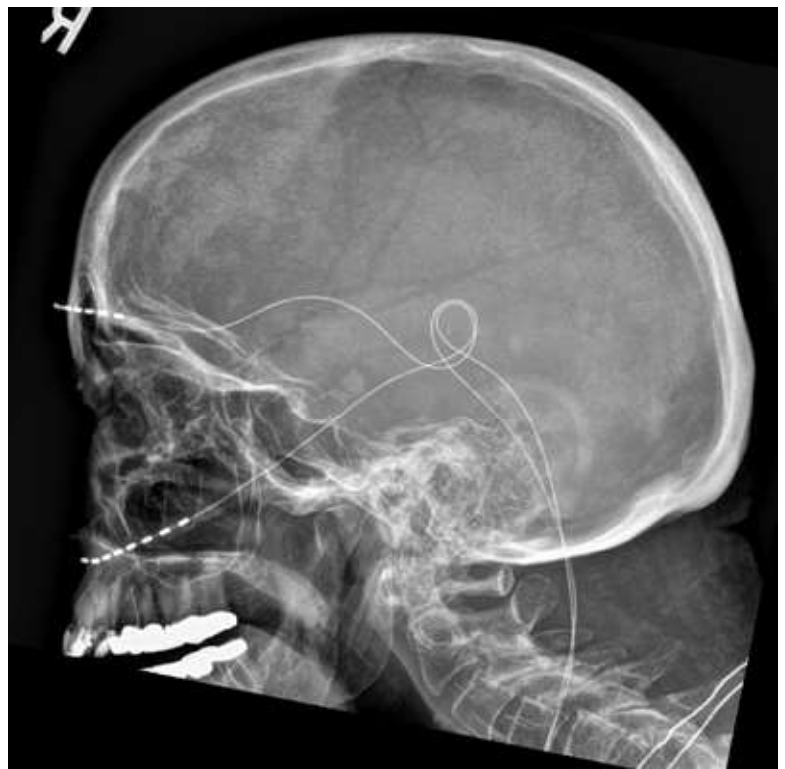


Figure 3: Lateral view - peripheral nerve stimulator

sometimes due to the pain being too deep or out of reach of the stimulation. In some cases, the pain is too extensive for the array of electrodes to treat. In these instances, patients may respond better to a type of neuromodulation that uses medication administered along the spinal cord. This treatment is called a spinal infusion pump.

**Once a patient and their physician decide to proceed** with a spinal infusion pump, the patient can undergo a trial to assess whether spinal medication is helpful before surgery to implant the pump system. The trial consists of a single injection of medication into the spine with a needle. The medication is usually a synthetic, non-opioid medication that can be highly effective in treating neuropathic facial pain. If the patient has significant pain relief with the trial

medication, then they may elect to undergo surgical implantation of a permanent spinal catheter and pump system. This implantable device consists of a catheter inserted into the spinal canal connected to a programmable reservoir that continually administers low doses of the medication directly into the spinal canal.

**Patients who have spent years on their facial pain journey** trying to find relief from their pain without success may eventually discover that spinal medication can be an effective treatment option for their facial pain, even when every other treatment has failed. ■

## There is Hope

**Even with the various surgical and medication** options currently available, for some people, the pain persists. Through research, we continue to expand our understanding of facial pain, hoping to develop more options to treat neuropathic facial pain. Whether you have classical trigeminal neuralgia, trigeminal neuropathic pain, post-herpetic neuralgia, or facial pain caused by an underlying condition such as MS – **there is hope.**