

A Review on Trigeminal Neuralgia

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Abstract

Trigeminal neuralgia (TN) otherwise called tic douloureux. It is a form of neuropathic pain. The trigeminal nerve carries sensation from face to brain. It is a long-term disorder that affects the trigeminal nerve. 1 in 8000 people per year suffers from trigeminal neuralgia. it is more common in women aged over 50. It is caused by the compression of the trigeminal nerve root. maxillary divisions are more commonly involved. TN of unknown etiology is considered as idiopathic. Diagnosis is more commonly based on the signs and symptoms. Symptoms range from mild to severe pain, often triggered by chewing, speaking or brushing of teeth. Pain areas are in the mouth and face. uncomfortable tingling and burning sensation. Treatment includes medication and surgery. The anticonvulsants are usually the initial treatment and are effective in about 90% of the patients. Side effects are frequently experienced that necessitate drug withdrawal in as many as 23% of patients.

Keywords: *trigeminal neuralgia, tic douloureux, trigeminal nerve, ISH diagnostic criteria , trigeminal nerve root.*

Introduction

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 is the fifth of 12 pairs of cranial nerves in the head. It is the nerve responsible for providing sensation to the face ^[1]. 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 because of an inherited blood vessel formation. Hypertension and multiple sclerosis (MS) also are risk factors ^[2].

Clinical Features

Trigeminal neuralgia symptoms may include one or more of these patterns:

- Episodes of severe, shooting or jabbing pain that may feel like an electric shock
- Spontaneous attacks of pain or attacks triggered by things such as touching the face, chewing, speaking or brushing teeth
- Bouts of pain lasting from a few seconds to several minutes
- Episodes of several attacks lasting days, weeks, months or longer — some people have periods when they experience no pain
- Constant aching, burning feeling that may occur before it evolves into the spasm-like pain of trigeminal neuralgia
- Pain in areas supplied by the trigeminal nerve, including the cheek, jaw, teeth, gums, lips, or less often the eye and forehead
- Pain affecting one side of the face at a time, though may rarely affect both sides of the face
- Pain focused in one spot or spread in a wider pattern
- Attacks that become more frequent and intense over time

The severity of the pain makes it difficult to wash the face, shave, and perform good oral hygiene. The pain has a significant impact on activities of daily living especially as people live in fear of when they are going to get their next attack of pain and how severe it will be. It can lead to severe depression and anxiety ^[3].

International headache society (IHS). classified trigeminal neuralgia into two types.

- 1 . classical / idiopathic / typical.
2. Symptomatic.

Classical trigeminal neuralgia is a unilateral disorder characterised by brief electric, shock like pains . they are abrupt in onset and termination and limited to the distribution of one or more divisions of the trigeminal nerve .In symptomatic trigeminal neuralgia pain is similar to classical type, but it is caused by a demonstrable structure lesion other than vascular compression .

Etiology

1. Compression of the trigeminal nerve root
2. Primary demyelination disorders
3. Infiltrative disorders of the trigeminal nerve root , ganglion and nerve.
4. Non - demyelinating lesions of the pons or medulla
5. Familial trigeminal neuralgia.

The most common cause of trigeminal neuralgia is a compressing loop of an artery (most commonly the superior cerebellar artery (SCA)) or vein pressing on the trigeminal nerve at the cerebellopontine angle , seen in ~ 95% of patients ^[4,5]. It has been shown that compression of the centrally myelinated, proximal or posterior segment of the cisternal portion of trigeminal nerve results in clinically significant neuralgia, not the more distal, peripherally myelinated nerve (oligodendrocytes vs Schwann cells). The reason for this is not well understood, however. There is associated demyelination of the compressed nerve in some cases.

Although rare, posterior fossa tumors can be another cause, most commonly vestibular schwannomas, meningiomas, arachnoid cysts, or epidermoid cysts . Multiple sclerosis may also cause trigeminal neuralgia and its incidence is much higher in multiple sclerosis than in the general population ^[5].

Diagnosis

The diagnosis of trigeminal neuralgia is mainly based on your description of the pain.

Type. Pain related to trigeminal neuralgia is sudden, shock-like and brief.

Location. The parts of your face that are affected by pain will tell your doctor if the trigeminal nerve is involved.

Triggers. Trigeminal neuralgia-related pain usually is brought on by light stimulation of your cheeks, such as from eating, talking or even encountering a cool breeze^[6].

Examination of the Fifth Cranial Nerve

. The evaluation of the fifth cranial nerve is conducted as part of the general neurological examination. The fifth cranial nerve is the largest of the nerves, and its functions are both sensory and motor. The corneal reflex is elicited with the fine tip of a cotton swab, touching but not dragging the wisp of cotton over the cornea ^[6,7].

Sensory Examination.

The sensory examination of the three divisions is conducted with light touch (cotton wool), pinprick, vibration, and hot/cold sensation, ending with deep pressure. In this fashion, all the modalities are sequentially evaluated^[7].

Diagnostic Imaging

Imaging studies in TN have included skull x-rays, computerized tomography, and now MR imaging. Standard MR imaging is ordered in these patients to evaluate other causes of the syndrome (vide infra). The sensitivity of MR imaging alone for determining the vessels or site of cross compression is poor.

Electrophysiological Tests

Electrophysiological investigations into the trigeminal nerve have yielded consistent results, but they have not been widely used. They are a good complement to a careful sensory examination. Indeed, there is close correlation between these electrophysiological investigations and the clinical examination, which can specify the type of sensory neuropathy^[5].

MRI

Vascular contact deforming the trigeminal nerve is seen in about 15% of cases. In such cases, it is important to mention if the contacting vessel is an artery or vein and if it is contacting the proximal or distal portion of the cisternal portion of the trigeminal nerve. A dedicated protocol including T2 or T1 volumetric acquisition techniques with thin slices in all three planes should be helpful. However, an evidence-based review did not find evidence to support or refute the usefulness of MRI for this purpose^[8].

Treatment

Trigeminal neuralgia treatment usually starts with medications, and some people don't need any additional treatment. However, over time, some people with the condition may stop responding to medications, or they may experience unpleasant side effects. For those people, injections or surgery provide other trigeminal neuralgia treatment options. Anticonvulsants. Doctors usually prescribe carbamazepine (Tegretol, Carbatrol, others) for trigeminal neuralgia, and it's been shown to be effective in treating the condition. Other anticonvulsant drugs that may be used to treat trigeminal neuralgia include oxcarbazepine lamotrigine and phenytoin. Other drugs, including clonazepam and gabapentin, also may be used. Antispasmodic agents. Muscle-relaxing agents such as baclofen (Gablofen, Lioresal) may be used alone or in combination with carbamazepine. Side effects may include confusion, nausea and drowsiness^[9, 10]. Botox injections. Small studies have shown that onabotulinumtoxinA (Botox) injections may reduce pain from trigeminal neuralgia in people who are no longer helped by medications. However, more research needs to be done before this treatment is widely used for this condition.

Surgery

Surgical options for trigeminal neuralgia include:

Microvascular decompression: This procedure involves relocating or removing blood vessels that are in contact with the trigeminal root to stop the nerve from malfunctioning. During microvascular decompression, the doctor makes an incision behind the ear on the side of pain. Then, through a small hole in skull, the surgeon moves any arteries that are in contact with the trigeminal nerve away from the nerve,

and places a soft cushion between the nerve and the arteries. Microvascular decompression can successfully eliminate or reduce pain most of the time, but pain can recur in some people. Microvascular decompression has some risks, including decreased hearing, facial weakness, facial numbness, a stroke or other complications. Most people who have this procedure have no facial numbness afterward ^[11]. Brain stereotactic radiosurgery (Gamma knife). In this procedure, a surgeon directs a focused dose of radiation to the root of trigeminal nerve. This procedure uses radiation to damage the trigeminal nerve and reduce or eliminate pain. Relief occurs gradually and may take up to a month. Brain stereotactic radiosurgery is successful in eliminating pain for most people. If pain recurs, the procedure can be repeated. Facial numbness can be a side effect ^[12]. Other procedures may be used to treat trigeminal neuralgia, such as a rhizotomy. In a rhizotomy, the surgeon destroys nerve fibers to reduce pain, and this causes some facial numbness. Types of rhizotomy include: Glycerol injection. During this procedure, the doctor inserts a needle through the patients' face and into an opening in the base of the skull. The doctor guides the needle into the trigeminal cistern, a small sac of spinal fluid that surrounds the trigeminal nerve ganglion — where the trigeminal nerve divides into three branches — and part of its root. Then, the doctor will inject a small amount of sterile glycerol, which damages the trigeminal nerve and blocks pain signals. This procedure often relieves pain. However, some people have a later recurrence of pain, and many experience facial numbness or tingling. Balloon compression. In balloon compression, the doctor inserts a hollow needle through the face and guides it to a part of the trigeminal nerve that goes through the base of your skull. Then, the doctor threads a thin, flexible tube (catheter) with a balloon on the end through the needle. The doctor inflates the balloon with enough pressure to damage the trigeminal nerve and block pain signals. Balloon compression successfully controls pain in most people, at least for a period. Most people undergoing this procedure experience at least some transient facial numbness ^[12, 13]. Radiofrequency thermal lesioning. This procedure selectively destroys nerve fibers associated with pain. While sedated, the surgeon inserts a hollow needle through your face and guides it to a part of the trigeminal nerve that goes through an opening at the base of the skull. Once the needle is positioned, the surgeon will briefly wake you from sedation. The surgeon inserts an electrode through the needle and sends a mild electrical current through the tip of the electrode. The patient will be asked to indicate when and where you feel tingling. When the neurosurgeon locates the part of the nerve involved in pain, the patient is returned to sedation. Then the electrode is heated until it damages the nerve fibers, creating an area of injury (lesion). Radiofrequency thermal lesioning usually results in some temporary facial numbness after the procedure. Pain may return after three to four years ^[14].

Conclusion

The peripheral pathogenic mechanism of trigeminal neuralgia is induced by progressive dystrophy in the peripheral branches of the trigeminal nerve which can be evoked by the compression syndrome ^[5]. A patient with suspected trigeminal neuralgia should be examined carefully by the specialists who have expertise in assessing and diagnosing possible pathological processes and be able to eliminate the contributing factors so the trigeminal neuralgia can be managed.

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