



## Trigeminal Neuralgia: an Endodontist's Diagnostic Dilemma

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## ABSTRACT

One of the most challenging aspects of endodontic practice is the diagnosis and treatment of orofacial pain. Misdiagnosis of orofacial pain is common. One of the condition that may mimic dental pain is Trigeminal neuralgia. It is a very peculiar disease. The pain, also known as "tic douloureux", is paroxysmic and very severe. It can be triggered by a light cutaneous stimulus on a very localized spot on the face. The aim of this article is to review the etiology, diagnosis and treatment of one condition that may mimic dental pain: trigeminal neuralgia.

**Keywords:** Trigeminal neuralgia (TN), Classical Trigeminal neuralgia (CTN), Symptomatic Trigeminal neuralgia (STN), multiple sclerosis (MS), magnetic resonance angiogram (MRA).

## 1. INTRODUCTION

One of the most challenging aspects of endodontic practice is the diagnosis and treatment of orofacial pain (Michael, 2004). An estimated 22% of the general population experiences orofacial pain in any given 6-month period (Lipton et al. 1993). Misdiagnosis of orofacial pain is common. The convergence of sensory neurons to higher centers makes localization and interpretation of pain symptoms difficult. Tooth pain is usually resolved with endodontic treatment. However in rare instances clinical response is not predictable and pain persists despite intervention. These cases challenge an endodontist's knowledge and skill in clinical diagnosis and treatment. The purpose of this article is to review the etiology, diagnosis and treatment of one condition that may mimic dental pain: trigeminal neuralgia.

The International Association for the Study of Pain (IASP) defines TN as sudden, usually unilateral, severe, brief, stabbing, recurrent episodes of pain in the distribution of one or more branches of the trigeminal nerve (Merskey, 1994). Trigeminal neuralgia is the most common form of facial pain in people older than 50 years of age. Various epidemiological studies have shown the annual incidence to be about 4–5 new patients per 100,000. The highest incidence occurs in the ages between 50 and 70 years; in 90% of the cases the symptoms begin after the age of 40 years. Trigeminal neuralgia is more prevalent in women than men with a ratio of 1.5:1 (James, 1995). The pathophysiology is unclear. Based on clinical observations, compression of the trigeminal nerve near the origin of the brain stem, the so-called root entry zone, by blood vessels or tumor, may cause trigeminal neuralgia.

The trigeminal nerve has three branches, (i) the Ophthalmic branch, which runs above the eye, forehead and front of the head, (ii) the Maxillary branch, which runs through the cheek, upper jaw, teeth and gum and side of the nose and (iii) the Mandibular branch, which runs through the lower jaw, teeth and gums. One or more branches can be involved in TN (<http://www.tna.org>).

## 2. SUBTYPES

In the latest classification of the International Headache Society, a distinction is made between Type 1-classical TN (also known as idiopathic or typical TN) and Type 2 - symptomatic TN (atypical TN): classical TN (CTN) includes all cases without an established etiology, i.e. idiopathic, as well as those with potential vascular compression of the fifth cranial nerve, whereas the diagnosis of symptomatic TN (STN) is made in cases secondary to tumour, MS, structural abnormalities of the skull base (The International Classification of Headache Disorders, 2nd edition).

## 3. CAUSES FOR TRIGEMINAL NEURALGIA

The exact cause of your TN may not be known. The following can cause the nerve to send pain messages to our brain:

- Pressure from blood vessels pressing on the trigeminal nerve this compression causes the wearing away of the myelin sheath (protective coating) around the nerve
- Pressure from a tumor or cyst
- Injury to the nerve from head trauma, surgery, or a stroke
- TN can occur in patients with multiple sclerosis (MS), which is a disease caused by the deterioration of myelin throughout the body

## 4. SIGNS AND SYMPTOMS OF TRIGEMINAL NEURALGIA

Trigeminal neuralgia is recognized by unilateral short-lived, strong, sharp, shooting pains in 1 or more branches of the fifth cranial nerve. The pain is sharp, shooting, lancinating, and "electric shock" type. Pain attacks that last from 1 second up to 2 minutes and it repeats every few minutes to hours. Pain is so severe that one cannot eat, drink, or speak. Spasms in facial muscles during pain

attack. The International Headache Society described the following criteria for essential trigeminal neuralgia (The international classification of headache disorders, 2nd edition.)

- A. Paroxysmal pain that lasts from a fraction of a second to 2 minutes, occurring in 1 or more branches of the trigeminal nerve, and fulfilling criteria B and C.
- B. The pain has at least one of the following characteristics:
1. Intense, sharp, superficial or stabbing.
  2. Precipitated from trigger areas or by trigger factors.
- C. The attacks are stereotypically described by the patient.
- D. There are no signs of neurological disorders.
- E. The attacks are not caused by other disorders.

#### 4.1. Trigger area

The Most TN pain attacks are brought on by touching a trigger area on the face:

- Eating or drinking
- Smiling, yawning, or talking
- Shaving or washing your face
- Putting on makeup or combing your hair
- Wind or temperature changes
- Noise or lights

(Table 1, Table 2, Table 3, Table 4)

**Table 1**

Pain Distribution in the Various Nerve Branches in Trigeminal Neuralgia according to Rozen (Rozen, 2004)

Trigeminal Nerve Branches	% of Pain Distribution
V1 -ophthalmic branch only	4%
V2 - maxillary branch only	17%
V3 - mandibular branch only	15%
V2 + V3	32%
V1 + V2	14%
V1 + V2 + V3	17%

**Table 2**

The International Headache Society have suggested their own diagnostic criteria for trigeminal neuralgia

Characteristic	Description
Character	Shooting, like an electric shock, stabbing, superficial
Seriousness	Moderate to very intense
Duration	Each pain attack lasts seconds but a number of different attacks can occur simultaneously after which there is a pain free interval
Periodicity	Periods of weeks to months without pain
Location	Distribution of T. neuralgia, mainly unilateral
Emanation	Within the area of the trigeminal nerve
Trigger factors	Light touching, such as when eating, talking or Washing
Alleviating factors	Frequent sleep, anti-epileptics
Accompanying characteristics	Trigger zones, weight loss, poor quality of life, depression.

**Table 3**

Differential diagnosis of odontogenic and neuropathic pain according to Okeson (Okeson, 2000)

Odontogenic pain	Neuropathic pain
Pain is dull ache or occasionally sharp.	Pain may be dull, sharp, shooting or burning.
Response to stimuli, such as hot, cold or percussion, is predictable and proportionate.	Response to hot, cold or percussion does not reliably relate to the pain and may be disproportionate.
Pain is usually inconsistent and tends to get better or worse over time.	Pain is persistent and remains unchanged for weeks or months.
Pain often disrupts sleep.	Pain rarely disrupts sleep.
There is often an identifiable source (i.e., caries, deep restoration, periodontal disease, fracture line).	There is no obvious source of local pathology.
Local anesthesia of the suspect tooth eliminates the pain.	Response to local anesthetic is ambiguous.
	Response to local anesthetic is ambiguous.
	Repeated dental therapies fail to resolve the pain.

**Table 4**

Differential diagnosis of odontogenic and neuropathic pain according to Marbach & Raphael (Marbach JJ, Raphael KG, 2000), Okeson (Okeson JP, 2000)

Trigeminal neuralgia	Atypical odontalgia
Pain is characterized as unilateral, paroxysmal and stabbing.	Pain is dull and continuous.
Trigger areas characterize pain.	Trigger areas occur less often.
More common after 40 years of age, peaking in the 50s and 60s.	More frequent in women in their mid-40s.
May occur in the absence of obvious trauma.	Usually precipitated by a traumatic event (root canal, extraction, etc.).

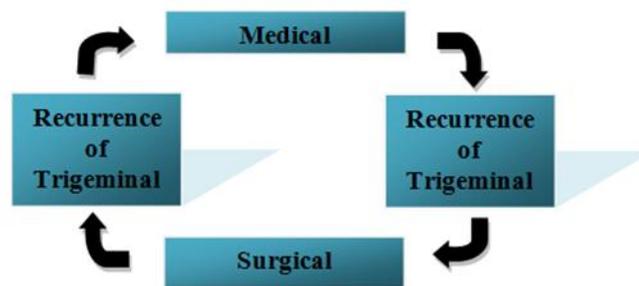
## 5. DIAGNOSIS OF TRIGEMINAL NEURALGIA

- CT scan: Computer tomography scan (CT scan) is an x-ray machine uses a computer to take images of the head.
- MRI: Images are taken of the head to examine the trigeminal nerve.
- MRA: Magnetic resonance angiogram (MRA) is a type of magnetic resonance imaging (MRI) scan that uses a magnetic field and pulses of radio wave energy to provide pictures of blood vessels inside the brain. Contrast-enhanced magnetic resonance angiography with gadolinium enhancement is an extremely sensitive and specific method for demonstrating compression in TN (James et al. 1995; Patel NK et al. 2003)

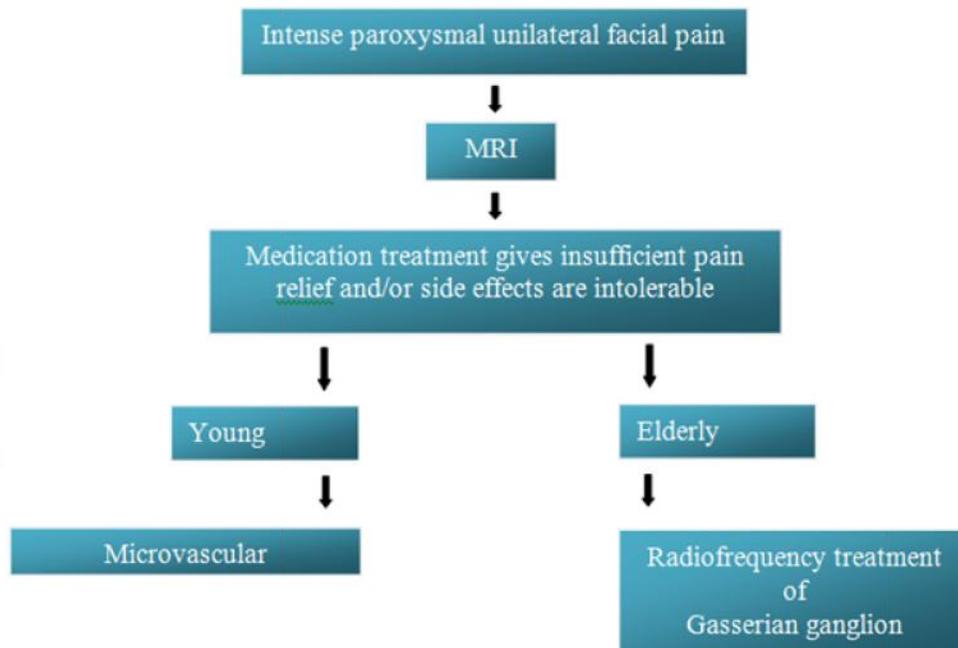
## 6. DIFFERENTIAL DIAGNOSIS OF TRIGEMINAL NEURALGIA (Nurmikko, 2006)

- MS
- Cluster headache
- Postherpetic neuralgia
- Geniculate neuralgia (Ramsay Hunt)

- Sphenopalatine ganglion neuralgia
- Glossopharyngeal neuralgia
- Atypical trigeminal neuralgia
- Typical trigeminal neuralgia
- Dental disease, orbital disease
- Temporomandibular dysfunction
- Temporal arteritis
- Giant cell arthritis
- Glaucoma
- Atypical migraine
- Chronic paroxysmal hemicrania
- Cracked tooth syndrome
- Idiopathic stabbing headache
- Nervus Intermedius neuralgia
- Trigeminal neuropathy.



Algorithm for the Surgical Management of Trigeminal Neuralgia



Clinical Practice Algorithm (Maarten van Kleef et al, 2009)

## 7. TREATMENT OPTIONS

### 7.1. Conservative Treatments (Table 5)

**Table 5**

Medical Treatments for Trigeminal Neuralgia according to Rozen (Rozen TD, 2004)

Medication	Dosage	Time to Pain Relief
Carbamazepine	400–800 mg/day	24–48 h
Phenytoin	300–500 mg/day	24–48 h
Baclofen	40–80 mg/day	?
Clonazepam	1,5–8 mg/day	?
Valproate	500–1500 mg/day	Weeks
Lamotrigine	150–400 mg	24 h
Pimozide	4–12 mg	?
Gabapentin	900–2400 mg/day	1 week
Oxcarbazepine	900–1800 mg/day	24–72 h

### 7.2. Interventional Treatments

If the medical treatment is unsuccessful or has too many side effects, an invasive treatment can be carried out. In this case, there are currently 5 clinically appropriate possibilities:

1. Surgical microvascular decompression (MVD) (Janetta, 1996)
2. Stereotactic radiation therapy, Gamma knife.
3. Percutaneous balloon microcompression.
4. Percutaneous glycerol rhizolysis.
5. Percutaneous radiofrequency (RF) treatment of the Gasserian ganglion.
6. Gasserian ganglion stimulation/neuromodulation.
7. Radiofrequency rhizotomy
8. Retrogasserian rhizotomy
9. Suboccipital craniotomy

## 8. CONCLUSION

Neuropathic pain in the head and neck region is common and can result in multiple unnecessary dental treatments. Trigeminal neuralgia is a neuropathic condition that may challenge the accurate diagnosis of orofacial pain. An endodontist should be well equipped with the knowledge and skill to differentiate between the pain of odontogenic origin and trigeminal neuralgia. A well informed accurate diagnosis helps to deliver appropriate therapy and avoid aggravating the condition.

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