



RESEARCH ARTICLE

TRIGEMINAL NEURALGIA OFTEN MISDIAGNOSED AS DENTAL PROBLEM

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ABSTRACT

INTRODUCTION: Trigeminal neuralgia (TN) is a condition characterized by sudden recurrent episodes of intense, sharp facial pain, often described as electric shock-like sensations. It primarily affects the distribution of the trigeminal nerve (cranial nerve V) and causes debilitating discomfort that can mimic dental problems. The pain typically affects one side of the face and can be triggered by various stimuli, such as chewing, speaking, brushing teeth, or even a light touch. Consequently, patients often approach dental surgeons for treatment. **AIMS AND OBJECTIVES:** Due to the location and nature of the pain, trigeminal neuralgia is often misdiagnosed as a dental issue, leading to unnecessary dental procedures and treatments. Proper identification is essential to avoid misdiagnosis and unnecessary dental interventions, as trigeminal neuralgia can frequently be confused with dental issues. Although trigeminal neuralgia (TN) is relatively uncommon, it can significantly impact affected individuals. **MATERIAL AND METHOD:** This study is a retrospective observational analysis conducted in the outpatient departments (OPD) of Dental, Medicine, and Neurosurgery, covering the period from January 1, 2022, to December 31, 2024, encompassing a three-year retrospective study. **RESULTS: RESULTS:** A total of 250 patients presenting with facial pain were included in the study. The demographic distribution was as follows: Patients' ages ranged from 30 to 70 years, with gender distribution comprising 96 males (38.4%) and 154 females (61.6%). The majority of patients (90%) first attended the dental department. **CONCLUSION:** Increased awareness of TN among healthcare professionals, particularly dental practitioners, is essential for accurate diagnosis and effective management. Proper identification could significantly enhance patient outcomes.

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INTRODUCTION

Trigeminal neuralgia (TN) is a condition characterized by sudden recurrent episodes of intense, sharp facial pain, often described as electric shock-like sensations. It primarily affects the distribution of the trigeminal nerve (cranial nerve V) and causes debilitating discomfort that can mimic dental problems. The pain typically affects one side of the face and can be triggered by various stimuli, such as chewing, speaking, brushing teeth, or even a light touch. Consequently, patients often approach dental surgeons for treatment.

Aims and Objectives: Due to the location and nature of the pain, trigeminal neuralgia is often misdiagnosed as a dental issue, leading to unnecessary dental procedures and treatments. Proper identification is essential to avoid misdiagnosis and unnecessary dental interventions, as

trigeminal neuralgia can frequently be confused with dental issues. Although trigeminal neuralgia (TN) is relatively uncommon, it can significantly impact affected individuals.

MATERIAL AND METHOD

This study is a retrospective observational analysis conducted in the outpatient departments (OPD) of Dental, Medicine, and Neurosurgery, covering the period from January 1, 2022, to December 31, 2024, encompassing a three-year retrospective study.

OBSERVATION AND RESULTS

Total of 250 patients presenting with facial pain were included in the study. The demographic distribution was as follows:

Patients' ages ranged from 30 to 70 years, with gender distribution comprising 96 males (38.4%) and 154 females (61.6%). The majority of patients (90%) first attended the dental department.

Table 1. Demographic distribution

TOTAL NO. OF CASES	MALE	FEMALE	AGE RANGES
N=250	N=96	N=154	30-70YRS
PERCENTAGE	38.4%	61.6%	30-70 YRS

Table 2. Type of trigeminal neuralgia

Total No. Cases	Primary, Idiopathic Neuralgia (itn)	Secondary, Symptomatic neuralgia (STN)
N=250	N=227	N=23
PERCENTAGE	90.8 %	9.2 %

Table 3. Management of trigeminal neuralgia

MEDICINE THERAPY	N=225/250	90%
SURGICAL THERAPY	N=15/250	06%
Rhizotomy (Rhizolysis)	N=10/250	4%

Most patients were managed with medicinal treatment (90%), while only 6% underwent surgical treatment, and 4% were treated with rhizotomy. The majority of patients (90%) first attended the dental department. Upon presentation, patients were evaluated for the source of facial pain through a thorough clinical assessment, including history-taking and a physical examination. Patients seen in the dental department revealed that approximately 50% underwent various dental procedures, which included tooth extraction, root canal therapies, endodontic retreatment, and apicoectomy. Following dental treatment, 35% of patients reported continued facial pain and were subsequently referred to the Neurology Department for further assessment and management.

DISCUSSION

Global Prevalence: The prevalence and incidence of trigeminal neuralgia (TN) vary depending on several factors, including the population studied, the diagnostic criteria used, and geographical location. A systematic review published in the journal "Headache" in 2018 estimated the global prevalence of TN to be approximately 4.5 per 100,000 people. (1) In the United States, a study published in the "Journal of Neurosurgery" in 2016 reported a prevalence of 1.4 per 100,000 people. (2) In Europe, the prevalence of TN was estimated to be around 4 per 100,000 people in a study published in the "European Journal of Neurology" in 2011. (3) A Swedish study published in the "Acta Neurologica Scandinavica" in 2013 found a prevalence of 5.5 per 100,000 people. (4).

Prevalence and Incidence in India: A retrospective study from a tertiary care hospital in India reported an incidence rate of trigeminal neuralgia of approximately 4.5 per 100,000 person-years. The study noted that the condition primarily affected individuals aged 40 years and older, with a higher prevalence in women. (5)

Clinical Characteristics: A study published in the Indian Journal of Neurology highlighted that trigeminal neuralgia was more prevalent in women, with a female-to-male ratio of about

2:1. Most patients reported episodes of severe, stabbing facial pain, particularly affecting the V2 and V3 branches of the trigeminal nerve. Pain episodes were often triggered by everyday activities such as chewing or brushing teeth. (6) Research indicates that secondary trigeminal neuralgia can be commonly associated with conditions such as multiple sclerosis in the Indian population, similar to findings globally. (7).

Reasons for Misdiagnosis: Pain Location: One of the main challenges in diagnosing trigeminal neuralgia is its symptom overlap with dental problems. The pain associated with trigeminal neuralgia is typically felt in areas innervated by the trigeminal nerve (V2 and V3 branches), which includes the teeth, gums, and jaw, making differentiation from dental pain difficult.

Similar Symptoms: Both conditions can present with sharp, shooting pain and can worsen during activities involving the mouth, such as chewing or brushing teeth.

Patient's Focus: Patients may attribute sudden sharp pains to dental issues, especially if they have a known dental history or recently had dental work.

Limited Knowledge: General dental practitioners may have limited exposure to trigeminal neuralgia, leading to reliance on dental treatments rather than considering alternative diagnoses.

Differentiating Features: Nature of Pain: The pain of trigeminal neuralgia is often described as electric shock-like, while dental pain may be constant or throbbing.

Triggers: Trigeminal neuralgia has specific triggers that may not be present in dental pain.

Diagnostic Approach: Patient History: A thorough history that explores the characteristics of the pain, triggers, and any neurological symptoms can aid in diagnosis.

Clinical Examination: A physical examination may help determine if there is a neurological component to the pain.

Pathophysiology of Trigeminal Neuralgia: The pathophysiology of trigeminal neuralgia (TN) is complex, involving physiological, anatomical, and neurobiological factors. Here's a detailed overview:

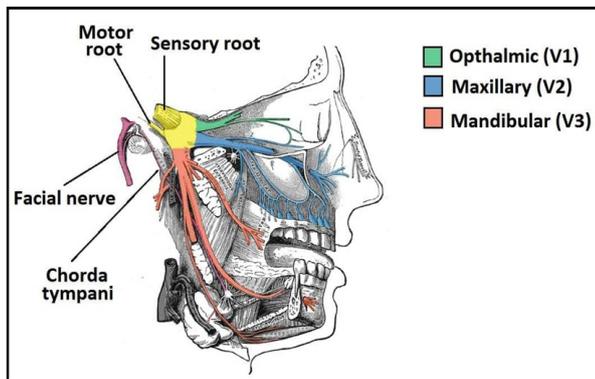
Nerve Anatomy and Function: The trigeminal nerve (cranial nerve V) is the largest cranial nerve and is responsible for sensation in the face and certain motor functions such as biting and chewing. It has three major branches:

V1 (Ophthalmic): Innervates the forehead and upper eyelid.

V2 (Maxillary): Innervates the cheek, upper lip, and upper teeth.

V3 (Mandibular): Innervates the lower lip, chin, and lower teeth.

Mechanisms of Pain Production: Demyelination: A primary mechanism leading to trigeminal neuralgia is the demyelination of the trigeminal nerve roots, often due to multiple sclerosis (MS) or other neurodegenerative diseases.



Picture 1. Anatomy of trigeminal Nerve

This disruption can lead to hyperexcitability of the nerve fibers.

Neurovascular Compression: In many cases, trigeminal neuralgia is believed to be caused by vascular compression of the trigeminal nerve root, particularly at the entry zone where the nerve exits the brainstem. This may result in focal demyelination and abnormal excitability.

Ectopic Discharges: Damage or irritation of the trigeminal nerve can lead to the generation of ectopic action potentials, resulting in abnormal signaling and pain perception.

Central Sensitization: Repetitive pain attacks may lead to central sensitization, where the central nervous system (CNS) becomes more sensitive to sensory stimuli. This can result in increased pain signaling, even in the absence of triggering events, leading to allodynia (pain from stimuli that do not normally provoke pain).

Neurotransmitter Involvement: Certain neurotransmitters, including glutamate, play a significant role in transmitting pain signals. Abnormal levels can contribute to heightened sensitivity and pain in trigeminal neuralgia.

Genetic Factors: While trigeminal neuralgia can occur sporadically, genetic factors may influence susceptibility, particularly in familial cases. Variations in genes affecting neural development and pain pathways may contribute to the disorder.

Other Potential Causes: Besides classical trigeminal neuralgia (often due to vascular causes), secondary (Symptomatic) trigeminal neuralgia (sTN) can be caused by structural lesions, such as tumors, arteriovenous malformations, or trauma, as well as by inflammatory or infectious processes (e.g., post-herpetic neuralgia in patients with a history of shingles).

Types of Trigeminal Neuralgia: Primary (Classic) Idiopathic Trigeminal Neuralgia (iTN): This is the most common type, accounting for about 85-90% of cases. It involves sudden and severe pain on one side of the face, typically affecting the maxillary, mandibular, or ophthalmic branches of the trigeminal nerve, triggered by light touch or pressure. There is no known cause for iTN, and it is diagnosed based on symptoms and exclusion of other causes (8)(9).

Symptomatic Trigeminal Neuralgia (sTN): This type accounts for about 10-15% of TN cases and is caused by

lesions or tumors compressing or damaging the trigeminal nerve. The pain is typically more diffuse and can occur on both sides of the face. Diagnosis is made based on the presence of a lesion or tumor compressing or damaging the trigeminal nerve. (9)(10)

Comorbid Conditions Associated with Trigeminal neuralgia: Trigeminal neuralgia (TN) is a chronic pain condition affecting the trigeminal nerve, and it can lead to severe facial pain. While it may occur in isolation, it frequently has associated comorbid conditions, such as:

Multiple Sclerosis (MS): TN can occur in patients with MS due to demyelination affecting the trigeminal nerve pathways. (11)

Epilepsy: An association exists between TN and epilepsy; shared pathway mechanisms and the effects of chronic pain may play roles. (12)

Hypertension: Some studies suggest a correlation between TN and hypertension, although the underlying mechanisms are not fully understood.

Depression and Anxiety: Chronic pain conditions, including TN, can lead to and exacerbate mood disorders.

Neurovascular Disorders: Conditions such as stroke or other neuropathies may also correlate with trigeminal neuralgia.

Diabetes Mellitus: Diabetes can damage nerve structures and is often associated with painful neuropathies, including TN.

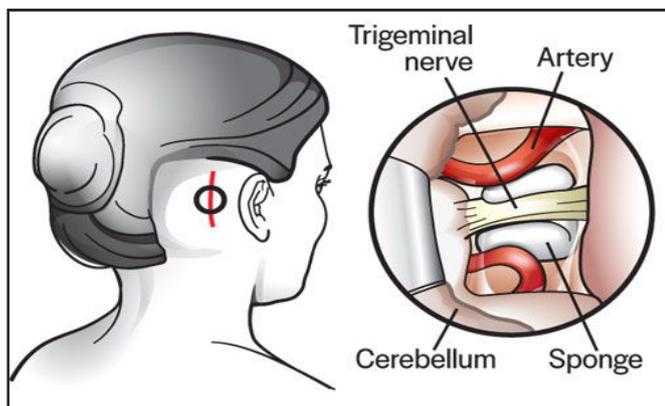
Management and Treatment Options: Treatment for TN can be categorized into medicinal and surgical approaches:

Medicinal Treatment: Anticonvulsants: First-line treatments typically include carbamazepine and oxcarbazepine. Other options may include lamotrigine and gabapentin. Muscle Relaxants: Baclofen may be used in combination with other medications.

Antidepressants: Tricyclic antidepressants may provide relief for some patients.

Surgical Treatment: Microvascular Decompression: TN is initially treated with drugs, but in medically refractory severe cases or cases where it is difficult to maintain the drug due to the side effect of the drug, other treatment is required. Many studies have recommended surgical treatment (18). A surgical procedure aimed at relieving pressure from the trigeminal nerve. A surgical procedure, MVD, has the potential to offer long-term relief.

It minimizes the possibility of postoperative side effects, including numbness. Jannetta developed classical MVD surgery using a surgical microscope to prove that the compression of the arteries or veins can lead to TN. Over time, Jannetta refined his surgical technique and eventually adopted the posterior fossa (retrosigmoid) approach (13). He used Teflon padding to decompress the culprit vessel and trigeminal nerve because it was easy to handle and produced minimal arachnoid scarring. MVD shows excellent pain control results in most cases. Initial pain control after MVD was reported to be 80.3–96% (14,15,16,17).



Pic: 2. Microvascular Decompression (MVD)

Radiorosurgery: Gamma Knife radiorosurgery (GKRS), is an important treatment option for trigeminal neuralgia. Unlike traditional surgical methods, GKRS is a non-invasive procedure that does not require any incisions. Instead, it utilizes focused radiation to target and damage specific areas of the brain responsible for pain transmission (19,20). This method is particularly suitable for patients who may not qualify for surgical interventions such as microvascular decompression (MVD) or who prefer a less invasive approach to managing their condition. Gamma Knife radiorosurgery is effective in alleviating pain and improving the quality of life for many individuals suffering from trigeminal neuralgia (19, 20).

Nerve Blocks: Blockade of the branches of the trigeminal nerve (V2 and V3) in the pterygopalatine or infratemporal fossa are traditionally performed using a paresthesia technique by position-ing the needle anterior or posterior to the pterygoid plate is an image-guidance approach of either fluoros- copy or computed tomography. Nerve blocks can be an effective treatment option for managing pain in patients with trigeminal neuralgia (TN). These minimally invasive techniques aim to interrupt the pain pathways and provide relief from the severe, usually unilateral, facial pain associated with the condition.

Glycerol Rhizotomy: A chemical neurolysis technique in which glycerol is injected into the trigeminal nerve to disrupt the pain-conducting fibers. Studies have shown that glycerol rhizotomy can provide significant pain relief in many patients (22).

Botulinum Toxin Injections: While not a traditional nerve block, botulinum toxin has been used in some cases for trigeminal neuralgia with promising results (23).

Radiofrequency Ablation (RFA): In the Treatment of Trigeminal Neuralgia. radiofrequency ablation (RFA) has emerged as a promising alternative. RFA is a minimally invasive procedure that uses heat energy to destroy the small portion of the trigeminal nerve responsible for the pain. The procedure is performed under local anesthesia and can be done as an outpatient procedure. RFA has been shown to provide long-term pain relief for TN patients with a low complication rate (21). These may be considered for symptomatic relief in inoperable cases.

CONCLUSION

Awareness of trigeminal neuralgia among dental professionals is crucial for accurate diagnosis and treatment. A multidisciplinary approach involving neurologists may be

necessary for comprehensive care. Understanding the pathophysiology of trigeminal neuralgia is critical for both diagnosis and treatment. The condition involves a unique interplay of peripheral and central mechanisms, and individualized treatment approaches targeting these underlying mechanisms can lead to improved patient outcomes. If you suspect trigeminal neuralgia, it is important to consult a neurosurgeon or neurologist for a thorough evaluation and appropriate management. If you or someone you know is experiencing facial pain, consulting a qualified healthcare provider for an accurate diagnosis and appropriate treatment is essential.

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