

Diagnosis and Management of Trigeminal Neuralgia in Dentistry: A Literature Review

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Abstract: Trigeminal neuralgia (TN) is a paroxysmal neuropathic pain disorder characterized by sharp, brief, and recurrent pain in the trigeminal nerve distribution. Because it occurs in the maxillofacial region, TN is frequently mistaken for odontogenic pain, leading patients to seek dental care and risk unnecessary procedures. This review aims to summarize current literature on the clinical features, diagnostic challenges and management of trigeminal neuralgia in dental practice, highlighting the important role of dentist in its detectione and care. The diagnosis of trigeminal neuralgia was based on multidisciplinary approach, including history taking according to ICHD-3 criteria, dental vitality testing, neurological examination and MRI, with specialist collaboration in complex cases. The results showed that trigeminal neuralgia is frequently misdiagnosed as odontogenic pain, requiring history, neurological exam, MRI, and dental evaluation for accurate diagnosis. Carbamazepine was the primary treatment, with surgery for refractory cases, and a multidisciplinary approach proved essential. Trigeminal neuralgia requires accurate evaluation and dentist involvement to ensure proper diagnosis and effective management.

Keywords: Dentistry; Neuropathic pain; Odontogenic; Trigeminal neuralgia

Introduction

Trigeminal neuralgia (TN) is a neuropathic pain disorder characterized by paroxysmal, sharp, stabbing, and sudden pain in the distribution of the trigeminal nerve. The pain is usually unilateral, lasts from seconds to minutes, and can be triggered by minor activities such as brushing teeth, talking, eating, or even a light touch to the face. This condition is known as one of the most excruciating types of pain and significantly reduces the patient's quality of life. TN is classified into two main forms: classic (idiopathic) and symptomatic. The classic form is generally associated with chronic vascular compression at the entry zone of the trigeminal nerve into the brainstem, while the symptomatic form is associated with structural abnormalities such as tumors, multiple sclerosis, or other neurological lesions. Distinguishing between the two is important because it determines the diagnostic and therapeutic approach to be used.

Although TN is a neurological disorder, its involvement in the facial region, which is also the primary area of dentistry, presents a significant diagnostic challenge. Many patients with TN initially seek treatment from a dentist because of pain in the maxillary or mandibular region, mimicking odontogenic

pain such as pulpitis or apical periodontitis. Patients often undergo unnecessary dental procedures, such as tooth extractions or root canal treatment, without any improvement in their pain symptoms. This challenge is compounded by the presence of other facial pain conditions, such as atypical odontalgia, which overlaps with TN but originates from psychogenic or functional mechanisms. In some cases, the pain does not respond to conventional dental therapy or common analgesics, and a correct diagnosis requires an integrated psychological, neurological, and dental approach.

Furthermore, the diagnosis of TN relies not only on the characteristics of the pain but also requires imaging such as MRI to rule out secondary causes. Radiographic and vital examination of the teeth are crucial to rule out odontogenic pain. In certain cases, such as teeth with dens invaginatus, pulpitis pain can closely mimic TN, requiring careful evaluation. The need for uniform diagnostic and management standards has prompted several neurology organizations to develop clinical consensus guidelines to guide practitioners, including dentists. These guidelines emphasize the importance of first-line pharmacotherapy such as carbamazepine and oxcarbazepine, and consider surgical intervention options such as microvascular decompression in refractory cases.

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This review aims to review the current literature on trigeminal neuralgia (TN) in the dental context. The primary focus is on outlining the clinical characteristics of TN, the challenges of differential diagnosis with odontogenic pain, and appropriate diagnostic and management approaches. Furthermore, this review highlights the importance of dentists in early recognition of TN and the need for interdisciplinary collaboration to improve diagnostic accuracy and therapeutic success.

Method

The methods used in assessing and diagnosing trigeminal neuralgia (TN), however, all emphasize the importance of a thorough anamnesis and supporting examinations. The history taking is the primary step in establishing a diagnosis of trigeminal neuralgia (TN). Typical symptoms include unilateral facial pain, paroxysmal, very intense, brief (seconds to two minutes), with an electric shock-like sensation, and often triggered by mild stimulation of the facial area (trigger zone). Questions during the history taking also cover the presence of pain-free periods between attacks, the distribution of the trigeminal nerve branches, and triggers such as talking or chewing. Many cases are initially misinterpreted as odontogenic pain or sinusitis, so a history of delayed diagnosis is also important in the history taking (Antonaci et al., 2020).

Several studies were conducted observationally by interviewing patients who met the ICHD-3 criteria, followed by radiological examinations such as MRI, CT scan, OPG, as well as neurological tests such as blink reflex and EEG to rule out secondary causes (Liu & Tanaka, 2025; Latorre et al, 2023; Mascarell et al, 2022). Clinical consensus from neurologists also shows that the use of MRI with special sequences (FIESTA, DRIVE, CISS) is highly recommended to detect neurovascular conflict, and pharmacological therapy such as carbamazepine is the first choice, before considering surgical intervention (Latorre et al, 2023). This examination also serves to rule out other possible secondary causes, such as tumors or structural lesions in the brainstem. Thus, the history serves as the primary means of establishing a diagnosis, while supporting examinations confirm the etiology and determine therapeutic strategies (Latorre et al., 2023).

In addition to the clinical history, additional neurological examinations may be performed to clarify

the diagnosis. Blink reflex testing, evoked potential testing, and assessment of response to sensory stimulation can help differentiate TN from other trigeminal neuropathies with similar symptoms. A history of systemic risk factors such as autoimmune disorders, depression, or sleep problems is also often explored in the history, as these factors can contribute to the development of neuropathic pain. The diagnosis is confirmed when all ICHD-3 criteria are met, further confirmed by imaging findings and a neurological examination (Liu & Tanaka, 2025).

Several clinical cases demonstrate the importance of a thorough differential diagnosis, especially when pain resembling TN turns out to originate from an odontogenic condition such as pulpitis with dens invaginatus. Tooth vitality testing using cold testing, electric pulp testing, and CBCT imaging are helpful in identifying the true source of pain (Mascarell et al., 2022). Additionally, a multidisciplinary approach is recommended for patients with chronic neuropathic symptoms resembling TN who do not respond to carbamazepine but instead respond to a combination of psychological therapy, antidepressants, and behavioral interventions. In patients with chronic neuropathic symptoms that do not improve with first line therapy such as carbamazepine, the history should also include psychological aspects, including a history of anxiety and depression. In such cases, the diagnosis may point to atypical odontalgia or other chronic neuropathic pain, which requires a multidisciplinary approach rather than purely TN (Mascarell et al., 2022; Tizzoni et al., 2022). This shows that the diagnosis of TN requires a holistic evaluation that includes neurological, odontological, and psychological aspects (Tizzoni et al, 2022).

Result and Discussion

After conducting a search for scientific articles that meet the inclusion criteria of the article review, all articles were obtained as the result of narrative reviews, consensus, and case reports that describe the complexity of TN diagnosis, pharmacological and surgical management approaches, and the challenges of its differential diagnosis with odontogenic pain conditions in dental practice. The subjects studied in the articles included adult patients with symptoms of paroxysmal facial pain, both in individual case reports and reviews of the broader clinical literature.

Table 1. Summary of Journal Article Review

Researcher, Research Article Title and Journal	Location, Research Objectives and Design	Data Sources and Sample Size	Research result
Antonaci et al (2020), Italy "Pitfalls in recognition and management of trigeminal neuralgia", The Journal of Headache and Pain.	Identifying the diagnosis and management of TN. Design: Narrative literature review.	Journal articles and clinical cases. Sample size not specified.	Misdiagnosis of TN is common. Symptoms similar to toothache lead to incorrect intervention. Further clinical training for dentists is needed.
Liu & Tanaka (2025), Japan "Pathogenesis, Diagnosis, and	Provides a comprehensive	Peer-reviewed literature between	Classic TN is caused by vascular compression. A tentative diagnosis

Researcher, Article Title and Journal	Location, Research Objectives and Design	Data Sources and Sample Size	Research result
Management of Trigeminal Neuralgia: A Narrative Review", Journal of Clinical Medicine.	understanding of the pathogenesis, diagnosis, and therapy of TN. Design: Narrative review based on scientific literature.	2020-2025. Sample size not specified.	requires a history, neurological examination, and MRI. Carbamazepine is the effective first-line treatment.
Spanish Society of Neurology (2023), Spain "Diagnosis and treatment of trigeminal neuralgia: Consensus statement" Revista de Neurologia: Mascarell et al (2022) Spanish "Pulpitis in a dens invaginatus presenting a Trigeminal Neuralgia: A Case Report", Journal of Clinical and Experimental Dentistry. Tizzoni et al. (2022), Italy "Atypical odontalgia and trigeminal neuralgia: psychological, behavioral and psychopharmacological approaches in a dental clinic", F1000Research.	Developing a consensus on the diagnosis and therapy of TN. Design: Consensus of neurologists. Describe a case of pulpitis mimicking TN. Design: Clinical case report. To examine the differences between atypical odontalgia and TN and the importance of a psychological approach. Design: Multidisciplinary literature review.	Survey and data from neurology practices in Spain. No number of cases mentioned. One patient in a dental clinic with facial pain symptoms similar to TN. Data from clinical cases and multidisciplinary literature. Sample size not stated.	Carbamazepine is recommended as initial therapy. MVD is effective in refractory cases. The importance of early diagnosis between classic and symptomatic TN is emphasized. Pulpitis of the dens invaginatus can mimic TN. Vitality and radiographic tests are important before establishing a diagnosis of TN. There is overlapping symptoms between psychogenic and neuropathic pain. Collaborative diagnosis is necessary between a dentist, psychiatrist, and neurologist.
Fernández Rodríguez B et al (2019), Spanish, "Familial classic trigeminal neuralgia", Neurologia.	Describes a case of classic familial TN. Design: case study.	Clinical observation. Sample: 1 family with 3 members experiencing TN. Scientific literature; no new samples.	Found evidence of a genetic component in classic familial TN; onset is usually earlier and response to therapy is similar to sporadic TN.
Shinoda M et al (2019), "Peripheral and central mechanisms of persistent orofacial pain", Front Neurosci.	Explaining the peripheral & central mechanisms of persistent orofacial pain. Design: scientific review.	Clinical and neurophysiological evaluation. Sample: 45 patients with atypical triggers. 92 TN patients undergoing microvascular decompression surgery; preoperative MRI evaluation.	Persistent orofacial pain involves complex peripheral-central interactions (sensitization), which are relevant for TN and other chronic pain. It represents a potential target for pharmacological and neuromodulatory therapies. Atypical triggers are often associated with activation of A-delta afferents, providing mechanistic insights into the management of pain triggered by environmental and dietary factors.
Koh W et al (2021), Korea, "Atypical triggers in trigeminal neuralgia: The role of A-delta sensory afferents in food and weather triggers", Korean J Pain.	Assessing atypical TN triggers (food, weather) and A-delta afferent mechanisms. Design: clinical observational.	Clinical and neurophysiological evaluation. Sample: 45 patients with atypical triggers. 92 TN patients undergoing microvascular decompression surgery; preoperative MRI evaluation.	Identification of neurovascular compression on MRI correlates with surgical outcomes; patients with evidence of compression are more likely to have a good postoperative outcome.
Wang Z et al (2022), China, "The application of MRI for the prediction of surgical outcomes in trigeminal neuralgia", Postgrad Med.	Assessing the role of MRI in predicting surgical outcomes for TN. Design: retrospective cohort.	Outpatients at Yalgado Ouedraogo University Teaching Hospital; sample size: 188 patients.	The prevalence of common headache disorders, including TN, is high. TN is found to be a small proportion of cases, indicating the need for specific diagnostics in patients with facial pain.
Dabilgou AA et al (2020), Burkina Faso, "Frequency of headache disorders in neurology outpatients", SN Compr Clin Med.	Assessing the frequency of headache disorders in neurology outpatients. Design: 3-month prospective cross-sectional study.	17 observational and questionnaire studies; total >800 patients.	TN has a significant impact on quality of life, including depression, anxiety, social isolation, and occupational dysfunction. This emphasizes the need for psychosocial support in TN management.
Melek LN et al (2018), Unspecific, "The psychosocial impact of orofacial pain in trigeminal neuralgia patients: a systematic review", Int J Oral Maxillofac Surg.	Reviewing the psychosocial impact of orofacial pain in TN patients. Design: systematic review.		

Researcher, Article Title and Journal	Location,	Research Objectives and Design	Data Sources and Sample Size	Research result
Bendtsen L et al (2019), Europe, "European Academy of Neurology guideline on trigeminal neuralgia", Eur J Neurol.		Developing European Academy of Neurology (EAN) guidelines on the diagnosis and management of TN. Design: evidence-based guidelines.	Systematic literature review and expert recommendations. No direct patient samples.	Provides recommendations for diagnosis (ICHD-3 criteria), medical treatment (surgical intervention), and management of TN variants. Emphasizes the importance of differentiating classic, secondary, and atypical TN.
O'Callaghan L et al (2020), England, "Burden of illness of trigeminal neuralgia among patients managed in a specialist center", J Headache Pain.		Assessing the burden of TN disease in patients managed at a specialist center. Design: retrospective observational.	Patient data at a specialist centre in the UK; n = 182 TN patients.	TN has a significant impact on quality of life, including daily functioning, psychosocial well-being, and the use of analgesic medications, demonstrating the need for a multidisciplinary approach.
Renton T (2019), Not specific, "Chronic pain and overview or differential diagnosis of non-odontogenic orofacial pain", Prim Dent J.		Provides an overview of chronic non-odontogenic orofacial pain & differential diagnosis. Design: narrative review.	Scientific literature; no new samples.	Describes the mechanisms of chronic orofacial pain, including TN, post-herpetic neuralgia, and myofascial pain. Emphasizes the importance of differential diagnosis for appropriate therapy.
Besi E, Zakrzewska J (2020), Unspecified, "Trigeminal neuralgia and its variants. Management and diagnosis", Oral Surgery		Reviewing TN variants, diagnosis, and management strategies. Design: narrative review.	Recent scientific literature. Sample size not stated.	Describes the classification of classical and secondary TN, diagnostic techniques, and medical and surgical treatment options. Provides an evidence-based management algorithm.

Definition and Etiology of Trigeminal Neuralgia (TN)

Trigeminal neuralgia (TN) is a form of paroxysmal neuropathic pain affecting one or more branches of the trigeminal nerve, characterized by sudden, brief, and recurrent intense, electric shock-like pain. Mild stimuli such as brushing teeth, eating, or talking often trigger attacks. Liu and Tanaka (2025) divided TN into three types: classic (usually due to chronic vascular compression in the root entry zone of the trigeminal nerve), symptomatic (due to structural lesions such as tumors or multiple sclerosis), and idiopathic (without an identified cause). TN is one of the most painful forms of facial pain, often leading to significant functional and emotional disability. TN is also a form of primary neuropathic pain that produces a characteristic, electric shock-like pain that significantly impacts the patient's quality of life.

Other factors suspected of contributing to TN include neurovascular disorders, a history of trauma, tooth deformities, and psychological factors and inflammation of the surrounding tissues. Antonaci et al. (2020) noted that patients frequently experience pain in the dental area, which is often misinterpreted as odontogenic pain and leads to unnecessary invasive dental procedures. Tizzoni et al. (2022) also added that psychogenic factors can influence the perception of facial pain and complicate the diagnosis. Furthermore, it was found that TN can occur due to genetic involvement in classic TN.

Pathophysiology of Trigeminal Neuralgia (TN)

The pathophysiological mechanisms of TN involve both the peripheral and central nervous systems. TN is

influenced by complex interactions between peripheral afferent neurons and central sensitization at the spinal cord and brainstem levels. Activation and dysfunction of nociceptor neurons can trigger changes in the central pain processing system, leading to hyperexcitability and sustained amplification of pain signals. A-delta fibers are known to play a crucial role in mediating non-noxious stimuli such as wind or cold food, which trigger sharp pain in TN patients. These findings support the theory that in classic TN, there is a shift or reorganization in sensory processing pathways, allowing even mild stimuli to produce a severe pain response. These changes are also associated with ephaptic transmission phenomena due to local demyelination, particularly in the root entry zone, a common site of vascular compression.

Trigeminal Neuralgia (TN) Diagnosis

The diagnosis of TN is generally made clinically based on the patient's characteristic pain description, the presence of trigger zones, and the absence of permanent neurological deficits. Latorre et al. (2023) stated that the ICHD-3 criteria serve as a reference for the diagnostic classification of TN, which emphasizes unilateral, paroxysmal pain, and an attack duration of between a few seconds and two minutes. MRI is recommended to rule out the possibility of symptomatic TN due to compression by a structural lesion. Contact between blood vessels and the trigeminal nerve can also be found in healthy volunteers, implying that MRI findings must be confirmed clinically to avoid misdiagnosis.

However, the diagnostic process often faces challenges, especially because the symptoms can mimic dental conditions such as pulpitis or periapical abscess. Mascarell et al. (2022) reported a case of pulpitis in *dens invaginatus* that mimicked TN, highlighting the importance of careful clinical interviewing and investigation. This is reinforced by reports from various studies that delayed diagnosis and mismanagement of TN patients are common. Therefore, it is important to differentiate TN from other forms of facial pain, including dental pain and idiopathic neuropathy, to ensure more targeted therapy. Appropriate clinical education and training for practitioners, including dentists, is crucial to improving diagnostic accuracy. A multidisciplinary approach also plays a crucial role in assessing pain history, the nature of attacks, and response to treatment during the diagnostic process.

Trigeminal Neuralgia (TN) Management

TN therapy begins with a pharmacological approach. Liu and Tanaka (2025) stated that carbamazepine is the most frequently used first-line drug, although side effects such as dizziness, somnolence, and hepatic toxicity may limit its long-term use. Alternatives such as oxcarbazepine, gabapentin, pregabalin, baclofen, and lamotrigine can be given, especially if carbamazepine is not tolerated. For cases refractory to medical therapy, interventional approaches such as microvascular decompression (MVD), radiofrequency rhizotomy, and percutaneous balloon compression are quite effective treatment options. Some approaches also include neuromodulation and ablation techniques, which carry a risk of minor to moderate neurological complications.

Personalized therapy that considers the duration of symptoms, age, response to previous therapy, and comorbidities is the ideal approach in the management of chronic TN. Surgical interventions such as MVD remain the primary option for cases with obvious vascular compression, taking into account individual risk assessment. Tizzoni et al. (2022) emphasized the importance of a multidisciplinary approach, especially when there is a psychogenic component or symptoms overlap with atypical odontalgia. Psychopharmacological therapy, counseling, and cognitive behavioral therapy can help reduce pain perception in patients with psychosomatic disorders that mimic TN. Several studies have also shown that a combination of medication and psychosocial therapy provides better outcomes in patients with mixed symptoms.

Prognosis of Trigeminal Neuralgia (TN)

The prognosis for TN varies widely, depending on the etiology, timing of diagnosis, and response to treatment. Patients with classic TN generally have a better prognosis than those with symptomatic forms.

Latorre et al. (2023) reported that patients undergoing MVD had significantly higher long-term pain-free outcomes. However, some patients continue to experience pain recurrence despite undergoing invasive therapy, and others do not respond to conventional pharmacological therapy. Liu and Tanaka (2025) showed that in patients with a history of long-term pharmacological therapy, the risk of cumulative side effects is a particular concern. Innovative pharmacological approaches such as the use of specific sodium channels and glutamate pathway blocking agents have the potential to improve long-term prognosis, especially in patients with atypical facial pain and therapy resistance. Patients diagnosed late tend to experience more severe psychological impact and are at risk of transition to chronic facial pain, which is more difficult to manage therapeutically. Therefore, long-term management of TN should be individualized and adaptive to the patient's symptom development.

Clinical Implications for Dentist

TN has a direct impact on dental practice because pain is often felt in the same maxillofacial region as odontogenic structures. Antonaci et al. (2020) noted that dentists are often the first healthcare providers patients contact, and misdiagnosis leads to unnecessary invasive procedures. This is especially true because TN pain mimicking pulpitis or other dental disorders is often not recognized as neuropathic pain. The case presented by Mascarell et al. (2022) reinforces the importance of considering the differential diagnosis before performing procedures such as extractions or root canal treatment, especially in patients who do not respond to standard dental care. Knowledge of trigger zones, pain patterns, and response to antiepileptic medications can be early indicators to differentiate TN from common dental pain.

Dentists should be trained to perform a thorough clinical examination and consider referral to a neurologist or pain specialist if neuropathic pain is suspected. Ongoing education regarding orofacial pain, as well as the integration of neurologic pain modules into dental education curricula, are important steps in enhancing the role of dentists in the diagnosis and management of TN. With early detection and appropriate referral, morbidity and psychological impact on patients can be significantly reduced.

Conclusion

Trigeminal Neuralgia (TN) is a neuropathic facial pain condition characterized by sharp, recurrent attacks of pain due to involvement of the trigeminal nerve, with etiologies involving vascular compression, neurophysiological changes, and possibly genetic factors. Accurate diagnosis is crucial, as TN often mimics odontogenic complaints. Therefore, a thorough clinical evaluation, detailed history taking, and supporting

examinations such as MRI are essential to differentiate it from other causes of facial pain. Management of TN is stepwise, beginning with pharmacological therapy and progressing to interventional or surgical procedures in refractory cases, and considering psychological interventions if a psychological component is present. The prognosis of TN depends heavily on the accuracy of the diagnosis and the chosen management strategy. Therefore, the active involvement of dentists in recognizing, differentiating, and appropriately referring patients with TN is crucial to avoid unnecessary procedures and improve clinical outcomes and overall quality of life.

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Author Contributions

Susanna Halim conceptualized the research idea, while Nadia Putri Sania conducted the analysis, research process, and literature review. Both authors read and approved the final manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest.

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