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Odontogenic Pain Mimicking Trigeminal Neuralgia: The Diagnostic Value of Cone-Beam Computed Tomography: A Case Report

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Background: Trigeminal neuralgia (TN) is characterized by severe and often relentless pain in the trigeminal nerve distribution. It is primarily a diagnosis of exclusion, highlighting the importance of a thorough workup to rule out treatable or secondary causes of atypical facial pain.

Case Report: An 89-year-old woman experienced 2 years of relentless odontogenic pain that had been misdiagnosed as TN. She was referred to endodonticsfor a cone-beam computed Tomography (CBCT) scan. CBCT led to the diagnosis of an abscess and nerve impingement due to an old crown post. Following tooth extraction, abscess drainage, and antibiotic therapy, the patient had resolution of her pain.

Conclusions: This case highlights the importance of CBCT in the diagnostic workup of orofacial pain in suspected cases of TN, particularly when prior dental consultations and evaluations of past treatments have not identified a definitive cause.

Key words: Trigeminal neuralgia, odontogenic pain, cone-beam computed tomography, orofacial pain, case report

BACKGROUND

Trigeminal neuralgia (TN) is a clinical diagnosis that can both mimic and be mimicked by other causes of orofacial pain. Despite advances in imaging, multidisciplinary care, and diagnostic algorithms, odontogenic causes remain underrecognized in clinical medicine. This case report describes a patient who underwent comprehensive neurologic and radiologic evaluation without identification of a treatable dental or neurological etiology—one that was ultimately revealed only through a targeted endodontic cone-beam computed tomography (CBCT). This case highlights the importance of incorporating advanced dental imaging into select TN workups and supports reconsideration of current diagnostic guidelines.

CASE REPORT

An 89-year-old woman with no significant past medical history presented to our neurology-based pain management clinic with a 2-year history of chronic stabbing pain in her left maxilla and a preexisting diagnosis of poorly controlled TN despite having been treated with oxcarbazepine, gabapentin, and over-the-counter nonsteroidal anti-inflammatory drugs, such as ibuprofen and naproxen. Three months prior to presentation, the pain had progressively worsened. The new symptoms were described as paroxysms of intense pain in the maxilla of 8/10 intensity, lasting minutes to hours, triggered by chewing and drinking cold beverages.

A focused facial pain examination was then performed, including light touch and pinprick testing over all trigeminal divisions, inspection of masticatory muscles, and intraoral palpation of alveolar processes. Trigger zones along the infraorbital and mental nerve distributions were assessed, evaluating mandibular

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opening against resistance, and checking for point tenderness at the tooth apices. There was no pain elicited by direct palpation over tooth #14, which initially made the etiology difficult to discern. Prior to her visit, she had seen multiple specialists, including geriatrics, general neurology, a temporomandibular joint (TMJ) specialist, a general dentist, and an oral surgeon. TMJ dysfunction and temporal arteritis had been ruled out. Panoramic radiography of the teeth and jaw (2-dimensional [2D], x-ray) revealed no features compatible with odontogenic pain (Fig. 1). The addition of pregabalin and tramadol produced marginal benefit. Laboratory testing revealed erythrocyte sedimentation rate of 11 mm/h (normal 0-20 mm/h) and a mildly elevated C-reactive protein at 2.8 mg/dL (normal < 1.0 mg/dL). Magnetic resonance imaging (MRI) brain and magnetic resonance angiography (MRA) of the head were normal. MRI TMJ showed mild desiccation of the left TMJ articular disc and possible mild left condylar head edema without significant joint effusion. A CBCT study was requested by the endodontist to obtain a 360° 3-dimensional view of the posterior maxilla, allowing for an assessment of the bone and root anatomy that 2D panoramic radiographs cannot provide. Compared with conventional radiographs, CBCT offers superior spatial resolution, elimination of anatomical superimposition, and precise localization of periapical pathology (Fig. 2). The patient promptly underwent extraction of 3 teeth along with incision and drainage of abscess and subsequent treatment with amoxicillin-clavulanate. Fifteen days after the teeth extraction and abscess drainage, the patient reported complete resolution of pain symptoms. Although the exact nerve impinged is difficult to confirm without histopathological evaluation, the patient's pain was likely due to irritation of the posterior superior alveolar nerve, a terminal branch of the maxillary (V2) division of the trigeminal nerve. This branch innervates the V2 molars and their supporting structures, including tooth #14, where the periapical pathology was identified.

DISCUSSION

TN is characterized by sudden, brief, stabbing episodes of severe pain along the distribution of one or more branches of the trigeminal nerve. Composed of 3 main branches, the trigeminal nerve is the largest cranial nerve and is responsible for sensation of the face and motor function of the muscles of mastication. The incidence of TN is 4-13 people per 100,000/y and carries a female to male ratio of 2-3:1 (1,2). Pain attacks are typically provoked by stimulating trigger points in the distribution of the trigeminal nerve and result in debilitating pain symptoms. TN is classified as idiopathic, classic, and secondary. The classic form accounts for 75% of cases and is associated with neurovascular compression at the trigeminal nerve root entry zone, often caused by the superior cerebellar artery, which results in focal demyelination of the trigeminal nerve leading to ectopic nerve firing (2). Secondary TN constitutes ~ 15% of cases and is typically caused by tumors, arterial malformations, or multiple sclerosis. In idiopathic TN, no underlying pathology is identified (2). Neuroimaging with MRI and MRA is the current gold standard in the diagnostic workup of suspected TN (9). The European Academy of Neurology, American Academy of Neurology, European Federation of Neurological Societies, and UpToDate (uptodate.com), for example, recommend MRI brain with and without contrast, along with MRA head to confirm or rule out neurovascular compression or secondary etiologies (4). The management of TN generally involves preventative and rescue therapy for symptomatic relief. Preventative pharmacotherapy utilizing anticonvulsants and neuropathic pain agents remains the standard of care for classic and idiopathic etiologies (2). Interestingly, while the UpToDate guidelines, as well as other guidelines, such as the American College of Radiology (3) and the European Academy of Neurology (4), as well as systematic reviews (10,11), offer comprehensive approaches to diagnosing and managing pain, they do not explicitly recommend referral to endodontics and CBCT. Differentiating TN from dental pain is challenging, especially in atypical cases, but clinical features, such as pain duration, quality, and triggers, can help distinguish them. While TN pain is brief, paroxysmal, electric, and triggered by light touch, odontogenic pain is typically continuous, aching, and provoked by thermal stimuli or chewing (5).

Herein, a typical algorithmic approach, such as the one available on UpToDate, would likely have led to a misdiagnosis of idiopathic TN. The pain was stabbing in quality and triggered by innocuous stimuli, such as cold beverages and chewing. However, the prolonged duration of pain episodes was atypical for TN, necessitating further investigation. In such cases, a thorough evaluation to rule out odontogenic causes of pain, including dental caries, fracture, periodontal abscess, or pulpitis, is essential. In this case, despite multiple consultations with general dentists and oral surgeons,

the underlying cause of the patient's pain remained undetected until a CBCT scan was performed following a targeted endodontic evaluation.

Initial odontogenic diagnostic evaluation for tooth pain tends to consist of panoramic radiography as the standard imaging technique. This imaging technique, however, has limitations in that it provides a 2D image, with possible overlapping and distortion of anatomy. This may lead to the imaging obscuring dental abnormalities that are more subtle and not readily picked up on this modality. Several studies (6-8) highlight the limitations of panoramic radiography and the benefits of more advanced imaging, such as CBCT, which has a higher rate of detecting abnormalities in the workup of unilateral odontalgia and nonspecific orofacial pain.

The resolution of the patient's symptoms following treatment illustrates the necessity of a multidisciplinary approach, along with the need for specific referrals for diagnostic purposes. The omission of this specific referral involving a CBCT scan may lead to missed diagnoses, as seen in this patient, in which standard dental evaluations undergone by multiple professionals did not uncover the issues until a more detailed scan was performed. The authors therefore advocate for updating the current guidelines to include CBCT in the standard diagnostic workup of suspected TN. Furthermore, the authors suggest there is reason to offer long-standing TN sufferers a CBCT scan in case new occult treatable pathology is identified.

This case highlights the value of a multidisciplinary approach and the diagnostic utility of CBCT in identifying dental pathologies missed on standard imaging. Symptom resolution following dental intervention reinforces its clinical relevance. Limitations include the single-patient design and reliance on patient-reported outcomes without formal pain scoring.

CONCLUSIONS

This case underscores the importance of maintaining a broad differential when evaluating orofacial pain and highlights the diagnostic utility of CBCT in identifying dental abnormalities that may be missed on conventional imaging. Early referral to dental specialists and incorporating CBCT into the diagnostic algorithm for TN may help prevent misdiagnosis, reduce patient suffering, and enable definitive treatment in otherwise refractory cases.

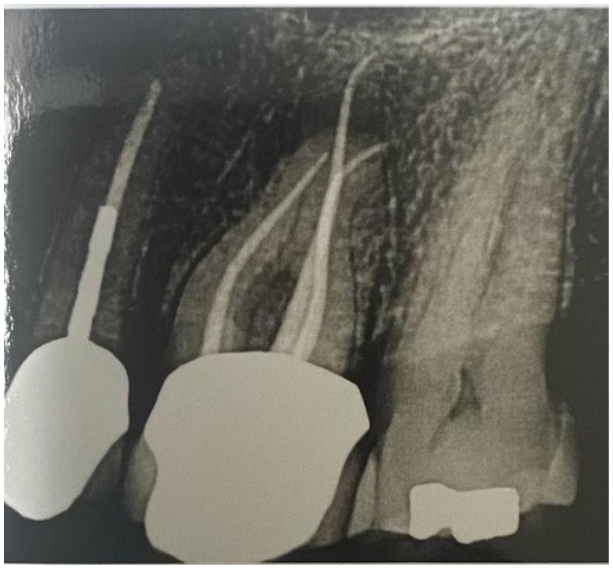

Fig. 1. Panoramic x-ray of the affected teeth. Cropped panoramic radiographic evaluation revealed no signs of odontogenic pathology.

Fig. 2. CBCT: Panoramic reconstruction of CBCT section revealed a periapical hypodensity, consistent with apical osteitis (red arrow).
CBCT, cone-beam computed tomography.

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