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## Odontogenic pain of non-odontogenic origin: A review

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### Abstract

Pain in the orofacial region is the most common reason for patients to visit a dental clinic. Tooth and/or its supporting structures are often source of pain. Pain originating from pulp dentine complex and/or periodontal structures presents with variable clinical characteristics and can be accurately diagnosed and treated. However, clinician often encounters situation when odontogenic causes of pain are excluded and non odontogenic causes should be considered. These include myofascial pain syndromes, temporomandibular disorders, neuralgias, ENT diseases, tumors, neurovascular pain or psychiatric diseases. Establishing a correct diagnosis is of utmost importance to render appropriate treatment. Obtaining a detailed history from the patient including the quality, volume, duration, frequency and periodicity of pain helps in differentiating non odontogenic from odontogenic causes. Aim of this review is to update the clinician's knowledge of etiologies of pain, thus helping the clinician to establish differential diagnosis for orofacial pain.

**Keywords:** Odontogenic, non-odontogenic, pain

### 1. Introduction

Most common chief complaint of the patient visiting a dental clinic is Orofacial pain [1]. Dental pain is the most common type of orofacial pain accounting for 26.8% of the total cases [2]. However, not all the cases with orofacial pain are associated with an odontogenic etiology. Other causes of pain in the head and neck region include yofascial pain syndromes, temporo mandibular disorders (TMD), neuralgias, ENT diseases, tumors, neurovascular pain or psychiatric diseases [3]. These conditions usually present with overlapping signs and symptoms and present a diagnostic dilemma for the clinician who usually treat the patient for dental pain [4]. Arriving at the correct diagnosis is of key importance to guide the delivery of appropriate treatment. Initiation of treatment without sufficient attention to the complex mechanism of pain may result in unnecessary treatment without eliminating the problem [5].

Clinical and radiographic features help in differentiating between odontogenic and non-odontogenic pain. Fracture, caries and defective restorations are clinical features which are associated with odontogenic pain. In addition, presence of sensitivity, pain on percussion, pain during mastication is other key features. Odontogenic pain is unilateral, localized and relieved by local anesthesia [6]. On the other hand, non-odontogenic pain may be described as tingling, shooting, burning, non-localized, which crosses the midline. It might be associated with a headache, joint pain, muscular pain and emotional stress. The patient may also present with a history of multiple extractions and endodontic treatment for pain relief [7]. This article aims at updating the clinician's knowledge of non-odontogenic causes of pain, to allow the operator to correctly diagnose the problem and render the correct treatment.

### 2. Clinical Characteristics of Non-Odontogenic Pain

The clinical presentation of non-odontogenic pain is varied and can mimic other pain disorders which may not originate in the orofacial region. The pain may be very mild and intermittent or severe, sharp, and continuous. Correct diagnosis and appropriate treatment is easily achieved in cases of primary pain where the source and site of pain are same. However, heterotopic pain can be diagnostically challenging as the source and the site of pain are different. Neurologic mechanisms of heterotopic pain is not well understood but it is thought to be related to central sensitization due to nociceptive input from deep structures such as muscles, joints and ligament [8].

### 2.1 Myofacial pain

The myofascial pain is described as non-pulsatile and aching pain associated with muscle. Patients are unable to locate the source of the pain and believe that the pain is associated with the tooth. The pain is triggered by palpating the muscles such as superior belly of the masseter which is referred to the maxillary posterior teeth and inferior belly of the masseter which is referred to mandibular posterior teeth, temporal referred to maxillary anterior or posterior teeth, and the anterior digastric referred to the mandibular anterior teeth [8]. The cause of pain is extensive muscle use and exacerbated emotional stresses rather than pathological tooth involvement. It has been reported that 37% of patients diagnosed with muscular orofacial pain had previously undergone endodontic or exodontic treatment in an attempt to alleviate their pain [9]. However, a distinguishing characteristic is the relief of toothache when local anesthetic is administered to the strained muscle (source of pain) rather than the tooth (site of pain). Warm or cold compresses, muscle stretching, massage, and a restful sleep may alleviate both the muscle and tooth pain.

### 2.2 Cardiac Toothache

Cardiac ischemia is a source of pain to the jaw associated with referred pain to the left shoulder, arm, neck, throat, ear, teeth, and mandible [10]. This type of pain is called heterotopic pain of cardiac origin. Inaccurate diagnosis in such cases can lead to unnecessary dental treatment. The cause of the cardiac pain referred to the orofacial region can be explained by the convergent mechanisms of the trigeminal complex [11]. When cardiac tooth pain is suspected proper questioning and through medical history helps in identifying true source of pain. Orofacial pain may be the only complaint in patients suffering from cardiac ischemia. In one study, 6% of patients presenting with coronary symptoms had pain solely in the orofacial region while 32% had pain referred elsewhere. Interestingly, bilateral referred craniofacial pain was noted more commonly than unilateral pain at a ratio of 6:1 [12].

### 2.3 Sinus Toothache

Sinusitis is a very common ailment and about 10% of maxillary sinusitis cases being diagnosed as having an odontogenic origin [13]. Due to the approximation of the roots of maxillary posterior teeth to the sinus cavity, infection in the dental tissue can lead to sinus inflammation and infection. Any infection and inflammation in the maxillary sinus can also present as odontogenic pain. Sensitivity to percussion, mastication, and/or temperature when felt in multiple teeth suggests pain of sinus origin rather than odontogenic origin [8, 14]. Patient often presents with the history of respiratory infection, nasal congestion, and sinus disease before the onset of the toothache [8]. Maneuvering the head to below the levels of the knees and palpation of the infraorbital regions may cause pain [8, 15]. Absence of hard or soft tissue involvement concludes the presence of sinus inflammation or infection.

### 2.4 Neurovascular Toothache

Headaches are most commonly associated with the cranium however, sometimes may involve the orofacial region thus mistaken as odontogenic pain. Neurovascular pain or migraine with orofacial symptoms more commonly involves maxillary division than the mandibular division of trigeminal nerve [16]. Cranial migraine is the term commonly used to describe headache involving the craniofacial region, which is mostly misdiagnosed and treated endodontically or underwent extractions. Several case reports are presented in literature

where such conditions have been diagnosed of odontogenic origin due to overlapping and similar presentations to true dental pains [17, 18]. Patients usually describe this type of pain involving midface region and/or unilateral head which may be interpreted as pain originating from the teeth, jaws or the temporomandibular joints. This condition is often misdiagnosed as pulpitis due to short, recurrences of excruciating intensity and pulsatile nature [19]. History and comprehensive clinical examination provides enough evidence to support non odontogenic cause of pain. If the clinician is in doubt then referral to the physician should be considered.

### 2.5 Neuropathic Toothache

Pain originating from any defect in the neural structures is referred to as neuropathic pain. This type of pain is a diagnostic challenge to the clinician as structures innervated by these nerves are painful but appears clinically normal. Neuropathic pain when experienced is either continuous or episodic in nature. Episodic neuropathic pain is referred to as neuralgia and is characterized by severe, shooting, electric-like pain that lasts only a few seconds [4, 20]. Trigeminal neuralgia involving the mandibular nerve is the most common type of neuralgia in the orofacial region. This type of paroxysmal pain is felt in the tooth, but is often experienced in a wider area. Patient reports of pain being felt along the distribution of the nerve involved and is often experienced following stimulation of the trigger points [5]. Anesthesia of the trigger zone eliminates the pain, however on occasion tooth itself represents a trigger zone and can lead to diagnosis of endodontic pain and unnecessary endodontic treatment. In most of the cases, persistence of pain after endodontic treatment requires reassessment of the differential diagnosis [21].

### 2.6 Neoplastic Toothache

One of the earliest symptoms of oral cancer is orofacial pain [22]. Squamous cell carcinoma located on gingiva, vestibule or floor of mouth presents with symptoms that mimic pain of odontogenic origin. Localized bone loss associated with intraosseous form of SCC may be misdiagnosed as a localized periodontal disease [23]. Other cancers which present with symptoms of odontogenic origin include nasopharyngeal cancers, lymphoma, leukemia, distant non-metastasized cancers, and metastatic malignancies [24]. Presence of pain and paresthesia is the most common finding in metastatic disease of jaw bone.

Orofacial pain may be the early symptom of oral cancer for which the patients visits a dentist. Primary Squamous cell carcinoma (SCC) of the oral mucosa may present with pain located on the gingiva, vestibule or floor of mouth. Pain was found to be the first clinical sign of oral cancer in 19.2% of cases [22], while other literature has suggested that two-thirds of patients with oral cancer have reported localized discomfort within the 6 months preceding a cancer diagnosis [23]. Primary intraosseous carcinoma is a SCC that occurs within the jaws, has no initial connection with the oral mucosa, and arises from either a previous odontogenic cyst or de novo [24]. Such malignancies are very rare, but they can be mistaken for having an odontogenic origin since the clinical presentation of localized bone loss may have the appearance of localized periodontal disease.

Nasopharyngeal cancers may present with signs and symptoms mimicking temporomandibular disorders [25, 26] parotid gland lesions [27], and odontogenic infections with

trismus [28]. Such neoplasms show presence of facial pain, limited jaw opening, deviation of the jaw on opening, earache, and headache, these signs may be confused with an odontogenic etiology.

Systemic cancers such as lymphoma and leukemia may present with toothache-like symptoms, as they infiltrate pain-sensitive structures like periosteum and gingiva that cause localized pain which may be confused with odontogenic pain [29]. Very rarely, the osseous osteolytic lesions of multiple myeloma develops adjacent to teeth and presents a radiologic diagnostic challenge

Metastases most often develop from the breast in women and the lung and prostate in males. In cases of soft tissue metastasis, pain is a rare complaint [30], whereas in metastatic disease of the jaw bones, pain has been reported in 39% and paresthesia in 23% of patients<sup>31</sup>. The pain and clinical features of metastases may be misinterpreted as that originating from an odontogenic source, the common sites being the posterior mandible, angle of the jaw, and ramus. In a retrospective case series of metastatic disease in the jaws, 60% of 114 cases reported the metastatic lesion in the oral region to be the first indication of an undiscovered primary malignancy at a distant site [32].

Orofacial malignancies may mimic odontogenic etiology. Therefore dental practitioners should use appropriate judgment when clinical features cannot be correlated with the results of odontogenic diagnosis. Neoplastic toothache must be considered when localized soft or hard tissue changes develop in close proximity to odontogenic structures and diagnostic findings are equivocal or negative.

### 2.7 Psychogenic Toothache

Psychological stress may lead to development of psychogenic tooth ache. Pain may be described as diffused, vague, and non-localized or sharp, stabbing, intense, with sensitivity to temperature changes. Often involves multiple teeth and pain may jump from one tooth to another. Due to the similarities of these characteristics to pain of odontogenic origin, leads to a diagnostic challenge. However, absence of a physiological factor or a pathological cause and presence of psychological factor gives a clue about the non-odontogenic cause of pain. Often accompanied by psychiatric features such as hallucinations or delusions, there is a greater likelihood that the pain is of psychogenic origin.<sup>33</sup> Dental treatment for such a condition does not resolve the pain symptoms. Response to treatment may be variable, including no response or unexpected response. Unnecessary dental treatment can be avoided by early identification and referral to a psychiatrist.

### 3. Conclusion

There are a multitude of nonodontogenic pains that can present at the site of a tooth and can mimic a toothache. Dental practitioners should also have an understanding of the complex mechanism of odontogenic pain and the manner in which other orofacial structures may simulate dental pain. In patients who present with toothache, dental practitioners should consider alternate etiologies of the pain when appropriate diagnostic tests do not lead to odontogenic etiology. Failure to establish the etiology of the pain will result in incorrect diagnosis and inappropriate treatment.

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