



Orofacial Pain and Nonodontogenic Toothache of Cardiac Origin: Case Report

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Orofacial pain has various causes, making it challenging to differentiate from dental-related diseases based solely on symptoms. Toothache, usually attributed to pathological changes in the pulp and periodontal tissue, is the most common cause of orofacial pain and relatively easy to diagnose. However, distinguishing orofacial pain and nonodontogenic toothache due to myofascial, neuropathic, neurovascular, paranasal sinus and cardiac originating, and psychogenic pain presents diagnostic challenges that may result in incorrect treatment. Therefore, dentists must recognize that orofacial pain can arise from not only dental issues but also other causes. This case report explores the necessary considerations in diagnosing orofacial pain and nonodontogenic toothache by examining the diagnoses of patients presenting at the dental hospital with orofacial pain and nonodontogenic toothache of cardiac origin.

Keywords: Cardiac origin; Diagnosis; Nonodontogenic toothache; Orofacial pain

INTRODUCTION

Orofacial pain has various causes, therefore, it may be difficult to distinguish from dental-related diseases based solely on symptoms. Diseases affecting the chest and throat, including those in organs, such as the heart, carotid artery, esophagus, stomach, lungs, thyroid, vagus nerve, and glossopharyngeal nerve, can cause orofacial pain [1].

Dental patients commonly complain of toothache, with odontogenic pain typically originating from pulp or periodontal tissue. Although odontogenic pain is relatively easy to diagnose with predictable treatment outcomes, nonodontogenic pain poses diagnostic challenges, often resulting in misdiagnosis when relying solely on standard odontogenic pain diagnostic procedures. Factors causing nonodontogenic pain include neuropathic, myofascial, paranasal sinus, and neurovascular, and psychogenic pain, as well as pain

referred from heart disease and otitis media [2].

Misdiagnosis of orofacial pain and nonodontogenic toothache can lead to irreversible treatments, such as root canal procedures or tooth extraction. Hence, dentists must meticulously gather a detailed medical history, including the duration, severity, pattern, and alleviating factors of the pain, and conduct a thorough intraoral and extra-oral clinical examination to rule out odontogenic causes.

This case report explores considerations in diagnosing orofacial pain and nonodontogenic toothache through cases related to diagnoses of patients presenting with orofacial pain and nonodontogenic toothache of cardiac origin. This study was conducted with the approval of the Institutional Review Board of Chosun University Dental Hospital (CUDHIRB-2307-001) and the written informed consent was waived by the board.

CASE REPORT

1. Case 1

A 79-year-old female patient visited the Department of Oral Medicine at Chosun University Dental Hospital complaining of pain and swelling in the left facial area, along with pain in the upper and lower posterior teeth. The pain had begun a few months prior without any particular identifiable cause, subsequently subsided, and then resurfaced two weeks before her visit. Prior to visiting the dental hospital, the patient had sought medical attention from the otorhinolaryngology and internal medicine department for ear pain but experienced no improvement with the prescribed medication. She noted a slight exacerbation of discomfort with the left side feeling uncomfortable during mastication, and increased pain when climbing stairs. On the radiograph, loss of alveolar bone was observed in the left upper and lower posterior regions, but no pain-causing pathologies were identified (Fig. 1). Clinical examination, revealed no discernible abnormalities during inspection, percussion, and probing of the fixed prosthesis in the left maxillary premolar, molar areas, and lower implant. Additionally, no pathological findings were identified that could give rise to sensations of swelling or pain in the implant prosthesis in the mandibular left molar region as well as in the premolar and incisor areas. Furthermore, there was no pain upon palpation of the left and right masseter and temporalis muscles.

The patient reported a three-year history of medication treatment for diabetes, hypertension, and angina pectoris. She noted recent heart discomfort persisting despite taking prescribed angina pectoris medication. Following a

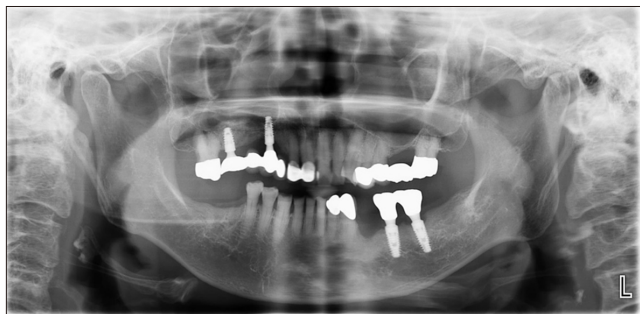


Fig. 1. Panoramic radiograph (case 1) showing alveolar bone loss in the left upper and lower posterior areas. No pathologies that could cause pain were identified.

comprehensive clinical and radiographic examination, it was explained that radiating pain due to angina pectoris could manifest in the left facial area and teeth. The decision was made for the patient to visit the dental hospital again after receiving treatment from the cardiology department. Upon a return visit to the dental hospital a month later, the patient reported the disappearance of heart discomfort, as well as the resolution of pain and swelling in the left facial area.

2. Case 2

A 68-year-old female patient visited the Department of Oral Medicine, Chosun University Dental Hospital, via a dental clinic, complaining of pain in the left upper and lower posterior teeth areas and the left shoulder area, even during rest. She described soreness in her upper and lower left posterior teeth persisting for a week, causing feelings of anger even when resting, without any discernible cause. The pain was similar to the previous week's pain, persisting even when she drank cold water. The radiograph indicated moderate alveolar bone loss in the left maxillary and mandibular areas, but no pathological findings accounting for the pain were observed (Fig. 2). During clinical examination, the left maxillary prosthesis and the left mandibular tooth exhibited no notable abnormalities during inspection, percussion, and probing. Furthermore, there was no pain upon palpation of the left and right masseter and temporalis muscles.

The patient had been taking medication for hypertension and diabetes for three years, and she had been receiving medication for angina pectoris since its diagnosis seven

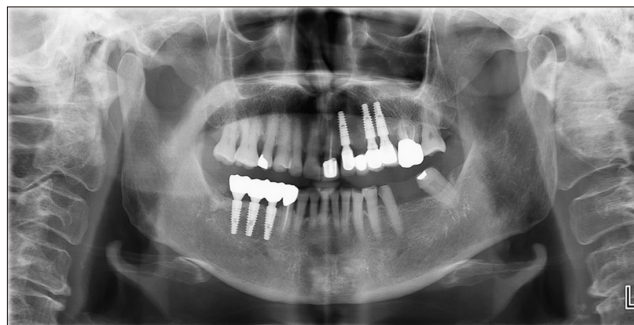


Fig. 2. Panoramic radiograph (case 2) showing moderate alveolar bone loss in the left maxillary and mandibular areas. No pathologies that could cause pain were identified.

years prior. Despite her medication, she had recently experienced discomfort in the heart area.

Following a comprehensive clinical and radiographic examination, it was explained that the pain radiating to the left upper and lower teeth and the left shoulder area was attributable to angina pectoris. Subsequently, the patient was referred to the cardiology department for further treatment. A follow-up confirmation by phone affirmed the resolution of toothache and shoulder pain after cardiology treatment.

DISCUSSION

Dentists can easily treat orofacial pain with a clear cause, such as a toothache, but may face confusion and uncertainty when confronted with pain lacking an obvious dental structural origin. Dental pain is a common cause of orofacial pain. However, orofacial pain with nonodontogenic toothache may also manifest as referred pain due to myofascial, sinus, neurovascular, neuropathic, cardiac, psychogenic, and systemic pain [3].

Toothache originating from pulpal or periodontal tissue may present various clinical characteristics, such as caries, deep restoration, extensive periodontal pockets, and tooth fractures causing pain. The pain can be alleviated by local anesthesia in the suspected tooth [4].

Myofascial pain is the most prevalent cause of nonodontogenic toothache, often leading to referred pain [5]. It is characterized by a trigger point in the form of a taut band, causing diffuse dull pain in the upper and lower posterior teeth and surrounding areas. Myofascial pain in the muscles, including the masseter muscle, temporal muscle, and anterior portion of the digastric muscle, may induce pain referred to the teeth. Molars are frequently implicated in referred pain upon palpating muscles or trigger points, with the masseter muscle being the primary contributor [6].

Facial sinusitis may present with pain in the maxillary teeth, similar to pulpal or periodontal toothache. In particular, maxillary sinusitis induces persistent pain around the zygoma, and inflammation of the maxillary sinus causes toothache-like pain due to its proximity to the apical area of the maxillary premolars and molars [7,8]. Key points for differential diagnosis include upper respiratory infection, infraorbital tenderness in response to pressure in the

affected sinus, increased toothache during forward head bending, incomplete relief of tooth pain after local anesthesia, and confirmation of air/fluid levels on Water's view or computed tomography [6,7].

Nonodontogenic toothache of neurovascular origin, attributed to migraines, often manifests in the maxillary canines or premolars. It is characterized by unilateral pain unresponsive to intraoral local anesthetic blocks. The diffuse dull pain, is not limited to the teeth, affecting the temporal region or the back of the eye, and intensifies with physical activity, such as climbing stairs [9].

Nonodontogenic toothache associated with trigeminal neuralgia clinically presents as electric-like paroxysmal pain lasting several seconds, predominantly on one side in the maxillary or mandibular branch of the trigeminal nerve. The pain extends beyond the teeth, often affecting a wide area, with a trigger zone causing pain even upon light stimulation. If the trigger zone involves a tooth, it can complicate diagnosis and lead to incorrect treatments, such as root canal procedures [2,6].

Cardiac ischemia can induce pain in the arms, neck, face, and even teeth. As dental pain may occasionally be the sole symptom reported by a patient, dentists should remain vigilant for dental symptoms occurring secondary to heart-related pain [10-13]. Although the precise mechanism remains unclear, it is thought to be associated with the convergence phenomenon. This occurs when pain caused by cardiac ischemia enters the central nervous system along the vagus and thoracic nerves, ascending to the cortex. This phenomenon, coupled with central sensitization, results in face, neck, and arm pain [6]. Common symptoms of ischemic heart disease include pain in the upper thoracic region, left and right lower jaw, left temporomandibular joint, and left ear area, as well as toothache [14]. Orofacial pain of cardiac origin may manifest before or during exercise or cardiac seizures, typically subsiding after cardiac surgery or vasodilator administration [15]. Clinical characteristics for diagnosing nonodontogenic toothache of cardiac origin include the following: pulsating, deep, and spreading toothache; toothache with a pressure or burning nature; toothache escalating with physical activity or exercise; a history of cardiovascular disease; and toothache alleviated by nitroglycerin tablets [3].

Similar to the first case reported herein, orofacial pain of cardiac origin may present as referred pain to the left facial area and teeth, intensifying with physical activity. In this case, the patient's angina pectoris was inadequately controlled, resulting in orofacial pain. However, both orofacial pain and nonodontogenic toothache were managed effectively after appropriate medical treatment. The second case involved a patient complaining of pain in the left neck and shoulder areas along with toothache. Additionally, they had been receiving long-term treatment for angina, confirming nonodontogenic toothache of cardiac origin.

Nonodontogenic toothache of psychogenic origin presents with an atypical toothache pattern and does not respond to dental treatment. Patients may report pain in multiple teeth, frequently changing location and nature. Dentists should be prepared to make referrals to appropriate healthcare professionals, such as psychiatrists, recognizing that somatoform toothache can pose serious diagnostic challenges. Additionally, patients with systemic diseases, such as malignant neoplasms, diabetes, and sickle cell anemia, may report toothache without specific dental lesions [3].

Dentists have a responsibility to appropriately treat orofacial pain and must distinguish pain originating in the teeth, oral cavity, and masticatory system from pain originating elsewhere. Therefore, inappropriate treatment, such as root canal procedures or tooth extractions, should not be undertaken due to misdiagnosis of orofacial pain or toothache arising from nondental causes.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

DATA AVAILABILITY STATEMENT

The datasets used in this study are available from the corresponding author upon reasonable request.

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AUTHOR CONTRIBUTIONS

Conceptualization: JMA. Data curation: JWR. Formal analysis: JMA. Funding acquisition: JMA. Methodology: JMA, HJP. Project administration: JWR. Visualization: HJP. Writing - original draft: JMA. Writing - review & editing: JMA, HJP.

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