



General Considerations in Managing Non- Odontogenic Orofacial Pain

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Abstract: Orofacial pain is characterized as facial and mouth discomfort. The most prevalent inflammatory pain to appear in this area is dental pain. However, chronic pain illnesses, such as temporomandibular joint disorders, primary headaches (neurovascular), neuropathic pain, and idiopathic pain, can commonly mimic toothaches. Dentistry's specialty in orofacial pain focuses on diagnosing and treating persistent, complicated facial pain and oromotor disorders. This area of dentistry has grown throughout time due to the desire to comprehend better a group of patients who, for some reason, were not experiencing tooth pain issues. Orofacial discomfort has a major impact on morbidity and the use of medical services. Several illnesses can cause orofacial discomfort; diagnostic uncertainty is commonly seen in clinical practice. Due to their varying pain presentation, toothaches can resemble many chronic episodic orofacial pain syndromes, leading to many improperly prescribed antibiotic regimens and surgical treatments. Ear, nose, throat, and maxillofacial surgeons also fall victim to the misdiagnosis, making them not the only professionals to suffer from it. The orofacial region's complex diversity makes it difficult for doctors to handle non-odontogenic pain with an oral origin. The physician must be well-versed in the many pain problems affecting the orofacial area and the various alternatives accessible for their best care to provide a precise diagnosis and successful treatment. This paper focuses on the different types of pain, characteristics, assessments, investigations, and general considerations in managing non-odontogenic pain of the orofacial region. To adequately manage these patients, our profession has come to understand how important a fundamental understanding of orofacial pain is. Many improvements have been brought about by this adjustment in the approach in both clinical and educational settings. This review covers all general aspects of orofacial pain management.

Keywords: Orofacial, pain, Chronic orofacial pain, non-odontogenic, orofacial pain, orofacial pain therapy

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I. INTRODUCTION

Orofacial pain is characterized as discomfort in the face and mouth areas¹. Dental pain is the most common inflammatory pain in the orofacial region. But other chronic pain conditions, including temporomandibular disorders (TMD), primary headaches, neuropathic pain, and idiopathic pain syndromes, can also mimic toothaches. Dentists are more knowledgeable in the orofacial region but need the education or expertise to recognize or treat migraines that primarily affect the first trigeminal division. The region is anatomically complex, with numerous potential diagnoses, so the correct diagnosis is frequently delayed. As a result, patients frequently undergo ineffective surgical and medical procedures, which themselves may complicate the presentation of the pain by altering its phenotype and making diagnosis and appropriate management more difficult¹. Due to their varying pain presentation, toothaches can resemble many chronic episodic orofacial pain syndromes, leading to many improperly prescribed antibiotic regimens and surgical treatments. Ear, nose, throat, and maxillofacial surgeons also fall victim to the misdiagnosis, making them not the only profession to suffer from it¹. Most individuals who feel any orofacial discomfort see their family doctor or dentist, where they are typically treated. Though, the patient must occasionally be sent to a specialist physician or a pain clinic. According to what was stated above, even a large portion of pain originates in dental, periodontal, and mucosal structures, some disorders might cause painful processes to develop in these same structures that originate from different extra-oral regions¹. The fact that pain might have several sources is one thing to consider while determining the etiology of orofacial discomfort, and other patient-perceived feelings like

depressive or anxious behaviour² can also impact it. It can be challenging to make a proper diagnosis since several forms of pain, even those with dissimilar nociception mechanisms share similar signs and symptoms^{3,4}. The orofacial region's complex diversity makes it difficult for doctors to handle non-odontogenic pain with an oral origin. Incorrect diagnosis and unsuitable therapy will come from failing to determine the cause of the pain. The physician must be well-versed in the many pain problems affecting the orofacial area and the various alternatives accessible for their best care to provide a precise diagnosis and successful treatment^{5,6}. This article overviews the different types of pain, characteristics, assessments, investigations, and general considerations in managing non-odontogenic pain of the orofacial region.

1.1 Guises of dental pain and orofacial pain

There are several ways that toothache and dental discomfort can manifest (Figure 1). Elicited pain can resemble trigeminal neuralgia, post-traumatic neuropathies, trigeminal autonomic cephalalgias, and other secondary neuropathies. Elicited pain is present in reversible pulpitis with touch and cold. Irreversible pulpitis causes slow, episodic, strong throbbing pain that might resemble migraine and myofascial pain¹. An aging population with heavily restored restorations, notoriously unpredictable vitality tests, and limited education about chronic pain present additional challenges for dentists in diagnosing non-odontogenic pain. As a result, dentists may frequently overlook the possibility of neuropathic or neurovascular pain. Types of pain include Non-odontogenic inflammation resulting in pain, Pain associated with a temporomandibular problem - Referred or heterotropic pain, Neurovascular pain, Idiopathic pain - Neuropathic pain¹.

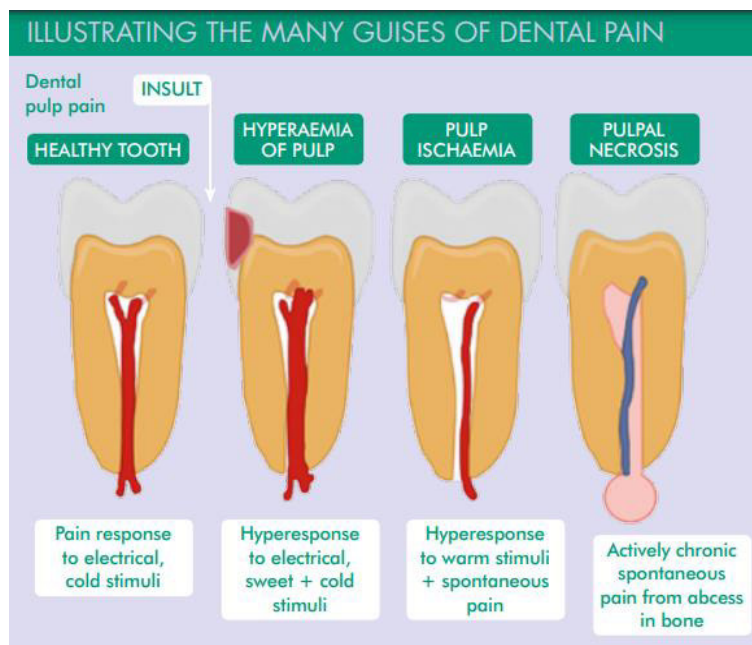


Fig 1: Guises of dental pain¹

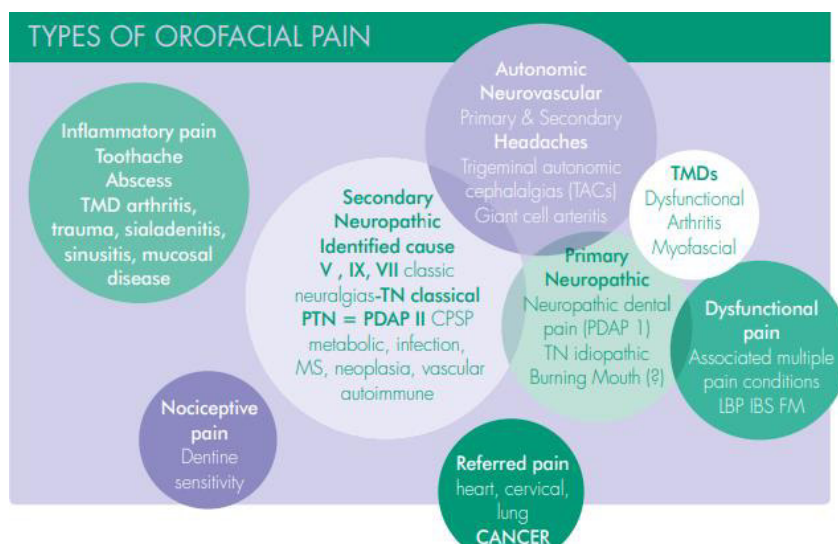


Fig 2: Types of orofacial pain ¹

1.2 OTHER CAUSES OF PAIN

Numerous medical disorders can resemble dental discomfort and vice versa. The following must be considered if there isn't a typical dental pathology.

1) Temporomandibular joints disorder (TMDs)

Disorders of the temporomandibular joints are called as TMDs. The most prevalent orofacial pain disorders affecting adults at stressful times, such as during life crises, are TMDs. Preauricular discomfort is one of the symptoms, which is made worse by opening wide, chewing tough food, and putting finger pressure on the joint. Frequent clicking, crepitus, or locking of the TMJ are dysfunctional symptoms associated with nonsynchronous motions of the condylar head and the temporomandibular joint (TMJ) meniscus. TMD evaluation and related tests are used to diagnose TMD. Reassurance and analgesics make up the majority of treatment. Only recurrent locking calls for surgery¹. Temporalis, masseteric, or pterygoid muscle discomfort are all examples of arthromyalgic pain, which should not be confused with osteo- or rheumatoid arthritis of the TMJ. Such discomfort is typically brought on by chronic clenching or grinding, and the best ways to treat it are with dental splints, assurance, and analgesics¹.

2) Headache

The signs resemble a V2 migraine¹.

3) Maxillary sinus pain

It is sinus discomfort in the maxilla. Pain, zygomatic discomfort, nasal congestion, and headache are the symptoms¹.

4) Otalgia

The signs include ear discomfort and perhaps conductive hearing loss. Identifying and treating the underlying cause are the goals of diagnosis and management. Despite being very rare, acoustic neuromata can cause toothaches or TMD discomfort. Hearing loss and potential facial paralysis might be signs of cancer¹.

5) Trigeminal autonomic cephalgia (TAC)

The signs are unilateral V2 periorbital severe pain with autonomic signs (facial flushing, sweating, conjunctival injection, ptosis, and nasal congestion), which distinguish TAC pain from pain of dental origin from maxillary teeth. The symptoms are short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) and short-lasting unilateral neuralgiform headache attacks with cranial autonomic symptoms (SUNA). The precise kind of TAC affects the diagnosis and treatment¹.

6) Trigeminal neuralgia (TN)

The symptoms include spontaneous, episodic allodynia brought on by activities like chewing and cleaning your teeth⁷.

7) Post-traumatic neuropathy

Until proven differently, postoperative discomfort following surgical treatments, including injections, should be regarded as post-traumatic neuropathy. In some circumstances, immediate surgery is necessary, such as removing freshly installed dental implants. A delayed diagnosis might lead to persistent neuropathic pain that needs medical treatment¹.

8) Neoplasia

Oral neoplasia seldom hurts unless the condition is advanced or a subsequent infection occurs. Like an invasive malignancy, peripheral neuropathy can be brought on by an infected tooth close to the inferior dental canal. Excluding neoplasia is an important step in investigating spontaneous neuropathy accompanied by pain¹.

1.3 Clinical Characteristics of Non-Odontogenic Pain

Non-odontogenic pain has a wide range of clinical manifestations and can resemble other conditions that may not have an orofacial etiology. The discomfort may be mild, sporadic, acute, intense, and persistent. In situations of primary pain, where the cause and site are the same, a proper diagnosis and suitable therapy are readily accomplished. However, diagnosing it can be difficult because

the source and location of heterotopic pain are distinct. Although the neurologic causes of heterotopic pain are not fully understood, it is believed that central sensitization brought on by nociceptive input from deep tissues such as muscles, joints, and ligaments is a contributing factor¹.

1) **Myofascial pain**

Myofascial pain is defined as an aching, non-pulsatile ache that is connected to a muscle. Patients mistakenly think their tooth is the source of discomfort since they cannot identify it. The pain is brought on by palpating certain muscles, such as the anterior digastric, which is referred to as the mandibular anterior teeth; the temporal, which is referred to as the maxillary anterior or posterior teeth; and the superior belly of the masseter, which is referred to the maxillary posterior teeth and inferior belly of the masseter which is referred to the mandibular posterior teeth. Instead of diseased tooth involvement, the source of pain is frequent muscle usage and increased mental stress. According to a study, 37% of individuals with muscle orofacial pain had previously had endodontic or exodontic therapy to relieve their discomfort. A differentiating feature, however, is the alleviation of toothache when the local anesthetic is applied to the strained muscle (pain source) rather than the tooth (pain location). Muscular and tooth discomfort may be relieved with warm or cold compresses, muscle stretching, massage, and sound sleep⁸.

2) **Cardiac Toothache**

Cardiac ischemia is a source of jaw discomfort that radiates to the left shoulder, arm, neck, throat, ear, teeth, and mandible. Heterotopic pain of cardiac origin is the name of this kind of discomfort. In many situations, a poor diagnosis may result in needless dental care. The concurrent processes of the trigeminal complex can be used to explain the origin of the heart discomfort directed to the orofacial area. When cardiac tooth pain is suspected, asking the right questions and going through your medical history will help you determine the real cause of your suffering. When patients have cardiac ischemia, their only complaint can be orofacial discomfort. In one research, just 6% of individuals who had coronary symptoms alone experienced pain in the orofacial area, whereas 32% had pain sent from elsewhere. Interestingly, at a ratio of 6:1, bilateral referred craniofacial discomfort was reported more frequently than unilateral pain⁸.

3) **Sinus Toothache**

A fairly frequent condition, maxillary sinusitis is estimated to have an odontogenic origin in 10% of patients. Because the roots of the maxillary posterior teeth are close to the sinus cavity, dental infections can cause sinus irritation and infection. Odontogenic pain can also be a symptom of a maxillary sinus infection or inflammation. Multiple tooth sensitivity to percussion, mastication, and temperature implies sinus discomfort rather than odontogenic pain. Before the beginning of the toothache, the patient frequently appears with a history of sinus illness, nasal congestion, and respiratory infections. Pain may be felt while lowering the head below the level of the knees and palpating the infraorbital areas. The absence of involvement in the hard or soft tissues proves sinus inflammation or infection⁸.

4) **Neurovascular Toothache**

Although they usually affect the head, headaches can affect the orofacial area and are therefore confused for odontogenic discomfort. The maxillary division of the trigeminal nerve is more frequently affected by neurovascular pain or migraines with orofacial symptoms than the mandibular division. The phrase "cranial migraine" is frequently used to describe headaches involving the craniofacial region. These headaches are frequently misdiagnosed and treated with endodontic therapy or by having teeth extracted. The literature has several case reports where these disorders are of odontogenic origin because of overlapping and comparable presentations to actual dental symptoms. Patients typically report midface and unilateral head discomfort, which may be mistaken for pain from the jaws, teeth, or temporomandibular joints. Due to its brief, intense recurrences and pulsatile character, this illness is sometimes misdiagnosed as pulpitis. A thorough clinical examination and the patient's medical history prove the pain is not odontogenic. Referral to the doctor should be considered if the clinician has any doubts⁸.

5) **Neuropathic Toothache**

Neuropathic pain is a general term resulting from a brain structure malfunction. The doctor faces a diagnostic dilemma with this kind of pain since the structures that these nerves innervate hurt even though they seem clinically normal. When felt, neuropathic pain can be either chronic or episodic. Neuralgia, also known as episodic neuropathic pain, is characterized by intense, brief episodes of electric-like agony that last only a few seconds. The most prevalent kind of neuralgia in the orofacial area is trigeminal neuralgia, which affects the mandibular nerve. Paroxysmal pain originates in the tooth but frequently spreads to a larger region. According to patient reports, the affected nerve's distribution is painful and frequently felt when the trigger points are stimulated. The pain is usually eliminated by anesthesia of the trigger zone. Still, occasionally the tooth functions as a trigger zone, which might result in the diagnosis of endodontic discomfort and unneeded endodontic treatment. Most of the time, persistent discomfort following endodontic therapy necessitates reevaluating the differential diagnosis⁸.

6) **Neoplastic Toothache**

Orofacial discomfort is one of the first signs of oral cancer. The symptoms of squamous cell carcinoma on the gingiva, vestibule, or floor of the mouth resemble tooth discomfort. The intraosseous variant of SCC's localized bone loss may be mistaken for localized periodontal disease. Nasopharyngeal cancers, lymphomas, leukemia, distant non-metastatic cancers, and metastatic malignancies are several tumors that might exhibit signs of odontogenic origin. The most frequent observation in the metastatic illness of the jaw bone is the presence of pain and paresthesia. When a patient consults the dentist for oral cancer, orofacial discomfort may be the first sign of the disease. Nasopharyngeal malignancies can exhibit symptoms and signs resembling temporomandibular disorders, parotid gland lesions, and odontogenic infections with trismus. Such tumors manifest as face discomfort, restricted jaw opening, jaw deviation upon opening, earache, and headache; these symptoms might be mistaken for an odontogenic cause. The symptoms of systemic tumors like lymphoma and leukemia, which invade pain-sensitive tissues like the periosteum and gingiva and create localized pain that

may be mistaken for odontogenic pain, might resemble toothache-like symptoms. When clinical signs and the outcomes of an odontogenic diagnosis cannot be associated, dental professionals should thus exercise appropriate judgment. When localized soft or hard tissue alterations appear adjacent to odontogenic structures and diagnostic results are unclear or unfavorable, neoplastic toothache must be taken into account⁸.

7) Psychogenic Toothache

Psychogenic dental pain might arise as a result of psychological stress. Pain can be dispersed, nebulous, non-localized or acute, stabbing, severe, and temperature-sensitive. Pain may move from one tooth to another when several teeth are involved. A diagnostic problem results from these traits' resemblance to the pain of odontogenic etiology. Although the existence of a psychological aspect obscures the non-odontogenic source of pain, the lack of a physiological or pathological reason does. Pain frequently

accompanied by mental symptoms like hallucinations or delusions is more likely to be psychogenic in origin. Such a problem cannot be treated by dental management since the pain symptoms remain. Treatment responses range from no reaction to surprising responses. Early detection and referral to a psychiatrist can prevent unnecessary dental treatment⁸.

1.4 Management of orofacial pain

Potential diagnostic difficulties are unavoidable due to the intricacy of the anatomy, the orofacial region's involvement in neurobiology, and the many ways toothaches manifest. These problems are worsened by the siloed training of practitioners who provide patients in their urgent quest for a precise diagnosis and efficient treatment of their orofacial discomfort, often contradictory advice, or worse, perform unneeded surgery. There are clear standards for many pain presentations listed below (Table I), and effective communication will probably result in diagnosing a diagnosis¹.

Table I: Management of orofacial pain¹

Type of pain	Condition	Medical management
Nociceptive pain	Dentine sensitivity	Topical agents
Inflammatory pain	Irreversible pulpitis Dental abscess	Extirpate RCT or extraction No antibiotics
Inflammatory pain +/- Mixed Ne centralised	TMD Arthromyalgia Arthritides	Non interventional Analgesia Paracetamol ibuprofen Bite Guard
Neurovascular pain	Headaches Migraine	TCAs, Triptans< GON Block or Botox
Neurovascular pain	Trigeminal Autonomic Cephalalgias	CH GON block SUNCT Lamotrogine PH Indomethacin trial
Neuropathic pain	Primary PDAP I or post-traumatic	TCAs, Gabanoids, SSRIs
Neuropathic pain	Burning mouth syndrome	TCAs, topical clonazepine, SSRIs
Centralized pain	PIFP Chronic headache	TCAs, Gabanoids, SSRIs

1.5 Systematic factors contributing to chronic pain

Neuromatrix disease is persistent pain. When tissue damage has healed, the brain continues to override pain in the healthy region, resulting in chronic pain perception in healthy tissues. It is a disorder of the peripheral and central nervous systems. Depending on the mechanistic distinction, there are two forms of chronic pain: neuropathic and dysfunctional. Nerve damage is related to neuropathic discomfort. Unknown causes exist for dysfunctional or concentrated pain¹. Various characteristics of chronic post-surgical pain have been linked to chronic pain propensity, which suggests that a patient may have a phenotypic and genotypic tendency to develop chronic pain. Genetic and psychological variables have been identified as risk factors for people who are susceptible to acquiring chronic pain states. Due to their possible lack of familiarity with persistent pain, dentists frequently mistake healthy toothaches for non-odontogenic pain¹.

1.6 Different Types of Inflammatory Pains

There are numerous types of pain: the "bread and butter" of dental treatment are the healthy nociceptive and inflammatory pains, whereas unhealthy non-protective pains include neuropathic pain with or without autonomic components and dysfunctional or centralized pain⁸. The most frequent inflammatory pain in the orofacial area is dental pain. After an injury, good inflammation causes short-lived

discomfort. Inflammatory pain comes in several forms, including reversible and permanent pulpitis and Periapical periodontitis⁵. A thorough history and examination will reveal the reason for dental-related discomfort in most emergencies. Inflamed pulp or exposed dentine can both result in sharp, shooting pain. Numerous conditions, including food impaction, dental caries, and ulcerative gingivitis, can result in dull throbbing discomfort⁹.

1.7 Different types of temporomandibular pains

People react differently to different jaw joints and chewing muscle disorders. According to researchers, the three primary categories of conditions are as follows.

- 1) Myofascial pain is characterized by discomfort or pain in the jaw-controlling muscles.
 - 2) Internal joint derangement includes a misplaced disc, a misaligned jaw, or damage to the condyle.
 - 3) "Arthritis" describes inflammatory and degenerative joint conditions that can affect the temporomandibular joint.
- The symptoms of TMJ issues can range widely. The most prevalent symptom is pain, particularly in the chewing muscles and jaw joints. A change in how the upper and lower teeth fit together is one of the other possible signs. Other symptoms include radiating pain in the face, jaw, or neck; stiffness in the jaw muscles; restricted jaw mobility or locking; severe clicking, popping, or grating in the joint while opening or shutting the mouth¹⁰. Three categories of TMDs

may be distinguished: arthritis, dysfunction, and arthromyalgia. TMDs and headaches are chronic pain diseases that most often affect the orofacial area. Patients with TMD have a high comorbidity of persistent pain. By referring pain to the second and third divisions of the trigeminal nerve, dental professionals must know that TMD myofascial pain might resemble pain in the posterior maxillary and mandibular molars. The maxillary and mandibular molar teeth might be the source of myofascial discomfort associated with TMDs¹.

1.8 Neurovascular pain

Due to the trigeminal nerve's V2 and V3 branches' supply to the temporal meninges, migraine might resemble dental pain. Given that the trigeminal nerve's v2 and v3 branches supply the temporal meninges, neurovascular pain brought on by migraines can resemble dental discomfort¹¹. According to reports, the second and third divisions of the trigeminal system might be affected by migraine¹. There are many dental discomforts from migraines being wrongly treated with root canals, dental restorations, and subsequent extractions. Unsurprisingly, these therapies did not relieve the patient's suffering in two cases. Numerous chronic pain syndromes, such as trigeminal autonomic cephalalgia owing to broken tooth syndrome, might be misdiagnosed due to the varied ways in which toothaches occur. Unfortunately, these individuals were subjected to ongoing dental and ENT invasive treatments and improper medicine since a basic pain history, including migrainous-related indications or a history of headaches, was not taken¹. Premaxilla (30%), V2 (17%), and V3 (31%) are the orofacial areas most frequently affected by neurovascular pain, with discomfort lasting nine to sixteen hours and affecting mostly men¹².

1.9 Neuropathic pain

The damage to nerve fibers caused by numerous aetiologies, such as toxic, traumatic, ischemic, metabolic, viral, or compressive damage, is known as neuropathic pain. Positive signs frequently include unpleasant or changed sensations, including tingling, prickling, or pain characterized as shooting, stabbing, searing, or having an electric shock sensation. Reduced feelings brought on by the loss of sensory function are referred to as negative symptoms. Additionally, patients may feel anesthesia dolorosa (pain in an anesthetic or numb location), allodynia, and hyperalgesia¹. The patient history and physical examination are the foundation for diagnosing Neuropathic pain. The typical descriptions of neuropathic pain include searing, painful, chilly, or electric shocks. It may also include tingling, pins & needles, numbness, or itching. Patients with post-traumatic neuropathy seldom exhibit clinically or radiographically detectable abnormalities, making the condition difficult to identify. The mandible is where neuropathic pain associated with dental implant placement is most frequently reported. It is brought on by ischemia from swelling, hemorrhage, or direct trauma from the drill or implant to the inferior alveolar or lingual nerves¹.

1.10 Assessment of non-odontogenic orofacial pain

It is typically challenging for both patients and dentists to identify the cause of discomfort. The patient's responsible for describing the pain clearly since the dentist or doctor can only diagnose it when the patient gives a particular history of the discomfort. Counseling a patient involves distinctive

knowledge, skills, and amazing communication abilities¹³⁻¹⁷. Understanding the patient's condition with a thorough history is crucial for making a correct diagnosis. The attentive, receptive practitioner may quickly establish a rapport with the patient.

Additionally, the resulting trust can enable the patient to speak openly with the visiting practitioner, providing crucial information about the procedure and feedback. Dealing with the patient's wants is vital; in certain circumstances, a repair is not feasible regardless of dosage. It is crucial to provide the patient with a clear understanding of what is happening and attainable goals^{18,19}. Those who experience chronic discomfort may overestimate their explanations. It is a result of worries and anxiety that might intensify the experience of pain. To identify the pain, the patient needs to have numerous components of the pain evaluated¹⁹. A multidisciplinary strategy, which may involve a team comprising a dentist, psychologist, neurologist, and pain management specialist, is necessary to care for persistent facial pain. It is done to fulfill each person's wish for an acceptable therapy¹⁷.

1.11 Investigation in non-odontogenic orofacial pain

The only objective symptom is pain; the key to successfully managing orofacial discomfort is a precise diagnosis. There are many different research techniques, including questionnaires that are sensitive and have been validated. Dental caries and periodontal abnormalities can be diagnosed using imaging techniques such as periapical X-rays. Cone-beam-computed tomography has been employed to detect flaws in dental panoramic tomography, which may be used to detect cysts, bone defects, and temporomandibular problems. Salivary gland problems can be treated using computed tomography and magnetic resonance imaging^{20,21}. The clinical diagnosis should be confirmed before beginning a final course of treatment. 4 techniques can aid in the diagnosis, including:

- 1) Diagnostic analgesia blocking muscles in the craniofacial area, TMJ, and the masticatory system helps identify masticatory pain and non-masticatory myofascial pain problems²². Injections into muscles, nerve blocks, and intracapsular injections are included²³.
- 2) Making use of diagnostic medications
- 3) Consultation if necessary, get medical advice to identify pain conditions correctly.
- 4) Trial treatment is an excellent way to confirm a diagnosis for a little time, provided the examiner knows the effects of placebo therapy. Oxcarbazepine can be utilized to confirm a paroxysmal surface diagnosis that is in doubt. As this medication has no analgesic effect, it does not reduce pain. During a few days, if alleviation exceeds the 40% maximum placebo effect, it is presumed that the illness in issue is paroxysmal neurologic. Yet a lack of alleviation does not rule out a neurological issue²³

1.12 Management of non-odontogenic orofacial pain

The head, face, and neck are affected by orofacial pain. The treatment of orofacial discomfort needs a multidisciplinary approach and an accurate diagnosis. The dentist can treat odontogenic etiology, but a multi-disciplinary approach is necessary to treat non-odontogenic pain²⁴. The following factors are included under pain management: Removing

noxious stimuli that cause pain, intercepting nociceptive pathways, and Understanding the neuronal mechanism of pain inhibition²⁵.

1) **Physical therapy**

Orofacial discomfort may be successfully treated with physical therapy and neuromodulation. A possible therapy option for patients may be the modulatory influence of the sensory stimulation method as a neuro mechanism for managing orofacial pain related to TMD²⁵. The techniques to stimulate the body's natural sensory receptors include superficial massage, mustard plaster counterirritation, vaporizer treatment, mechanical vibration, and hydrotherapy²⁴. Among transcutaneous sensory stimulation are electro-acupuncture and TENS²⁴. Electrical current stimulation of subcutaneous nerves is a form of percutaneous sensory stimulation²⁶.

2) **Thermovision**

Inflammation linked to orofacial discomfort can be localized using thermovision. To view inflammation related to or possibly causing orofacial discomfort, thermal imaging is a viable and affordable tool²⁷.

3) **Thermal therapy**

Mild heat promotes healing by boosting circulation. TMD, the face, and the neck are all treated with various superficial heat treatments. The therapeutic application of this approach in TMD therapy is supported by the advantages of heat, including pain reduction, reduced muscular tension, enhanced jaw functioning, and greater mouth opening. Thermal stimuli were applied for 5 to 30 minutes at least once every day²⁸.

4) **Cryotherapy**

The use of cryotherapy removes heat from the body²⁶. During intraoral surgery, cryotherapy is frequently given to increase healing by reducing swelling and pain²⁹. Cryotherapy has been approved for treating Vascular malformations, Leukoplakia, Hyperplastic lesions, Mucous cysts, facial pain, TMJ pain, and oral cancer²⁹. Minimal scarring also enhances the aesthetic result. Ice packs, ice massage, ice wrapped in paper towels, gel packs, ice chips in plastic bags, ice in washcloths, melting ice water via wet towels, and rubber ice bags are just a few methods to produce heat abstraction. These techniques will keep the tissues cold and lessen swelling and inflammation³⁰. Many lesions of the head and neck can be effectively treated with cryotherapy.

5) **Ultrasound**

According to the ultrasonic wave propagation theory, energy may go into deep tissue²⁶. As a pre-diagnostic, diagnostic, and therapeutic tool in dentistry, therapeutic ultrasound has been employed extensively in the medical area for use in urology, surgical intervention, bone healing, cancer-related osteointegration, and the healing of fully excised cutaneous lesions³¹. By causing the occlusion of dentinal tubules, ultrasound treatment that supports dentin development and repair may also reduce dentin hypersensitivity³².

6) **Diathermy**

Diathermy is heating bodily tissue by conversion using shortwave or microwave electromagnetic radiation³³.

7) **Manual techniques**

- **Massage:** Light stimulation of the cutaneous sensory nerves inhibits pain perception. Pain can frequently be diminished by gently massaging the tissues surrounding the affected location³⁴.
- **Stretch and spray method:** As a vapor-coolant, fluorimethane combines fluorocarbons. When the muscle is being stretched, parallel sweeps of vapocoolant are administered toward the pain source. For optimal effects, moist heat should be provided after the therapy. Myofascial trigger sites are treated with it³⁵.
- **Exercise:** The idea that a strong contraction of an antagonist's muscle results in a reflex relaxation of an agonist's muscle is utilized to treat masticatory muscle spasms³⁴.
- **Physical exercise:** Maintaining physical activity is a crucial component of treatment for people with chronic pain. Patients frequently retreat and retire to their beds. Those who maintain aerobic fitness levels report feeling better, sleeping better, and being more focused³⁴.
- **Psychiatric counseling:** Psychological treatment may include counseling and training in behavioral change³⁴. Training in behavioral modification: Training in stress reduction and relaxation are two forms of behavior change.

2. **FUTURE PROSPECTS AND RECENT RESEARCH**

2.1 **Local anesthetics**

Local anesthetics reversibly impair neuronal transmission by inhibiting sodium channels inside the neuronal membranes. The smaller nerve fibers are more sensitive to local anesthetics than nerve fibers of a larger diameter. The bigger diameter A beta and A alpha fibers are inhibited after the pain-conducting C- and A delta fibers. The efficacy of local anesthetics varies according to how well they dissolve in lipids. The potency of the topical anesthetic increases with lipid solubility. The most effective local anesthetic is lidocaine, an amide type of drug. Without the vasoconstrictor, doses up to 2% induce adequate, quick, and transient anaesthesia^{35,36}.

2.2 **Botulinum toxin**

The botulinum toxin types A, which is thought to prevent central sensitization, causes sustained and extended muscle relaxation by preventing acetylcholine release at the motor end plate. Botulinum toxin's effectiveness has been demonstrated in several trials to be greater than that of steroids and local anesthetics³⁷, and it may be helpful for individuals with myofascial pain syndrome who are resistant to conventional therapy; normally, it is not utilized in emergency conditions. Botulinum toxin therapy is typically well tolerated. However, side effects might include brief localized weakness and pain around the injection sites. An asymmetric smile or loss in muscle size, paresthesia, eye drooping, weakness, changes in speech, and bruises, among other things, may be noted in some circumstances³⁸. To assess the clinical results of treating non-odontogenic atypical orofacial pain with botulinum toxin A, Sang-Yun Kim et al.

conducted research between 2015 and 2017. According to the study, using botulinum toxin-A with other drugs and physical therapy is the most effective way to reduce pain ³⁹.

2.3 Corticosteroids

In individuals with post-herpetic neuralgia, trigeminal neuropathy caused by a traumatic neuroma, cluster headaches, and cervicogenic headaches, corticosteroids may be used with local anesthetics. Dexamethasone, triamcinolone, and betamethasone are three common corticosteroids. Patients with diabetes and glaucoma are advised to exercise caution. Ab unfavorable effects like localized alopecia and skin lightening are possible⁴⁴ following steroid injections. The greater danger of systemic side effects makes several injections advised. In addition to their adjuvant analgesic benefits, corticosteroids have an anti-inflammatory impact that locally reduces peripheral afferent sensitization⁴⁰. Steroids do not appear to have therapeutic significance for prolonging the effects of the local anesthetic, according to randomized controlled research ⁴¹.

2.4 Collagen

A component of the extracellular matrix called collagen is crucial for developing skeletal muscle networks. This new injectable treatment for myofascial pain uses muscle collagen. Compared to lidocaine and saline injections, the outcomes are encouraging, as demonstrated in a recent randomized clinical trial ⁴⁷. Repeated injections significantly reduced moderate to severe myofascial pain, but they also caused a rise in discomfort and edema that vanished within an hour after they were administered⁴². Nonodontogenic pain can have a wide range of clinical manifestations and may resemble other conditions that don't always have an orofacial etiology. The intensity of the pain might range from very little, sporadic discomfort to severe, acute, and ongoing discomfort. Additionally, pains felt in the tooth may not always be caused by dental structures, making it crucial to differentiate between the location and the cause of pain to make the right diagnoses and administer the proper treatments. The patient experiences pain at the site of the pain. However, the structure from which the pain truly comes is the source of the pain. The place and cause of pain are coincidental and present together in "primary" pain⁴³. In other words, there is pain where there has been structural damage. The physician does not face a diagnostic conundrum while treating primary pain since the treatment is apparent. Heterotopic pains have several locations and causes and can be difficult to diagnose. Once the cause of the pain has been identified, therapy should focus on that rather than the symptoms. Although the neurologic mechanisms underlying

heterotopic pain are poorly understood, it is generally accepted that they are related to the central effects of continuous nociceptive input from deep structures like muscles, joints, and ligaments. When suitable diagnostic tests do not reveal an odontogenic etiology in patients who report toothache pain, dental professionals should consider alternate aetiologies of the pain ⁴⁴. Incorrect diagnosis and unsuitable therapy will come from failing to determine the cause of the pain. Ozge Erdogan et al. performed retrospective research to examine the results of patients with suspected non-odontogenic pain who were sent to orofacial pain specialists following examination and treatment by an endodontist. The study concluded that it is difficult to diagnose and manage non-odontogenic pain. Patients may be more likely to experience persistent pain following endodontic therapy or suffer from an undetected, chronic orofacial pain disease as the genuine cause of their primary complaint⁴⁵. Understanding the trigeminal system's pain neurobiology is essential to produce more effective and secure treatments. It is important to emphasize the necessity of randomized controlled clinical trials to assess the effectiveness of established and novel treatments for orofacial discomfort. Shortly, groundbreaking research from the bench to the bedside will end the burden of chronic orofacial pain conditions.

3. CONCLUSION

With an appropriate understanding of the trigeminal system, the physician should be aware of the etiology and the obstacles that may mislead the diagnosis and make the therapy ineffective. Correct patient classification and disciplinary approach will provide helpful guidelines for using current information in treating orofacial pain problems based on a supportive and caring attitude. If the patient's pain complaints do not improve, one should look for other unusual conditions, and mental evaluation is also advised. Perhaps in the future, fascinating discoveries will relieve society's burden.

4. AUTHOR CONTRIBUTION STATEMENT

Dr. Aarati S. Panchbhai conceived the presented idea and encouraged Dr. Prasanna R. Sonar for this work. Dr. Prasanna R. Sonar wrote the manuscript with input from Dr. Aarati S. Panchbhai. Dr. Aarati S. Panchbhai helped with this manuscript's overall guidance and editing.

5. CONFLICT OF INTEREST

Conflict of interest declared none.

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