

# Differential Diagnosis of Orofacial Pain

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## Abstract

Orofacial pain, especially if the problem is chronic, presents a diagnostic and management challenge to all health practitioners. This paper suggests how clinicians might simplify the diagnosis of orofacial pain. First, the pain is classified into one of the three basic pain categories: somatic, neuropathic, or psychogenic pain. Somatic pain results from noxious stimulation of normal neural structures. Neuropathic pain is caused by a structural abnormality in the nervous system. Psychogenic pain arises from psychic causes; there is no apparent physiologic or organic basis for the pain. The next step is to determine the tissue system from which the pain arises: intracranial, extracranial, musculoskeletal, neurovascular, neurogenous, or psychological. Finally, some of the more common orofacial pain syndromes within each category are discussed.

**Key Words:** Somatic orofacial pain, neuropathic orofacial pain.

### **Introduction**

Diagnosing orofacial pain can be quite difficult and frequently presents a formidable challenge to even the most astute clinician. Patients may have multiple pain complaints and often present with a confusing constellation of signs and symptoms, which can result in a variety of diagnostic possibilities. For example, does the patient who presents with facial pain after chewing have a temporomandibular disorder (TMD), or could symptoms be related to a neuropathic disorder that was triggered by the chewing? This paper will offer a road map in an attempt to simplify diagnosis of some of the more common orofacial pain syndromes.

### **The Diagnostic Process**

The most important part of the diagnostic process is the history, which should include the following information concerning pain symptoms: (1) chief complaint(s); (2) characteristics of the pain(s) (location, mode of onset, quality, intensity, temporal behavior); (3) history of the present illness including results of previous examinations and treatment, and current medications; (4) any associated symptoms; (5) factors precipitating, aggravating, or relieving the pain; and (6) personal and past medical history. A physical examination should supplement the history. Various diagnostic aids such as imaging studies, laboratory tests, diagnostic anesthetic injections, and consultations with other health care practitioners may also be employed. In some cases, trial therapy may be necessary to confirm the diagnosis (1, 2).

### **Pain Categories**

Using the information obtained from the history, physical examination, and diagnostic tests, the clinician should determine which pain category (somatic, neuropathic, or psychogenic) best describes the patient's chief complaints.

#### **Somatic Pain**

Somatic pain results from the noxious stimulation of normal structures that innervate the affected area and is divided into superficial or deep somatic pain. Superficial somatic pain has a bright and stimulating quality, is primarily involved in acute pain conditions (e.g., mucogingival lesion) and usually does not present any diagnostic difficulty. In contrast, deep somatic pain arises from deeper body structures, has a dull, deep, depressing quality, and frequently exhibits CNS secondary excitatory effects such as referred pain to other sites and local autonomic effects (e.g., lacrimation, local edema, tearing of the eyes, and skin flushing). As a result, diagnosis can be elusive (1–3).

#### **Neuropathic Pain**

Neuropathic pain is due to a structural abnormality in one or more components of the nervous system that innervate the affected area. It can arise spontaneously in the absence of any obvious noxious stimulation and is usually described as bright, stimulating, and burning. Neuropathic pain may be accompanied by paresthesia along a distinct nerve distribution, and the severity of the pain is often out of proportion to the degree of stimulation; even light touch can cause intense pain (1, 3).

### **Psychogenic Pain**

Psychogenic pain originates in the mind; it is not elicited by noxious stimuli or any abnormality within the neural system. Although the patient has physical symptoms, there is no apparent physiologic or organic basis for the pain. Psychological factors are involved in the etiology, and a definite history of emotional or personality disorder is present (2, 4). Because an anatomic relationship between the pain source and the site of pain is absent, psychogenic pain may be felt in many areas, the location varying during the disease process. The degree of pain expressed by the patient is often exaggerated, and response to treatment is usually inconsistent (3–5).

### **Diagnostic Groups**

After establishing the pain category, the next step in the diagnostic process is to determine from which diagnostic group the pain originates. The clinician should then be able to identify specific pain syndromes on the basis of clinical characteristics as follows: (1) intracranial, (2) extracranial, (3) musculoskeletal, (4) neurovascular, (5) neurological, and (6) psychological (6).

### **Intracranial Structures**

Although pathology of intracranial structures is an uncommon cause of orofacial pain, it must be considered because of its serious consequences. Pain arising from a space-occupying lesion (e.g., tumor, edema) has a deep, dull, steady, aching quality, is usually progressive, and often has associated neurological signs or deficits such as weakness, sensory loss, or dizziness. Red flags for an intracranial lesion include a new onset headache in any patient older than 40 years of age or a change in the nature of a chronic headache, and pain accompanied by neurologic signs or deficits (7, 8).

### **Extracranial Structures**

Extracranial disorders include some of the more common disorders affecting the specialized structures: teeth, ears, eyes, nose, throat, sinuses, tongue, and glands. Because dental pathology is the most frequent cause of pain in and around the face and mouth, a good rule of thumb is to eliminate the teeth as the primary source of pain before proceeding to other suspected tissue systems. Odontogenic pain is of the deep somatic type and may exhibit a variety of central excitatory effects including referred pain, autonomic effects, and the induction of co-contraction and trigger points in muscles innervated by the trigeminal nerve (1, 9).

Orofacial pain is frequently due to maxillary sinusitis, located in the maxillary posterior teeth and face on the affected side. The mild-aching, non-pulsating pain is often associated with a feeling of fullness over the involved sinus, ear pain, deep eye pain, frontal headache, malaise, fever, nasal congestion, and nasal discharge. Pain does not originate from the lining of the maxillary sinus, as is commonly thought, but rather from the pain-sensitive structure of the nasal mucosa. Lowering of the head often increases pain by allowing any inflammatory exudate in the sinus to spread to the nasal mucosa, thereby causing referred pain to maxillary teeth. Opacification of the affected sinus may be detected by transillumination. Positive radiographic findings of inflammation in the sinus, along with elimination of pain by spraying local anesthetic into the nostril, confirm the diagnosis of maxillary sinusitis. Chronic sinusitis, as opposed to acute sinusitis, rarely causes facial or tooth pain (1, 10–13).

### **Musculoskeletal Pain**

Musculoskeletal pain falls into the category of deep somatic pain and is described as constant, dull, and aching, with occasional exacerbations of sharp pain. Functional activity, manual palpation of the affected area, and tests of provocation all increase the pain. This diagnostic group includes temporomandibular disorders (TMD), fibromyalgia, disorders of the cervical spine, and the various rheumatic and collagen diseases that can affect the muscles and joints involved in chewing and the cervical spine.

TMD consist of a group of related conditions which all impact adversely on mastication. Common patient complaints include pain in the preauricular area, jaw, face, temples, and ear, as well as limited mandibular movement and joint sounds during function. Cervical pain and dysfunction frequently accompany TMD (14).

Pains originating in the skeletal muscle, its tendinous attachment, and investing fascia are the most frequent causes of discomfort in the head and neck region, and can even refer pain to the teeth. This pain is usually diffuse and characterized by variability ranging from a feeling of pressure to excruciating intensity. Muscle pain can be divided into acute and chronic muscle disorders (15). Acute muscle disorders include muscle spasm, which is a sudden, involuntary contraction of a muscle or group of muscles, accompanied by pain, limited vertical opening of the mandible, and tenderness to palpation. Another acute muscle disorder is myositis, an inflammation of the muscle due to a local cause such as trauma, strain, or infection. Symptoms include swelling, tenderness to palpation, and pain with function (15).

The most common chronic muscular pain disorder is myofascial pain, a regional aching pain associated with localized tenderness in firm bands of muscle and tendons called trigger points (TrPs). Myofascial TrPs can develop in masticatory and associated head and neck muscles secondary to prolonged muscle tension, protracted muscle spasm, forward head posture, parafunctional activity, and trauma. Factors such as sleep disturbances, joint problems, viral diseases, and metabolic disturbances that weaken a muscle often predispose a weakened muscle to the development of TrPs (15–17). The key to diagnosing myofascial pain is to identify a TrP. When palpated, active TrPs cause referred pain in predictable patterns to a known reference zone and are often associated with secondary excitatory effects. Continuous, dull pain and localized tenderness in one or more muscles are characteristics of myofascial pain, but the severity of pain may range from mild to agonizing, excruciating, or incapacitating. In early stages, the pain may be more localized, but with chronicity, the TrP can refer pain to more distant sites (15–17).

Fibromyalgia (FM) is another generalized systemic chronic muscle disorder occurring primarily in women between ages 25 and 50. Unlike myofascial pain, which involves one or more specific muscles, FM is characterized by widespread pain and aching muscles throughout the body, especially in the weight-bearing muscles. The pain is accompanied by reproducible tender points at specific anatomical locations which are often confused with myofascial TrPs; both are tender to palpation, but only TrPs refer pain, elicit a jump response when palpated, and cause central excitatory effects (19). Inclusionary criteria for FM are a patient's complaint of chronic diffuse pain in all

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quadrants of the body for at least three months, and the presence of at least 11 of the 18 bilateral, symmetrical tender points in particular areas. Associated symptoms include chronic fatigue, a sleep disturbance, tension-type headaches, and irritable bowel syndrome. All blood tests and imaging studies are normal and diagnosis is by exclusion (15, 18).

Common disorders affecting the temporomandibular joint (TMJ) include a noninflammatory mechanical disturbance of the joint caused by a displaced articular disc (internal derangement), capsulitis, synovitis, and osteoarthritis. In its early stages, disc displacement with reduction creates a reproducible joint sound (click) present during opening and closing. Pain, when present, is perceived as a preauricular ache that often radiates to the ear, the side of the head, or the face, and is exacerbated by joint function. While many patients may demonstrate a click indefinitely without developing significant pain or dysfunction, a few patients may progress to a more advanced stage of dysfunction, including disc displacement without reduction. In its acute stage, disc displacement without reduction is characterized by an absence of clicking, signifying that the disc is still anteriorly displaced and not reducing. Severe pain in the joint, limited movement, and associated masticatory myalgia are often present. Over time, pain generally decreases and mandibular range of motion increases (19, 20).

When repetitive forces on the joint increase beyond its adaptive capacity, degenerative changes may occur in the articular surfaces. When these changes are accompanied by inflammation, the condition is referred to as osteoarthritis. Signs and symptoms of TMJ osteoarthritis usually include dull, aching pain with occasional burning in the joint and palpable joint tenderness sometimes accompanied by swelling. Crepitus, or multiple joint noises, and limited movement secondary to pain or degeneration may also eventually develop (14, 19, 21).

Of all the systemic polyarthritides, rheumatoid arthritis has the greatest propensity for affecting the TMJs, with a reported bilateral involvement of about 50%. Common TMJ complaints associated with rheumatoid arthritis include a deep, dull, preauricular pain during function, joint stiffness in the morning, clicking, crepitus, some loss in bite force, and tenderness to palpation. Progression of the disease process may cause condylar destruction and flattening of the eminence, resulting in an occlusal-facial deformity. TMJ symptoms often parallel the general disease; as the systemic disorder improves, complaints decrease. The key to the differential diagnosis is the presence of generalized symptoms in other joints of the body, including pain, swelling, morning stiffness, and loss of function along with positive laboratory findings (19, 21).

Lyme disease is a multi-organ disorder which can cause systemic effects such as headache, stiff neck, chills, fever, diffuse myalgias, malaise, and marked fatigue as well as neurological and cardiovascular abnormalities. Even though it is usually associated with large peripheral joints such as the knees, Lyme arthritis can involve the TMJ. Common symptoms include ear pain, TMJ pain, jaw claudication, and occasional palsy of the facial nerve. Because Lyme disease may mimic hundreds of other disorders, it frequently creates a diagnostic dilemma. Any complaint of TMJ pain or difficulty in chewing when accompanied by varying, unexplained symptoms should include Lyme disease in its differential diagnosis (22, 23).

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The cervical spine is an integral part of the upper quarter, which is composed of the head, neck, and shoulder girdles. Any dysfunction or disorder involving one of these components has the potential to cause pain in an adjacent or functionally related area. Degenerative joint disease involving the cervical vertebrae, disc disease, rheumatic disorders, and trauma are the most frequent causes of cervical clinical syndromes. Another, often overlooked source of pain that arises from the cervical region is related to forward head posture. Forward head posture, especially when accompanied by forward shoulder position, has been associated with the development of myofascial TrPs in the sternocleidomastoid and upper trapezius muscles. Entrapment of the greater occipital nerve, causing occipital neuralgia, may also result from forward head posture (24, 25). Common symptoms related to a cervical spine disorder include neck pain and dysfunction, as well as referred pain to the head and face. When the pain is musculoskeletal in origin, it is most often described as a deep ache with sporadic episodes of sharp pain when the area is stressed. Limited range of motion of the head and cervical spine, accompanied by pain or suboccipital tenderness and pain provoked by head and neck movement, may indicate a possible cervical etiology of pain (24–26).

### **Neurovascular Disorders**

The neurovascular pain disorders (migraine, tension-type, and cluster headaches) are common causes of chronic head and neck pain. They are a source of great concern because they can be severe and incapacitating. The pathogenesis of migraine headaches is controversial, but current research has implicated a neurogenic etiology (neurogenic inflammation) possibly causing secondary cerebrovascular changes. A wide diversity of factors are known to be capable of triggering the attacks, including diet, stress, sleep disturbances, and menstruation. The forms of migraine that the clinician is most likely to encounter are migraine with aura, formerly known as classic migraine, and migraine without aura, previously referred to as common migraine (16, 21, 51).

No laboratory or radiological tests exist for migraine; diagnosis is made on the basis of clinical features. Both forms of migraine have a hereditary predisposition, begin at a young age, primarily affect women, and occur with a variable frequency. Typical attacks may last from 4–72 hours, are usually unilateral, and are characterized as having pain that is pulsating with moderate to severe intensity. Sometimes the pain may be bilateral, especially in children, and non-pulsatile. Migraine is commonly associated with symptoms of nausea and/or vomiting, photophobia, and phonophobia. These headaches often begin immediately after awakening or soon thereafter. Routine physical activity aggravates them. Patients typically are unable to function and just wish to lie down in a dark room. Clinically, migraine with aura is similar to migraine without aura except that the attack is preceded by some symptoms which start from several minutes to an hour before the onset of the headache. This prodrome is characterized by visual disturbances, such as flashing lights and colors, zigzag patterns, or blind spots and, on occasion, numbness and tingling more on one side of the face and arm (21, 51).

Although cluster headaches are relatively uncommon, it is one of the most severe forms of headache and facial pain, and has been referred to as a "suicide headache" (7). Cluster headaches predominantly affect males, with a clinical male-to-female ratio of 5:1. There are two types: an episodic type, where the attacks of pain occur during a time of susceptibility, known as the cluster

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period, which may last for weeks or months; and a less common chronic form, where there is an absence of pain-free remission periods (9, 11). A cluster attack may last from 15 minutes to 3 hours, and can occur from once every other day to as often as 8 times per day. Frequently, the patient is awakened from sleep by the attack. Cluster pain is excruciating and has a boring, sharp, or burning quality. A typical attack is unilateral in location, involving the periorbital area, often with radiation to the ipsilateral temple and maxilla, including the teeth. It is almost always associated with autonomic symptoms such as lacrimation from the eye on the affected side, nasal congestion, rhinorrhea, forehead and facial sweating, ptosis, and eyelid edema. Another form of cluster, paroxysmal hemicrania, occurs mostly in females and features similar attacks that are shorter and more frequent (9, 20, 36).

Tension-type headache, previously called tension headache or muscle contraction headache, is divided into two major categories: episodic and chronic. The episodic tension-type headache lasts for 30 minutes to one week while the chronic form occurs with a frequency of at least 15 days a month for at least 6 months. Pain is usually described as a steady, dull, aching sensation of mild to moderate intensity, but throbbing pain may occasionally be present. The headaches occur primarily in the bifrontal occipito-nuchal and bitemporal areas, and are often associated with stiffness and tenderness of the neck. Photophobia or phonophobia may also be part of the headache complaint in some patients. Unlike migraine, physical activity does not worsen the pain, and nausea is usually absent (27–33). The chronic type may evolve from the episodic type and shares similar clinical features. Tension-type headaches must be differentiated from migraine without aura, referred pain from myofascial trigger points, cranial arteritis, and TMD, especially when bitemporal pain is a chief complaint. Some authors use another term, chronic daily headache, to describe a daily headache with clinical features primarily of a tension-type headache with superimposed episodes of migraine. Chronic daily headache is believed to represent a transformation of episodic migraine syndrome. These symptoms, called by some the rebound headache, may also result from frequent and excessive use of prescription and over-the-counter medications (34–37).

### **Neurological Disorders**

Neurogenic or neuropathic pain is due to a functional abnormality within the peripheral nervous system and does not involve noxious stimulation. Neuropathic pain may be divided into two main categories: paroxysmal and continuous disorders (1, 2). The most common paroxysmal facial pain is trigeminal neuralgia (TN), which occurs unilaterally in the distribution of one or more divisions of the trigeminal (V) nerve, usually the mandibular or maxillary. The time pattern of the pain is episodic, lasting for a few weeks to approximately a month, followed by a remission period of several months or years. When a pathological causal component (e.g., tumor, aneurysm, multiple sclerosis) can be identified, TN is classified as symptomatic; if a causative factor cannot be found, the condition is known as idiopathic TN. Onset is usually after age 40, affecting women more than men in a 3:2 ratio (1, 38, 39). TN can present as pain originating in the skin of the face, part of the mandible or maxilla, or frequently as a toothache, leading to a misdiagnosis of dental pathology. Patients describe the pain as "the worst pain I've ever had" and trace the pain along the path of the affected nerve (12). About 50% of patients have trigger zones on the face, which when lightly touched can precipitate the characteristic pain, causing patients to avoid normal activities such as eating, talking, or washing the

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face (39, 40). A careful history, along with a lack of obvious dental cause, should rule out odontogenic pain. TN must also be differentiated from TMD. Normal mandibular function can trigger the pain when trigger zones are present, and tic-like cramps or involuntary spasms of the facial muscles known as tic douloureux, often accompany a typical pain attack. A local anesthetic block of the involved nerve will almost always arrest the pain of TN, but will not usually affect TMD symptoms. This procedure, in combination with a careful history, should lead to the correct diagnosis (41, 42).

Continuous neuropathic disorders are characterized by constant, unremitting pain of variable intensity. The pain usually has a burning quality and may be accompanied by paresthesia (abnormal sensation) or dysesthesia (unpleasant sensation). A most perplexing example of a continuous neuropathic disorder is atypical odontalgia (AO), also known as phantom tooth pain. AO refers to persistent pain in apparently normal teeth and surrounding alveolar bone, or at extraction sites from which teeth have been removed because of pain (1, 43, 44). AO occurs mostly in women in their early forties, frequently affecting molars and bicuspids. Common characteristics are constant toothache or dental socket pain which can spread to other teeth, chronicity greater than four months, normal radiographs, and no clinically observable cause. The pain is usually described as dull, aching, throbbing or burning, and may be accompanied by an increased sensitivity to pressure over the affected area, and a feeling of dysesthesia. Standard dental diagnostic procedures such as pulp testing, thermal testing, and percussion give inconclusive results, and diagnostic nerve blocks are usually equivocal, leading to a diagnosis by exclusion (41, 43, 44). Current thinking seems to favor the concept of deafferentation initiated by some form of trauma to the offending tooth, such as endodontic therapy, endodontic surgery, periodontal surgery, tooth extraction, traumatic injury, or implants. “Deafferentation” refers to the partial or total loss of a sensory nerve supply to a particular body region. Following nerve injury, there is usually a feeling of numbness. However, in a small percentage of cases, a paradoxical situation of spontaneous pain may develop in the area of the diminished sensation. Onset of deafferentation pain can be delayed after the initial tissue damage, is highly resistant to treatment, and can spread to other orofacial structures (44–47).

Clinicians should also be aware of two other continuous neuropathic disorders affecting the trigeminal nerve: traumatic neuromas and trigeminal neuritis. When a peripheral nerve is partially or completely severed as a result of trauma injury, it attempts to repair the damage by regenerating. When this attempt is unsuccessful, a disorganized, intertwined mass of nervous tissue can result. Neuromas are characterized by deep, aching, burning pain induced by compression or stretching at the site of injury (41, 48). Trigeminal neuritis is due to inflammation of the peripheral branches of a nerve trunk as a result of trauma, bacterial or viral infection, or toxic causes. The pain is described as burning, bright, or stimulating, and is usually accompanied by a feeling of paresthesia or anesthesia in the distribution of the affected nerve. An example of neuritis affecting the facial nerve is Bell’s palsy, which usually results from compression of the nerve inside the facial canal or stylomastoid foramen. Although Bell’s palsy is not usually painful, it often causes facial paralysis and an obvious facial asymmetry (49). It should be noted that the sympathetic nervous system, specifically sympathetic efferent activity, may be involved in various deafferentation pain disorders as well as other neuropathies related to trauma. Sympathetic involvement should be suspected when the pain

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spreads, is refractive to treatment, and is accompanied by extreme sensitivity to light touch (allodynia), and autonomic symptoms (50, 51).

### **Psychological Disorders**

Pain from psychological causes includes somatization disorder, conversion hysteria pain, and hypochondriasis, all of which exhibit the clinical characteristics of psychogenic pain. Because most patients with chronic pain have psychological problems (e.g., depression, anxiety), their pain is incorrectly labeled as psychogenic in origin. Chronic pain behavior must not be confused with psychogenic pain. While psychogenic pain arises from an emotional or personality disorder that fulfills psychiatric diagnostic criteria, the psychological problems found in chronic pain patients are the result of the pain rather than its cause (5, 52, 53).

### **Conclusion**

An organized approach is necessary to assess and diagnose orofacial pain, since multiple medical and dental specialties are involved in the management of patients. The clinician must be able to correctly diagnose and treat the patient accordingly, or refer the patient to the appropriate specialist.

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