

Idiopathic Orofacial Pain: A Review

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The Internet Journal of Pain, Symptom Control and Palliative Care ISSN: 1528-8277

Citation: I.L. Alberts: Idiopathic Orofacial Pain: A Review. *The Internet Journal of Pain, Symptom Control and Palliative Care*. 2009 Volume 6 Number 2. DOI: 10.5580/19df

Keywords: Orofacial pain, idiopathic pain, facial pain, toothache, atypical pain, temporomandibular joint

Abstract

Pain in the orofacial region is both common and distressing. Their complex anatomy and aetiologies make their diagnosis challenging, frequently overlapping various surgical and medical disciplines, which makes their classification complex. Furthermore, there are a group of unclassified idiopathic pains, which frequently remain refractive to treatment. Traditionally, these pains were thought to be psychogenic in origin. Recently, this hypothesis has come under doubt, and for some idiopathic pains putative mechanisms have been proposed. This paper seeks to review the current literature on orofacial pain.

Introduction

Pain in the orofacial region is a common affliction, affecting between 10 and 50% of the population^(24, 52, 3). pain in the face and oral region can be particularly distressing and has a significant psychological meaning due to the region's role in speech, mastication, communication and body image^(40, 53). the trigeminal nerve is responsible for the sensory and motor innervation of much of the orofacial region, and takes up the bulk of the sensory cortex of the human mind, which also explains the highly distressing nature of pain in this region⁽⁴⁶⁾.

The International Association for the Study of Pain ([[IASP]]) definition of pain as: “*an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage*”⁽⁵²⁾ emphasises that pain is part of a pathological process. the cause could be local disease, neurogenic or vascular in nature, or referred from the neck and chest⁽³¹⁾. however, there remains an ill-defined and rare group of facial pains, which manifest themselves despite any discernible pathology. they are frequently termed atypical, idiopathic or non-somatic. although there is no pathological cause for the pain, the sensation felt by the patient is very real⁽³⁶⁾.

Patients suffering from these pains are frequently described as having underlying psychiatric disturbances^(51, 52, 25). however, the exact aetiology and classification of idiopathic orofacial pains remain a topic of controversy. this paper will first define what is meant by orofacial and idiopathic facial pain, and provide a review of recent literature on the subject.

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Physiology of Orofacial Pain

Pain forms one of the four hallmarks of acute local infection as described by the Roman physician Celsus “*rubor et tumor cum calore et dolore*”⁽⁴³⁾. algogenic intracellular factors are released locally from cell death, activating the phospholipids pathway, kinin pathway, histamine releasing mast cells and serotonin release⁽⁴⁶⁾. these factors initiate depolarisation of

nociceptors: sensory receptors which form the end of myelinated (a-fibre) and un-myelinated (c-fibre) nerves. nociceptors can be further sensitised by the action of prostaglandins produced by cyclo-oxygenase enzymes⁽⁶⁾. pain in the region is primarily conveyed by branches of the fifth cranial nerve (trigeminal nerve), which projects to the nucleus caudalis of the medulla, which is the functional equivalent of the spinal dorsal horn. from here, second order neurons project to the thalamus, where third order neurons project to the cortex⁽⁵³⁾. within the nucleus caudalis, primary afferent neuron terminals can synapse with several second order neurons, which is termed *divergence*. Furthermore, each secondary neuron can receive signals from several primary afferent neurons, which is termed *convergence*. Divergence and convergence together can explain how some pains are felt to radiate over a larger area, and how pain can be referred from one site to another⁽⁹⁾. within the nucleus caudalis the signal can be subject to further modulation by descending higher pathways, with a 'gate' acting between the primary and second order afferent neurons. this is the 'gate theory'⁽³⁴⁾. ultimately tertiary neurons in the cortex are activated, resulting in not only the sensation of pain and a physical response, but a downward neurological response, which essentially results in a positive feedback loop of nerve-induced inflammation at the site⁽⁴⁶⁾. the sensation of pain can therefore be dissociated from peripheral activity⁽¹⁴⁾. in summary, pain is recognised as being not a direct function of physical injury, but a complex interaction of cognitive and sensory processes, including past experiences, anxiety, attention and comprehension of the situation⁽³⁴⁾.

Aetiology of Orofacial pains

As described, pain is commonly a response to local tissue damage, which is termed acute pain. Specifically, in the orofacial region, the damage could have a variety of origins. The most frequent cause is dental caries, resulting in pulpitis⁽⁵¹⁾. however, the differential diagnosis of pain in the face of non-odontogenic origin can be complex due to the multitude of possible causes⁽⁵⁵⁾ (see figure 1.)

Dental	Pulpitis, cracked tooth
Periodontal	Gingivitis, periodontitis, pericoronitis
Mucosal	Ulceration
Temporomandibular (TMJ)	Traumatic acute dysfunction
Maxillary sinus	Sinusitis and carcinoma
Salivary glands	Sialadenitis, obstruction
Ear	Otitis externa
Tonsils	Quinsy
Referred pain	Angina, cervical spondylosis, lung cancer, eyes

Table 1: Some common causes of orofacial pain^(52, 50)

A second form of pain is chronic, or neuropathic pain. Chronic pain is defined as pain lasting longer than three months, or pain that outlasts the inflammatory stimulus⁽⁴⁶⁾. as with acute orofacial pain, there are a plethora of possible causes for chronic orofacial pains (see figure 2).

Neurological	Trigeminal neuralgia (tic douloureux), multiple sclerosis, post-herpetic and HIV.
Nociceptive	Cancer, osteoarthritis
Inflammatory	Rhematoid arthritis
Temporomandibular (TMJ)	Facial athromyalgia
Vascular	Migrane
Muscular	Tension headache
Idiopathic	Atypical odontalgia, idiopathic facial pain, burning mouth syndrome

Table 2: Some common causes of chronic pain in the orofacial region⁽⁵²⁾

An accepted classification or taxonomy of facial pain currently does not exist. The International Headache Society groups "atypical facial pains" which persist despite any observable organic cause under the heading "persistent idiopathic facial pain"⁽²¹⁾ and therefore lists it as an unclassifiable category of facial pains.

Idiopathic and Atypical Facial Pains

Trigeminal neuralgia is a well known example of an idiopathic facial pain, in that the exact aetiology of the disorder is currently unknown. The pain however, is well described, being sudden, sharp or electric shock-like with non-painful stimuli frequently triggering the pain⁽¹³⁾. it is observed that demyelination of the root entry zone of the trigeminal nerve is a common factor, which could be caused either vascular compression, or a mass lesion compression of the nerve⁽¹⁰⁾. the

disease can present in its atypical form⁽⁵⁶⁾, particularly following surgery to the oral cavity, head and neck, or ear nose and throat and is associated with an underlying, persistent burning pain in addition to the paroxysmal lancinating pains associated with typical trigeminal neuralgia⁽⁸⁾. after the exclusion of other differential diagnoses (particularly multiple sclerosis or intracranial masses) a diagnosis of trigeminal neuralgia is possible, and the patient can often be managed with carbamazepine, or referred for surgery⁽¹²⁾. it is consequently well categorised⁽²¹⁾.

However, as described, some patients can present with pains that do not fulfil the criteria any known cause for orofacial pain, hence their unclassified status⁽²¹⁾. this makes their diagnosis one of exclusion of all other possible causes⁽¹²⁾. atypical facial pains are frequently referred to as being psychosomatic in origin^(50,52) although they may well erroneously include unusual presentations of facial pains with known causes⁽⁸⁾. this essay will use the classification system suggested by Woda et al. (figure 3), where atypical pains made as diagnoses of exclusion according to the IHS⁽²¹⁾ are called persistent idiopathic orofacial pains, although a variety of other terms abound in the literature⁽⁵⁶⁾

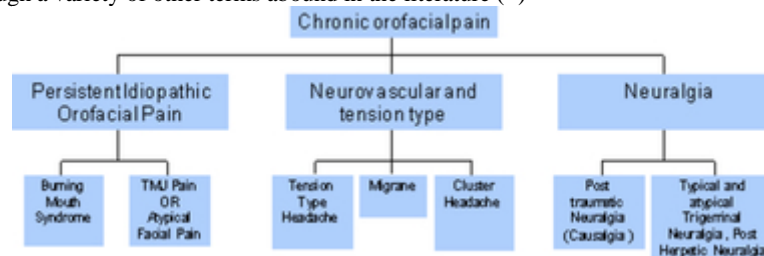


Figure 3: Classification of orofacial pains (adapted from 63)

Persistent Idiopathic Orofacial Pain

Having now carefully defined what is meant by pain ([[[specifically orofacial pain]]) and by idiopathic pain, we can now discuss persistent idiopathic orofacial pains in more detail. as described, they include all clinical manifestations of pain which cannot be categorised, and have no known organic cause. four main subgroupings of this pain can be identified which can present themselves clinically: atypical facial pain, atypical odontalgia, stomatodynia and temporomandibular disorders. in addition to the stated difficulties associated with the differential diagnosis of facial pains and the exclusion of all possible organic causes, the disorders are situated at the interface of several medical specialities⁽⁴²⁾. persistent idiopathic facial pain describes several unclassified symptoms of orofacial pain⁽²¹⁾, which will now be discussed in some detail.

Atypical Odontalgia

Atypical odontalgia is defined as prolonged or throbbing pain in the teeth or alveolar process, but has no identifiable odontogenic cause. Lilly and Law⁽²⁶⁾ describe a patient whose atypical odontalgia was incorrectly diagnosed as being of endodontic origin and then as trigeminal neuralgia, which resulted in various unnecessary treatments and surgery by dental and oral surgeons, neurologists and a neurosurgeon. unfortunately, such case histories are common. these treatments can exacerbate the pain and psychological anguish and frustration felt by the patient^(57,30,22). in the absence of any identifiable cause, it is frequently assumed that patients must have a psychological disorder^(45,50,44); an assumption for which little objective evidence exists⁽¹⁹⁾. while atypical odontalgia and depression are clearly linked⁽³⁾, it is thought that the pain precedes depression, rather than being its cause^(16,3). it is important to note that tricyclic antidepressants are frequently prescribed for patients with persistent idiopathic orofacial pains, but in lower doses than would be normal in patients with depression⁽⁴⁶⁾. while there are some purely psychosomatic pain syndromes⁽¹⁵⁾ are described, and must continue to be considered when diagnosing patients with persistent idiopathic orofacial pain, it is also worth considering various theories concerning the aetiology of atypical odontalgias.

Atypical odontalgia can be thought of as a “phantom tooth pain” and would therefore have a neuropathic cause, akin to the phantom sensations and stump pains, which are frequently felt by amputees⁽³⁰⁾. this mechanisms underlying amputees’ phantom pains are not completely understood, but involve peripheral ectopic activities, neuroplasticity including central sensitisation, and cerebral organisation^(32,56), which are also cited as possible pathological mechanisms for atypical odontalgias^(57,30).

It is cited⁽⁵⁷⁾ that invasive (dental, ENT or maxillofacial) surgical procedures can lead to the partial or complete severing of primary afferent trigeminal nerve fibres, which can lead to neuropathic iatrogenic pain⁽³⁰⁾. a theory of bacterial infection in the region of the trigeminal nerve is has also been suggested⁽⁵⁷⁾. the damage may also have been preceded by a facial trauma⁽⁵⁶⁾. the initial surgical procedure may well have been carried out in order to relieve pain: pre-existing pain and infection are possible indicators of post-amputation pain⁽³⁸⁾.

Psychological issues cannot be ignored. Patients may be pre-disposed, for example patients in a pain clinic were found to have high rate of sexual abuse histories⁽⁴⁷⁾, and is fully consistent with the “gate theory”⁽³⁴⁾. atypical odontalgia is therefore likely to be a grouping of several disorders, some of which may be purely somatisation disorders (of psychological aetiology), others may involve neuropathies, or central sensitisation in the subnucleus caudalis of the trigeminal nerve⁽⁵⁷⁾. in each case, a perjorative labelling of the patient’s pain as being purely “imagined” – which was the experience of 52% of patients⁽³⁰⁾ – is only likely to add to the patient’s psychological difficulties, the stigma attached to the disorder and their frustration with those treating them.

Stomatodynia

This sensation of burning in the mouth is also termed glossopyrosis, glossodynia or oral dysaesthesia, and involves a burning sensation in the tongue, buccal mucosa, gingivae, palate and pharynx⁽⁵⁾. the persistent, burning sensation is also associated with: “jaw pain, taste changes and subjective dry mouth, geographic and fissured tongue, painful teeth, loss of a comfortable jaw position, uncontrollable jaw tightness, headache, neck and shoulder pain, increased parafunctional activity, difficulty speaking, nausea, gagging and swallowing difficulties”⁽²⁰⁾. the pain is reported as being sufficient to cause difficulties in sleeping. there are various pathological causes for stomatodynia, including bacterial infections, xerostomia, irritation from dental prosthetics and materials⁽²⁷⁾.

In the absence of pathology, such patients are frequently thought, as with atypical odontalgia, to be suffering from depression, anxiety or hypochondria^(50,20). the aetiology of the disorder is unclear, with a variety of local and systemic factors. psychological factors are so often associated with the syndrome^(61,50,4) that it is frequently viewed as being psychological in origin⁽⁶⁴⁾. patients often erroneously receive various treatments and (dental) surgical procedures in the belief that there is a pathological cause for the disease⁽²⁰⁾. various treatments have been proposed for idiopathic stomatodynia, including antidepressants, local treatment with capsaicin and local anaesthetics. the patient should be reassured that the pain is not caused by a grave illness, and that in some cases the symptoms can spontaneously go into remission⁽²⁷⁾. possible neurological mechanisms in idiopathic stomatodynia have been implicated, including endogenous reduced dopamine⁽⁴¹⁾. understanding such neuropathologic mechanisms could lead to more effective treatments⁽⁶³⁾.

Temporomandibular disorders and phantom bite syndromes

Temporomandibular disorders or craniomandibular disorders are a complex group of disorders whose origin lie in the musculoskeletal structures of the masticatory system, which can involve the structures of the temporomandibular joint (TMJ), the muscles and ligaments associated with the TMJ⁽⁷⁾. in a number of cases, the systemic or traumatic aetiology of the disorder is known. however, in the majority of cases – estimated at 90 to 95%⁽¹⁷⁾ - the aetiology or pathological mechanism remains unclear. in these cases psychological factors have frequently been implicated, and not without good reason, since muscle tension or parafunctional oral habits, for example, form part of the disorder's aetiology⁽⁴⁸⁾. other evidence shows that, as with other idiopathic facial pains, it is a stress related disorder⁽⁷⁾. stress related hormones of the hypothalamic-pituitary-adrenal axis are shown to have a significant psycho-neuro-endocrine effect, and serum serotonin levels have been shown to correlate inversely with tmj pain sensitivity. the role of oestrogen receptors present in the tmj musculature has been suggested as a reason why the disorder affects women more frequently⁽⁶⁰⁾. the muscles are innervated by the trigeminal nerve⁽⁴⁹⁾, which can lead to periphery and central sensitisation of the pain, which has been discussed also in previous sections. pain responses in the tmj system are also related to the motor function of the muscles, leading to pain-spasm responses or changes in the muscle tonicity.⁽⁴⁹⁾. although historically thought to be the case⁽⁵⁹⁾, malocclusion is not known to be a cause of or predisposing factor to tmj pain, and therefore orthodontic treatment to correct the occlusion is not indicated. orthognathic surgery (manipulation of the jaws) and dental splints are frequently used treatments, though they lack any firm scientific basis⁽¹⁷⁾. in addition to being a cause, the psychological consequences of the disorder should not be underestimated; the tmj is intimately involved with eating and speaking, which can lead to the avoidance of talking and eating in public, causing social isolation and strained relationships⁽³⁹⁾.

The limited knowledge of TMJ disorder pathologies also has an important medico-legal consequence in litigation for pain associated with whiplash injuries sustained in motor-vehicle accidents⁽¹⁸⁾

Phantom bite syndrome describes an interesting subgroup of temporomandibular disorders. In these cases the patient becomes preoccupied with his or her dental occlusion and complains that this leads to pain and discomfort. It was first described by Marbach⁽²⁸⁾ as a psychiatric condition – monosymptomatic hypochondriacal psychosis. in such disorders, which are rare, the patient becomes fixated on one specific delusion⁽²⁸⁾. the syndrome has also been associated with body dysmorphic syndromes⁽¹¹⁾. however, recent research casts doubt on whether the syndrome is truly a psychosis⁽³⁰⁾, and may be more akin to phantom pains felt by amputees. in this case, the pain is not a stump pain caused by trigeminal nerve damage as with atypical odontalgia, but instead is related to plasticity of brain function⁽²³⁾, involving changes in the somatotopic map at the amputation site and brain, possibly caused by the removal of inhibiting existing neurons⁽³⁵⁾. given the orofacial structure's rich innervation and representation in the cortex⁽³⁷⁾ it is not surprising that subtle adjustments in occlusion during orthodontic or restorative dental treatment can result in significant sensual perception⁽³⁰⁾.

Conclusion

“When I tell you that months of unresolved, acute pain are debilitating and depressing, you suggest my pain is mental.... I tell you I want to be by a handgun. You think I am going to shoot myself. I think I am going to shoot you.” A Patient with Atypical Odontalgia⁽⁶⁾

Patients suffering from idiopathic orofacial pain as described may well present to a dental surgeon in the first instance. However, in these cases dental treatment is inappropriate, and may serve to exacerbate the pain⁽⁶⁴⁾. the anatomic complexity of the orofacial region overlaps several medical specialities⁽⁴²⁾. it is therefore wrong to perceive idiopathic facial pains as primarily a “dental” problem^(58,59,31) although orofacial pain and dentistry are synonymous. orofacial pains have a notable prevalence in the population, affecting around 10% of the adult population at any one time^(58,24). the diagnosis of atypical orofacial pain is one of exclusion⁽⁵⁸⁾, which means the patient must undergo a battery of tests, often carried out by several

medical specialities. a mechanistic dogma^(58, 59) which views pain as being the result of a peripheral stimulus frequently led to the description of such pains as being purely psychosomatic: it shown that more recent research into the neurobiology of pain casts doubt on this conclusion and there are a number of putative causes for these pains, though the link between the patient's mental state and sensation of pain cannot be ignored. the patient quoted shows just how distressing and pejorative it is to label the patient's pain as being purely mental: chronic orofacial pain is anything but "all in the mind"⁽⁶⁾.

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