

The classification and differential diagnosis of orofacial pain.

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Summary

Currently there are 4 major pain classification systems of relevance to orofacial pain: The International Association for the Study of Pain (IASP), International Classification of Headache Disorders (ICHD-II), The American Academy of Oro facial Pain (AAOP) and the Research Diagnostic Criteria for Temporomandibular Disorders (RDCTMD). Of the four the RDC/TMD is the most biopsychosocial system with the remaining three focusing more on the biomedical. Unsurprisingly clinical scientists and clinicians have both reported perceived deficiencies in the published systems and have proposed further modified classifications and nomenclature for orofacial pain.

Establishing a standardised biopsychosocial classification of orofacial pain is essential for ensuring continuity for patient care as it creates a standard language with which to communicate healthcare information, thus enabling improved and more specific (epidemiological) research and patient care. Despite ongoing attempts an accepted overarching classification of orofacial pain is still a work in progress.

There is an urgent need for a robust classification system for orofacial pain. This review aims to highlight the recent debate and continued struggle to attain a consensus on a

classification of orofacial pain and highlight some recent developments that assist differential diagnosis of these conditions.

Keywords

Orofacial pain, Temporomandibular Disorders, Trigeminal neuropathy, Trigeminal Neuralgia, classification

Key issues

- The goal of an accepted classification system of chronic orofacial pain conditions would facilitate research and management of patients with these conditions.
- Despite four leading authorities with interest in chronic orofacial pain having published guidelines a consensus on the classification of orofacial pain remains elusive
- This lack of a universal classification system may be due to rapid and expanding reported development in understanding pain and its management
- There is an urgent need for a robust classification system for orofacial pain.

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JD declares that he is part of the working group revising the RDC/TMD at present

Introduction

Pain in the oral and facial region (orofacial pain) produces significant biopsychosocial impacts. A recent US Surgeon General's report states that '...oral health means much more than healthy teeth, it means being free of chronic orofacial pain conditions'.¹ Epidemiologists report a significant burden of orofacial pain affecting the community: estimate place this at 39 Million, or 22%, of Americans 18 years or older suffering from this orofacial pain.^{2,3} Other reports from UK and Germany report similar prevalence rates.⁴ The estimated prevalence of chronic oro-facial pain is also large at 7%.⁵

Risk factors for chronic oro-facial pain include chronic widespread pain, age, gender, gender and psychological factors.⁶ Most population-based studies have shown that women report more facial pain than men⁶ with rates approximately twice as high among women compared to men.⁶ In contrast, other studies have found no gender difference in the prevalence of Orofacial pain. This may be due to the extensive variety of Orofacial pain conditions, which may have differing gender 'predilections'.

Orofacial pain may be due to various conditions affecting numerous structures local to or distant to the oral cavity including: the meninges, cornea, oral/ nasal/sinus mucosa, dentition, musculature, salivary glands and temporomandibular joint. The region's unique neurophysiologic characteristics, which are different to the spinal nociceptive system, can present diagnostic challenges to clinicians specialising in this area.⁷ The region's sensory supply is from both spinal (C2 and 3) and cranial nerves (III, V, VII [nervous intermedius], IX, X) the latter providing both sensory and autonomic supply. The main sensory supply to the orofacial region is from the trigeminal nerve and its large representation in the sensory cortex means that pain in the orofacial region can have significant biopsychosocial impacts: interruption with daily social function such as eating, drinking, speaking, kissing, applying makeup, shaving and sleeping⁸, and in some cases compromising the patient's self identity.

Over recent times there have been significant developments in understanding pain mechanism, the implications of which are spread over many different fields including: neuroimaging, psychometrics, neuro-immunity, neurophysiology and pain genetics.⁹ This in part may explain the difficulty in reaching and or maintaining a consensus for the taxonomy of pain itself. Woolf (2010)¹⁰ eloquently highlights this by posing the question 'what is this thing we call pain?'. Woolf classifies pain into 3 groups: nociceptive (detects noxious stimuli), inflammatory (adaptive and protective), and pathological (neuropathic with a lesion present or dysfunctional with no identifiable cause). He emphasises that the processes driving these pain types are different and that treatments should be specific and preferably directed at the distinct mechanisms responsible.¹⁰ Within the orofacial region there has been significant progress in advancing the understanding of musculoskeletal pain, and neuropathic pain and also in differentiating pain related to the Orofacial region.

Taxonomy has been called "the world's oldest profession"¹¹ and is the science of identifying and naming species, thereby allowing them to be arranged into a classification. The International Statistical Classification of Diseases and Related Health Problems (most commonly known by the abbreviation **ICD**) is a medical classification that provides codes to classify diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease.¹²

Pain necessarily involves three different levels of classification – pain symptoms, pain mechanisms, and pain syndromes. A syndrome is defined by taking into account what is known about aetiology, genetics, clinical symptoms, history and treatment response of a presenting pain.¹³ Features necessary for a classification of symptoms and mechanisms of pain will, therefore, be quite different from those used to classify syndromes. A classification of syndromes will be more useful as it not only allows us to predict treatment responses and prognosis, but also enables us to search for and identify

potential risk factors and morbidities. Taken as a whole, the measurement and classification of pain is important for the following reasons ¹⁴:

1. To identify the perceived intensity and characteristics (quality, time course) of the pain so that differences between presenting conditions can be identified and further investigated.
2. To provide diagnostic clues in the history or examination of the patient thereby enabling a provisional diagnosis, or differential diagnoses.
3. To identify the most efficacious management strategy for the presenting pain
4. To allow the biopsychosocial outcome of management strategies employed to be assessed.

Classification systems clearly need to be valid, reliable, comprehensive, generalisable, and flexible, and they need to be tested using consensus views of experts as well as the available literature.⁷ There is an urgent need for a robust classification system for orofacial pain recently highlighted by the confusion in arising amongst dental practitioners understanding of chronic OFP conditions¹⁵ and the preliminary report of a working group in this area.

This review aims to: outline the main classification systems in current use; present a short summary of the published critique of these systems and current developments in classification; briefly outline the processes involved in reaching a differential diagnoses for orofacial pain.

Classification systems for OFP

There have been several attempts to classify Orofacial pain conditions by pain associations. The main categories most have used have either been topographical (odontogenic versus non odontogenic) and or chronological (chronic versus acute). Several associations with interest in pain have published classifications: The International Association for the Study of Pain¹⁶ (IASP **Tables 1 and 2**); International Headache Society¹⁷ (International Classification of Headache Disorders-II **Table 3 A, B and C**), The American Academy of Orofacial Pain¹⁸ (**Table 4**) and the Research Diagnostic Criteria for Temporomandibular Disorders¹⁹ (RDC/TMD **Table 5**). As one would expect there has been published critique, and suggestions for modification, for most of these systems.²⁰⁻²⁵

The IASP classification, categorised OFP into "Relatively Localized Syndromes of the Head and Neck" is composed of five axes (Tables 2). The IASP system does not, however, fully address the psychosocial aspects of pain, which are required in order to provide a more comprehensive view of the disorder. Turk and Rudy²⁶ have suggested a modification of pain classification, which may be applicable to the IASP (the Multiaxial Assessment of Pain [MAP]) as it integrates physical, psychosocial, and behavioural data. Their further work with the MAP based a classification of chronic pain patients on psychosocial and behavioural data alone^{xx}. Their hypothesis was that certain patterns exist in chronic pain patients regardless of the medical diagnosis: dysfunctional patients, interpersonally distressed patients, and adaptive copers. The study indicated that despite differences in medical/dental diagnoses, patients had similar psychosocial and behavioural responses. Lynch and Elgeneidy²⁸ suggested further adaptations of the IASP classification in order to: account for neuropathic injury, and be consistent with DSM-IV terminology by using the term "not otherwise specified" instead of "atypical facial pain" (AFP) for a condition that does not conform to criteria in another category.²⁹

The term AFP may now, however, fall into disuse as the new international headache society's (IHS) classification (IHS 12.8) uses the term, "facial pain not fulfilling other criteria" for AFP (Table 11-7 or persistent idiopathic facial pain (**PIFP**)).²³ The IHS have recently updated their original classification of Headache disorders providing a second edition of **The International Classification of Headache Disorders** (ICHD-II Table 3 A-C).³³ A paper comparing the IASP (Table 2) and IHS (Tables 3 A-C) diagnostic categories shows the significant differences between the two systems, but both again focus mainly on the biomedical as opposed to the biopsychosocial.³²

The next major stakeholder in orofacial pain classification, the American Academy of Orofacial Pain (AAOP) (Table 4)²² used the IHS classification as the basis for their classification of OFP disorders. A separate axis is recommended by the AAOP for defining psychosocial factors and diagnosing mental disorders.

Two papers^{23, 42} have recently focused on both the ICHD-II and AAOP definitions of traumatic nerve injury presenting new terminology for post traumatic trigeminal nerve injuries. The two new terms, painful posttraumatic trigeminal nerve injury and non-painful posttraumatic trigeminal nerve injury have operationalized and tested criteria²³ and provide a more comprehensive recognition of the increasing cohort of patients experiencing chronic trigeminal pain as a result of surgical injuries.

A OFP condition specific operationalized set of diagnostic criteria for Temporomandibular Disorders (TMDs) were created in 1992 (The research diagnostic criteria for TMDs [RDC/TMD])^{xx}. The triggers for their creation included both the problems within the literature with classification of subjects for trials of management strategies and the growing appreciation of TMDs as a biopsychosocial entity. The RDC/TMD takes a dual

axes approach to assessing and classifying TMDs with Axis 1 providing a physical (biomedical) classification and Axis 2 providing a psychosocial classification of the patient's condition. The RDC/TMD is currently undergoing revision and a revised, more clinically applicable, version is in press (DC/TMD)^{xx}. Axis 1 of the current version groups TMDs into three categories: group 1 - muscle disorders; group 2 - disc disorders; group 3 - arthritides. Further details on the sub-group diagnoses possible within each of these groups can be found on the RDC's website (<http://www.rdc-tmdinternational.org/>) (Table 5). A reduced version of the RDC, the CEP-TMD, was produced independently of the RDC/TMD consortium and ignorance of the DC/TMD development, in order to allow clinicians to make TMD diagnoses in everyday practice that correlated to those produced by the RDC. This system is likely to fall into disuse once the DC/TMD is published.

Recent developments

Several studies have recently critiqued the established classification systems highlighting potential weaknesses in their application to the diverse OFP population.³⁴ One of the recurring themes amongst these critiques tends to be the omission of diagnostic entities from the various systems leading to patients' OFP becoming unclassifiable in between 7 to 44% of cases without the use of multiple diagnostic classifications^{34,35}. One of the more recent studies examining this applied International Classification of Headache Disorders (ICHD-II) diagnostic criteria to a series of 328 consecutive patients with orofacial pain. Just over half (56%) of the patients were successfully diagnosed with the ICHD-II and the remaining 44% of patients in the sample had the AAOP and RDC/TMD criteria applied diagnosing a further 37% of the total sample giving a diagnosis in 93% of the cohort after application of three diagnostic classifications (IHS II, AAOP, RDCTMD).

Benoliel et al's conclusion at the end of this study was that masticatory muscle pain (MMP) is only clearly defined by AAOP and the RDCTMD and neurovascular OFP (NVOP) is not defined by any of the four major OFP classification systems (IASP, IHCD, AAOP, RDC/TMD).

Other recent studies have suggested novel strategies for OFP classifications including: temporal pain patterns, cluster analysis, and ontological principles.

Benoliel et al³⁶ tested the **temporal definitions** of chronic daily headache (CDH) in a wholly orofacial pain population. They aimed to examine the definition of "chronic orofacial pain" (COFP) which is a term in abundance in the literature, but which probably most accurately refers to a group of conditions as opposed to one defined entity. Using the temporal definitions of CDH only 50% of the sample were defined as "chronic", with remainder split between "daily" and "episodic" OFP. They found no distinctive defining characteristics of "chronic orofacial pain" in either the history or examination process employed and therefore concluded that COFP was a temporal definition and not a diagnostic entity.

Given the wide-ranging presentations and putative sources for OFP it is perhaps unsurprising that a recent cluster analysis²⁰ has regrouped the various conditions comprising OFP (Table 6). The slight disadvantage to this system is that despite being based on sound study design and statistical procedure it relies on, sometimes putative, aetiology in order to group conditions. This has resulted in an idiopathic group, which includes somewhat discarded terminology for burning mouth syndrome and Temporomandibular Disorders. The existence of an idiopathic group may lead to a lack of a label and explanation for patients within that group and in turn lead to problems in their daily lives.

Given that ontology underpins the majority of classification systems it is unusual that it has remained unreported in the development of the majority of current orofacial pain classification systems. Nixdorf et al.,⁴¹ have proposed a new taxonomy model based on ontological principles for a specific orofacial pain condition known by a variety of pseudonyms including atypical odontalgia and phantom tooth syndrome. Diagnostic criteria for persistent dento-alveolar pain disorder (**PDAP**) were formulated using ontological principles in to provide an exemplar for other orofacial pain conditions. The criteria produced have the advantage of being concisely and operationally defined with the potential for sub-types of PDAP to be developed. As the paper acknowledges these criteria have yet to be tested.

At the time of writing there is a working group reassessing Chapter 13 of the IHS classification and aim to achieve a consensus on its revision in 2012. Any future overarching classification of OFP will need to take into account the developments in aetiology, and specifically genetic and pathophysiological basis of OFP conditions.

Differential diagnosis

The following sections are aimed at giving the reader an overview of the processes involved in formulating a differential diagnoses for patients presenting with OFP. They are not meant to be exhaustive and interested readers are referred to several excellent texts on the subject.

A recent report⁷ on the differential diagnosis of OFP highlights some important strategies to help distinguish between OFP conditions and come to a diagnosis or differential diagnoses. History-taking remains of paramount importance in facilitating the diagnostic process. Blau⁴⁴ suggested fifteen questions to facilitate the history taking process in OFP which cover the following aspects of the presenting pain:

- i. Onset
- ii. Frequency
- iii. Duration
- iv. Provoking factors
- v. Site of initiation of pain
- vi. Radiation and referral of pain
- vii. Is the pain deep or superficial
- viii. Aggravating or exacerbating factors
- ix. Relieving factors
- x. Characteristics of the pain
- xi. Severity
- xii. Other associated features, for example lacrimation or other autonomic signs and symptoms
- xiii. Previous management strategies attempted
- xiv. Patient's perceived cause(s) of pain

Several recent recommendations for the assessment of pain patients⁴⁵⁻⁵² cover the necessity for a full medical, dental, and social history, following the history of the presenting complaint.

The examination of a patient with OFP should include the following as a bare minimum and more detailed examination of some tissues or systems may be added as the diagnostic process refines:

1. Inspection of the head and neck, skin, topographic anatomy, and swelling or other orofacial asymmetry
2. Palpation of the temporomandibular joint and masticatory muscles, tests for strength and provocation. With assessment and measurement of the range of mandibular movement
4. Palpation of soft tissue (including lymph nodes)
6. Palpation of cervical muscles and assessment of cervical range of motion
7. Cranial nerve examination
8. General inspection of the ears, nose, and oropharyngeal areas
9. Examination and palpation of intraoral soft tissue
10. Examination of the teeth and periodontium (including occlusion)

Systemic conditions that can be associated with OFP are detailed in Table 7. There are also some conditions and diseases that can mimic or masquerade as OFP and Table 8 summarises the salient details of their presentations. Conversely some OFP conditions may masquerade or be misdiagnosed or misinterpreted as toothache and these are outlined in Table 9.

Systemic Diseases Associated with Headache and Orofacial Pain
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- Paget's disease
- Metastatic disease
- Hyperthyroidism
- Multiple myeloma
- Hyperparathyroidism
- Vitamin B deficiencies
- Systemic lupus erythematosus
- Vincristine and other chemotherapy for cancer
- Folic acid and iron deficiency anaemias

Table 8

Red Flags - Orofacial Pain Symptoms that may indicate serious or malignant disease ⁵²

- Spontaneously occurring focal neuropathy with pain and or altered sensation confirmed by physical examination may indicate tumor invasion of nerve
- Pain at the angle of the mandible, brought on by exertion, relieved by rest may indicate cardiac ischemia
- patient over 50 years with known history of carcinoma localized progressive headache; superficial temporal artery swelling, tenderness, and lack of pulse
- Jaw claudication, visual symptoms, palpably tender superficial temporal arteries – Temporal arteries
- Systemic symptoms of fever, weight loss, anorexia, malaise, myalgia, chills, sweating - unlikely to be associated with OFP
- New onset headache in adult life of increasing severity with: nausea, and vomiting without evidence of migraine or systemic illness; nocturnal occurrence; precipitation or exacerbation through changes in posture; confusion, seizures, or weakness; any abnormal neurologic sign – suggests a mass effect in cranial

cavity (through intracranial tumour).

- Earache, trismus, altered sensation in the mandibular branch distribution – suggests infratemporal fossa or acoustic nerve impingement eg by tumour.
- Trigeminal neuralgia in a person less than 50 years of age may be suggestive of multiple sclerosis

Table 9

Orofacial Disorders That May Be Confused with Toothache

- Trigeminal neuralgia
- Trigeminal neuropathy (due to trauma or tumor invasion of nerves)
- Atypical facial pain and atypical odontalgia (PDAP)
- Cluster headache
- Acute and chronic maxillary sinusitis
- TMDs

Time taken in eliciting a thorough pain history may often clarify the diagnosis as in any other pain condition. Multidisciplinary OFP assessment ideally also includes psychometrics, pain profiling, quantitative sensory testing, haematology (Table 11) and imaging (Table 11) where indicated.

Table 11

Haematology investigations:	Imaging ⁵³
<p>The most frequently employed haematological investigations for OFP include:</p> <ul style="list-style-type: none"> • Full blood count – predominately looking for anaemias 	<ul style="list-style-type: none"> • Plain dental radiography (Dental pantomogram DPT) to identify caries, infection, bone loss etc • MRI exclude space occupying lesions, demyelination and

<ul style="list-style-type: none"> • Haematinics: Ferritin, B12, Folate – looking for deficiency states causing secondary burning mouth syndrome • Zinc levels • Hypothyroidism – causing headache • Diabetes (HBA1c) • Antibody screen ENAs ANAs • ESR or CRP if inflammatory condition suspected. 	<p>vascular compromise of the Trigeminal nerve</p>
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An outline of the presenting features of acute OFP related to inflammatory conditions is given in Table 12. This is followed in Table 13 by an outline of the presenting features of chronic orofacial pain conditions.

Conclusion Chronic orofacial pain continues to present a diagnostic challenge and it is possible therefore to make a misdiagnosis. The bio, psycho, and social impact of orofacial pain should always be examined and patients should receive a diagnosis, albeit provisional in some cases, as soon as possible. An overarching, comprehensive, OFP classification system is under development under the auspices of the IASP and several other international stakeholders and will help further advance research and management of this complex group of conditions.

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