**The classification and differential diagnosis of orofacial pain.**

Tara Renton BDS PhD

Professor Oral Surgery, Department Oral Surgery, Kings College London Dental Institute, Denmark Hill Campus, Bessemer Rd, London SE5 9RS tel 0203 299 2313 email tara.renton@kcl.ac.uk

Aggarwal VR BDS PhD

NIHR Clinician Scientist, School of Dentistry, Coupland 3 Bldg, Oxford Road, Manchester. M13 9PL

**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.

Financial disclosure/Acknowledgements: Vishal Aggarwal is supported by a Clinician Scientist Award issued by the NIHR - grant number CS/2008/08/001. The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the National Institute for Health Research or the Department of Health.

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

**Comment [JD1]:** Should you guys not also declare you're part of IHS working party?

## 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 men[6] 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 internedius], 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 sleeping[8], and in some cases compromising the patient's self identity.

**Comment [JD2]:** Refs: Number 8 from the manuscript plus:
Reissmann, D.R. et al. (2007) Functional and psychosocial impact related to specific temporomandibular disorder diagnoses. *J Dent*, **35**, 643-650.
Souza, F.T. et al. (2011) The impact of burning mouth syndrome on health-related quality of life. *Health Qual Life Outcomes*, **9**, 57.
Zakrzewska, J.M., Jorns, T.P. & Spatz, A. (2009) Patient led conferences--who attends, are their expectations met and do they vary in three different countries? *Eur J Pain*, **13**, 486-491.

**Comment [JD3]:** At some point in their life? Is this point prevalence?

**Comment [JD4]:** ?Condition-specific? I think this is what you mean as ref 6 is about general OFP, but condition specific studies eg focus on one type of OFP don't show this. I haven't got refs to support this and there are none here?

**Comment [JD5]:** Ref:
Durham, J. et al. (2011) Temporomandibular disorder patients' journey through care. *Community Dent Oral Epidemiol*, **39**, 532-541.
Durham, J. et al. (2010) Living with uncertainty: temporomandibular disorders. *J Dent Res*, 89, 827-830.

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

**Comment [JD6]:** Ref your work and others work on BMS and TRPV etc.
Also ref OPPERA prelude studies:
Dworkin, S.F. (2011) The OPPERA study: act one. *J Pain*, **12**, T1-3.
Fillingim, R.B. et al. (2011) Potential psychosocial risk factors for chronic TMD: descriptive data and empirically identified domains from the OPPERA case-control study. *J Pain*, **12**, T46-60.
Fillingim, R.B. et al. (2011) Summary of findings from the OPPERA baseline case-control study: implications and future directions. *J Pain*, **12**, T102-7.
Greenspan, J.D. et al. (2011) Pain sensitivity risk factors for chronic TMD: descriptive data and empirically identified domains from the OPPERA case control study. *J Pain*, **12**, T61-74.
Maixner, W. et al. (2011) Orofacial Pain Prospective Evaluation and Risk Assessment study--the OPPERA study. *J Pain*, **12**, T4-11.e1-2.
Maixner, W. et al. (2011) Potential autonomic risk factors for chronic TMD: descriptive data and empirically identified domains from the OPPERA case-control study. *J Pain*, **12**, T75-91.
Ohrbach, R. et al. (2011) Clinical findings and pain symptoms as potential risk factors for chronic TMD: descriptive data and empirically identified domains from the OPPERA case-control study. *J Pain*, **12**, T27-45.
Slade, G.D. et al. (2011) Study methods, recruitment, sociodemographic findings, and demographic representativeness in the OPPERA study. *J Pain*, **12**, T12-26.
Smith, S.B. et al. (2011) Potential genetic risk factors for chronic TMD: genetic associations from the OPPERA case control study. *J Pain*, **12**, T92-101.

**Comment [JD7]:** Not sure what you mean here and have deleted the last sentence as may make us a hostage to fortune. Do you mean like Benoliel's work on POMP?

**Comment [JD8]:** Is this what you mean...I think you could lose someone here?

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 conditions[15] 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.

**Comment [JD9]:** Need to give a worked example here or clarify further as when I think syndrome I think of gorlin-goltz and I wouldn't call TMDs a "syndrome", but I can see what you're driving at, however, there are plenty of people who will take umbridge if this is not carefully worded.

**Comment [JD10]:** As a general comment there's a lot of switching between pain and orofacial pain and this is making things difficult to follow. Can we not put this in terms of OFP?

**Comment [JD11]:** Ref: Ohrbach, R. et al. (2010) Recommendations from the International Consensus Workshop: convergence on an orofacial pain taxonomy. *J Oral Rehabil*, **37**, 807-812.

**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 Pain[16] (IASP **Tables 1 and 2**); International Headache Society [17] (International Classification of Headache Disorders-II **Table 3 A, B and C**), The American Academy of Orofacial Pain[18] (**Table 4**) and the Research Diagnostic Criteria for Temporomandibular Disorders[19] (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 Rudy[26] 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 Elgeneidy[28] 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]

**Comment [JD12]:** Think these refs also need to include refs34 and 35 as currently

**Comment [JD13]:** Consistency – why not do a search and replace from the top and put (OFP) behind the first instance of orofacial pain in the main body of the text?

**Comment [JD14]:** There are two citatiuons within this citation in the bibliography – I supect they need to be seprated and the second citation placed where I have put XX in superscript

**Comment [JD15]:** Acronym not previously defined, I presume you mean this

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 biopsychoscial.[32]

**Comment [JD16]:** I think this is fair Tara, do you concur?

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 criteria[23] 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

**Comment [JD17]:** Refs: Dworkin, S.F. & LeResche, L. (1992) Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. *J Craniomandib Disord*, **6**, 301-355. Suvinen, T.I. et al. (2005) Review of aetiological concepts of temporomandibular pain disorders: towards a biopsychosocial model for integration of physical disorder factors with psychological and psychosocial illness impact factors. *Eur J Pain*, **9**, 613-633.

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 indepedntly 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.

**Comment [JD18]:** Ohrbach, R. et al. (2010) Recommendations from the International Consensus Workshop: convergence on an orofacial pain taxonomy. *J Oral Rehabil*, **37**, 807-812.

**Comment [JD19]:** Ref: Hasanain, F. et al. (2009) Adapting the diagnostic definitions of the RDC/TMD to routine clinical practice: a feasibility study. *J Dent*, **37**, 955-962.

**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,

**Comment [JD20]:** Not sure which the "several" are because ref 34 (benoliel) doesn't cite several and is a singular article? I know it's pedantic, but I guaranttee someone will pick up and take offence. I am presuming that 20-25 are also critique but this isn't made clear here and neither are their brief details covered

**Comment [JD21]:** Ref should be: Benoliel, R. et al. (2008) The International Classification of Headache Disorders: accurate diagnosis of orofacial pain? *Cephalalgia*, **28**, 752-762.

**Comment [JD22]:** Ref should be: Benoliel, R. et al. (2008) The International Classification of Headache Disorders: accurate diagnosis of orofacial pain? *Cephalalgia*, **28**, 752-762.

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 al[36] 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 recent cluster analysis[20] 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 (XXXXXXX) of the IHS classification and aim to achieve a consensus on its revision in 2012. Any future over-arching classification of OFP will need to take into account the developments in aetiology, and specifically genetic and pathophysiological basis of OFP conditions.

**Comment [JD23]:** Orofacial pain conditons? What's the title of chapter 13?

**Comment [JD24]:** Is this accurate?

**Differential diagnosis**

The following sections are aimed at fgiving 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.

Comment [JD25]: Refs to:
AAOP guidelines book
Rafi's book
TMDs an evidence based approach
Joanna's book
Wright's manual of TMDs
Okeson's book on OFP

A recent report[7] 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. Blau [44] 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 patients[45-52] cover the necessity for a full medical, dental, and social history, following the hisotyr 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 figure XX. There are also some conditions and diseases that can mimic or masquerade as OFP and figure XX 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 figure XX.

**Systemic Diseases Associated with Headache and Orofacial Pain**

**Comment [JD26]:** I have removed the psycjological features bit for two reasons: 1) I am not sure that it is up-to-date with the latest DSM, and 2) it is almost word-for-word from Burkett's oral medicine table which comes from IASP and wasn't cited with the features

- 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

**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
- New onset; in 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

**Comment [JD27]:** Don't follow this?

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

| **Orofacial Disorders That May Be Confused with Toothache** |
|---|
| • Trigeminal neuralgia<br>• Trigeminal neuropathy (due to trauma or tumor invasion of nerves)<br>• Atypical facial pain and atypical odontalgia (PDAP)<br>• Cluster headache<br>• Acute and chronic maxillary sinusitis<br>• 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 (Fig XX) and imaging (Fig XX) where indicated.

| **Haematology investigations:** | **Imaging** [53] |
|---|---|

| | |
|---|---|
| The most frequently employed haematological investigations for OFP include:<br>• Full blood count – predominately looking for anaemias<br>• Haematinics: Ferritin, B12, Folate – looking for deficiency states causing secondary burning mouth syndrome<br>• Zinc levels<br>• Hypothyroidism – causing headache<br>• Diabetes (HBA1c)<br>• Antibody screen ENAs ANAs<br>• ESR or CRP if inflammatory condition suspected. | • Plain dental radiography (Dental pantomogram DPT) to identify caries, infection, bone loss etc<br>• MRI exclude space occupying lesions, demyelination and vascular compromise of the Trigeminal nerve |

**Comment [JD28]:** Pardon my ignorance, but I presume this is for BMS?

**Comment [JD29]:** Do you not mean fasting blood glucose and is this for BMS – if so please can we state it

**Comment [JD30]:** Again pardon my ignorance, but why? Are you just operating an exclusionary approach to exclude underlying systemic connective tissue disease? If so perhaps we should state this.

An outline of the presenting features of acute OFP related to inflammatory conditions is given in Table 7. This is followed in Table 8 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.

**Acknowledgements**

Vishal Aggarwal is funded under the terms of a Clinician Scientist Award issued by the National Institute of Health Research - grant number CS/2008/08/001. The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the National Institute for Health Research or the Department of Health.

Tara Renton works as an Honorary Consultant on Oral Surgery at Kings College Foundation Hospital Trust and currently undertakes research in this field funded by CLRN, MRC, Pfizer and the Royal College of Surgeons England.

The authors would like to acknowledge UK Specialist Interest group in Orofacial pain and Temporomandibular Disorders (USOT) and the IHS as their involvement in these groups has allowed them to participate in the wider debate and critique on classification and differential diagnoses of oro-facial pain

**References**


1. Koopman JS, Dieleman JP, Huygen FJ, de Mos M, Martin CG, Sturkenboom MC. Incidence of facial pain in the general population. *Pain* 147(1–3), 122–127 (2009).
2. Riley JL III, Gilbert GH, Heft MW. Orofacial pain symptom prevalence: selective sex differences in the elderly? *Pain* 76(1–2), 97–104 (1998).
3. Lipton JA, Ship JA, Larach-Robinson D. Estimated prevalence and distribution of reported orofacial pain in the United States. *J. Am. Dent. Assoc.* 124(10), 115–121 (1993).
4. Macfarlane TV, Blinkhorn AS, Davies RM, Kincey J, Worthington HV. Oro-facial pain in the community: prevalence and associated impact. *Community Dent. Oral Epidemiol.* 30(1), 52–60 (2002).
5. Aggarwal VR, Macfarlane GJ, Farragher TM, McBeth J. Risk factors for onset of chronic oro-facial pain – results of the North Cheshire oro-facial pain prospective population study. *Pain* 149(2), 354–359 (2010).
6. *Riley JL 3rd, Gilbert GH. Orofacial pain symptoms: an interaction between age and sex Pain 2001; 90 (3) 245-256*
7. Hegarty AM, Zakrzewska J. Differential Diagnosis for Orofacial Pain, Including Sinusitis, TMD, Trigeminal Neuralgia. Dent Update 2011; 38: 396–408
8. Locker D, Grushka M. The impact of dental and facial pain. Journal Dental Research. 1987: 66: 1414-1417
9. Hargreaves KM. Neurophysiological classification. Orofacial pain. 2011 Mar;152(3 Suppl):S25-32. Epub 2011 Feb 2.
10. Woolf CJ What is this thing called pain Review The J Clin Investigation Vol 120; 11:3742-4

11. Knapp, S. (2010) *What's in a name? A history of taxonomy.* http://www.nhm.ac.uk/nature-online/science-of-natural-history/taxonomy-systematics/history-taxonomy/index.htm.
12. WHO | International Classification of Diseases (*ICD*) www.who.int/whosis/**icd**10
13. **Woolf CJ** Novel analgesic development: from target to patient or patient to target? Curr Opin Investig Drugs. **2008** Jul;9(7):694-5.
14. Chou R, Loeser JD, Owens DK, Rosenquist RW, Atlas SJ, Baisden J, Carragee EJ, Grabois M, Murphy DR, Resnick DK, Stanos SP, Shaffer WO, **Wall** EM; Interventional therapies, surgery, and interdisciplinary rehabilitation for low back **pain**: an evidence-based clinical practice guideline from the American **Pain** Society. American **Pain** Society Low Back **Pain** Guideline Panel. Spine (Phila Pa 1976). **2009** May 1;34(10):1066-77
15. Aggarwal et al., Dentists' preferences for diagnosis, management and referral of chronic oro-facial pain: Results from a national survey *Health Education Journal 0017896911419350, first published on September 13, 2011*
16. Merskey H, Bogduk N, editors. Classification of chronic pain, Task Force on Taxonomy, International Association for the Study of Pain. 2nd ed. Seattle: IASP Press: 1994. p. 210–3.
17. International Headache Society. The international classification of headache disorders: 2nd edition. *Cephalalgia* 24(Suppl. 1), 9–160 (2004).
18. Okeson JP. The classification of orofacial pains. Oral Maxillofac Surg Clin North Am. 2008; 20: 133-44.
19. Anderson GC, Gonzalez YM, Ohrbach R, Truelove EL, Sommers E, Look JO, Schiffman E. The Research Diagnostic Criteria for Temporomandibular Disorders. VI: future directions. J Orofac Pain. 2010 Winter;24(1):79-88.
20. Woda A, Tubert-Jeannin S, Bouhassira D, Attal N, Fleiter B, Goulet JP, Gremeau-Richard C, Navez ML, Picard P, Pionchon P, Albuisson E. Towards a new taxonomy of idiopathic orofacial pain. Pain. 2005; 116: 396-406.

**Comment [JD31]:** This is not the correct ref for RDC original version it is Dworkin and leresche 1992 – see previous comment bubble for full ref.

21. De Boever JA, Nilner M, Orthlieb JD, Steenks MH. Recommendations by the EACD for examination, diagnosis, and management of patients with temporomandibular disorders and orofacial pain by the general dental practitioner. J Orofac Pain. 2008; 22: 268-78.

22. Okeson J, editor. Orofacial pain: guidelines for assessment, diagnosis, and management. Chicago: Quintessence Publishing Co, Inc.; 1996. *Jeffrey P. Okeson The Classification of Orofacial Pains* ***Oral and Maxillofacial Surgery Clinics*** *2008 Volume 20, Issue 2 , Pages 133-144, May*

23. Benoliel R, Kahn J, Eliav E. Peripheral painful traumatic trigeminal neuropathies. Oral Dis. 2011 Nov 22. doi: 10.1111/j.1601-0825.2011.01883.x. [Epub ahead of print]

24. Nixdorf N, Moana-Filho EJ, Law AS et al. Frequency of Nonodontogenic Pain after Endodontic Therapy: A Systematic Review and Meta-Analysis *Journal of Endodontics* 2010; 36 (9) 1494–1498

25. *Karibe H, Goddard G, McNeill C, Shih ST. Comparison of patients with orofacial pain of different diagnostic categories. Cranio. 2011 Apr;29(2):138-43*

26. Turk D, Rudy T. Toward a comprehensive assessment of chronic pain patients. Behav Res Ther 1987;25:237–49. Turk D, Rudy T. The robustness of an empirically derived taxonomy of chronic pain patients. Pain 1990;43:27–35.

27. Olesen J. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. Cephalalgia 1988; 8 Suppl 7:61–72.

28. Lynch M, Elgeneidy A. The role of sympathetic activity in neuropathic orofacial pain. J Orofac Pain 1996;10:297–305.

29. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. American Psychiatric Association;Washington (DC): 1994.

30. Frazier and Russell in 1924

31. Dworkin SF, Burgess JA. Orofacial pain of psychogenic origin: current concepts and classification. J Am Dent Assoc. 1987 Oct;115(4):565-71.
32. Olesen J. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. Cephalalgia 1988; 8 Suppl 7:61–72.
33. Lipton RB, Bigal ME, Steiner TJ, Silberstein SD Olesen J Classification of primary headaches. Neurology. 2004 Aug 10;63(3):427-35.
34. *Benoliel, N Birman, E Eliav, Y Sharav . The International Classification of Headache Disorders: accurate diagnosis of orofacial pain? (2008) Volume: 28, Issue: 7, Pages: 752-62*
35. *Zebenholzer K, Wöber C, Vigl M, Wessely P, Wöber-Bingöl C. Facial pain and the second edition of the International Classification of Headache Disorders. Headache. 2006 Feb;46(2):259-63.*
36. *Benoliel R, Eliav E, Sharav Y Classification of chronic orofacial pain: applicability of chronic headache criteria. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010 Dec;110(6):729-37.*
37. The CEP-TMD is demonstrated and available on-line http://www.ncl.ac.uk/dental/AppliedOcclusion/
38. Ohrbach R. Assessment and further development of RDC/TMD Axis II biobehavioural instruments: a research programme progress report. J Oral Rehabil. 2010 Oct;37(10):784-98.
39. *Ohrbach R, List T, Goulet JP, Svensson P.Recommendations from the International Consensus Workshop: convergence on an orofacial pain taxonomy.J Oral Rehabil. 2010 Oct;37(10):807-12*
40. *Karibe H, Goddard G, McNeill C, Shih ST. Comparison of patients with orofacial pain of different diagnostic categories. Cranio. 2011 Apr;29(2):138-43*
41. Nixdorf DR, Drangsholt MT, Ettlin DA, Gaul C, De Leeuw R, Svensson P, Zakrzewska JM, DE Laat A, Ceusters W. Classifying orofacial pains: a new

proposal of taxonomy based on ontology. J Oral Rehabil. 2011 Aug 18. doi: 10.1111/j.1365-2842.2011.02247.x

42. Renton T, Yilmaz Z.Profiling of Patients Presenting with Posttraumatic Neuropathy of the Trigeminal Nerve. Journal of Orofacial Pain Fall 2011 Volume 25 , Issue 4.
43. Oberman M, Holle D  Katsarava Z. Trigeminal neuralgia and persistent idiopathic facial pain. *Expert Rev. Neurother.* 11(11), 1619–1629 (2011)
44. Blau JN. How to take a history of head oro facial pain. *Br Med J* 1982; 285:1249–1251
45. Cruccu G, Anand P, Attal N, Garcia-Larrea L, Haanpa¨a¨ M, Jørum E, SerraJ, Jensen T. EFNS guidelines on neuropathic pain assessment. European Journal of Neurology 2004, 11: 153–162
46. Gronseth G, Cruccu G, Alksne J *et al.* Practice parameter: the diagnostic evaluation and treatment of trigeminal neuralgia (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology and the European Federation of Neurological Societies. *Neurology* 71(15), 1183–1190 (2008).
47. Dubner R.Discussion on New Approaces to the DifferentialDiagnosis of Chronic Orofacial Pain. 1990 Anesth Prog 37:72 1990
48. Matos R, Wang K, Jensen JD, Jensen T, Neuman B, Svensson P, Arendt-Nielsen L. Quantitative sensory testing in the trigeminal region: site and gender differences. J Orofac Pain. 2011 Spring;25(2):161-9
49. Hapak L, Gordon A, Locker D, Shandling M, Mock D, Tenenbaum HC. Differentiation between musculoligamentous, dentoalveolar, and neurologically based craniofacial pain with a diagnostic questionnaire. J Orofac Pain. 1994;8(4):357-68
50. Madland G, Feinmann C. Chronic facial pain: a multidisciplinary problem. J Neurol Neurosurg Psychiatry. 2001; 71: 716-9. Review.

51. Forssell H, Tenovuo O, Silvoniemi P, Jaaskelainen SK. Differences and similarities between atypical facial pain and trigeminal neuropathic pain. *Neurology* 69(14), 1451–1459 (2007).

52. Sarlani E, Schwartz AH, Greenspan JD, Grace EG. Facial pain as first manifestation of lung cancer: a case of lung cancer-related cluster headache and a review of the literature. *J. Orofac. Pain.* 17(3), 262–267 (2003).

53. Cha J, Kim ST, Kim HJ *et al.* Trigeminal neuralgia: assessment with T2 VISTA and FLAIR VISTA fusion imaging. *Eur. Radiol.* DOI: 10.1007/s00330-011-2216-1 (2011) (Epub ahead of print).

54. Renton T. Acute trigeminal Pain. Reviews in Pain British Pain Society publication Part 1Vol1 no 1 March 2011 ISSN 2042-1249/

55. Reviews in Pain British Pain Society publication Part 2 Vol5 no 4 Dec 2011 ISSN 2042-1249

56. Hillerup S. Iatrogenic injury to the inferior alveolar nerve: etiology, signs and symptoms, and observations on recovery. *International Journal of Oral and Maxillofacial Surg*ery 2008; 37 (8) 704–709

57. Renton T,Yilmaz Z. Managing iatrogenic trigeminal nerve injury; A case series and review of the literature . Int J Oral and Maxillofacial Surgery 2011 in press

58. Baron R, Binder A, Wasner G. Neuropathic pain: diagnosis, pathophysiological mechanisms, and treatment. Lancet Neurol. 2010 Aug;9(8):807-19. Review

59. Yoshimasu F, Kurland LT, Elveback LR. Tic douloureux in Rochester, Minnesota, 1945–1969. *Neurology* 22(9), 952–956 (1972).

60. Katusic S, Williams DB, Beard CM, Bergstralh EJ, Kurland LT. Epidemiology and clinical features of idiopathic trigeminal neuralgia and glossopharyngeal

neuralgia: similarities and differences, Rochester, Minnesota, 1945–1984. *Neuroepidemiology* 10(5–6), 276–281 (1991).

61. Mueller D, Obermann M, Yoon MS *et al.* Prevalence of trigeminal neuralgia and persistent idiopathic facial pain: a population-based study. *Cephalalgia* DOI: 10.1177/0333102411424619 (2011) (Epub ahead of print).
62. De Simone R, Marano E, Brescia Morra V *et al.* A clinical comparison of trigeminal neuralgic pain in patients with and without underlying multiple sclerosis. *Neurol. Sci.* 26(Suppl. 2), S150–S151 (2005).
63. Teixeira MJ, de Siqueira SR, Bor-Seng-Shu E. Glossopharyngeal neuralgia: neurosurgical treatment and differential diagnosis. *Acta Neurochirugica (Wien)* 2008; 150 (5) 471–475
64. Klasser GD, Fischer DJ, Epstein JB. Burning mouth syndrome: recognition, understanding, and management. Oral Maxillofac Surg Clin North Am. 2008 May;20(2):255-71, vii. Review
65. Affolter B, Thalhammer C, Aschwanden M, Glatz K, Tyndall A, Daikeler T. Difficult diagnosis and assessment of disease activity in giant cell arteritis: a report on two patients. *Scandinavian Journal of Rheumatol*ogy 2009; 38 (5) 1–2
66. Kavuk I, Yavuz A, Cetindere U, Agelink MW, Diener HC. Epidemiology of chronic daily headache. *Eur. J. Med. Res.* 8(6), 236–240 (2003).
67. Migraine
68. Sjaastad O, Bakketeig LS. The rare, unilateral headaches. Vaga study of headache epidemiology. *J. Headache Pain* 8(1), 19–27 (2007).
69. Cittadini E, Matharu MS. Symptomatic trigeminal autonomic cephalalgias. Neurologist. 2009 Nov;15(6):305-12. Review
70. Cohen AS, Matharu MS, Goadsby PJ. Short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) or cranial

autonomic features (SUNA) – a prospective clinical study of SUNCT and SUNA. *Brain* 129(Pt 10), 2746–2760 (2006).

71. Evans RW, Agostoni E. Persistent idiopathic facial pain. *Headache* 2006; 46 (8) 1298–1300

72. Sardella A, Demarosi F, Barbieri C, Lodi G. An up-to-date view on persistent idiopathic facial pain. *Minerva Stomatol.* 58(6), 289–299 (2009).

73. Remick RA, Blasberg B. Psychiatric aspects of atypical facial pain. *J. Can. Dent. Assoc.* 51(12), 913–916 (1985).

74. Melis M, Lobo SL, Ceneviz C *et al.* Atypical odontalgia: a review of the literature. *Headache* 43(10), 1060–1074 (2003).

75. Nixdorf N, Moana-Filho EJ, Law AS et al. Frequency of Nonodontogenic Pain after Endodontic Therapy: A Systematic Review and Meta-Analysis *Journal of Endodontics* 2010; 36 (9) 1494–1498