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Diagnostics of Orofacial Pain and Temporomandibular Disorders

Thomas List and Richard Ohrbach

Temporomandibular disorders (TMDs) and orofacial pain occur in about 5–12% of the adult population and in approximately 4–7% of youth and adolescents (Drangsholt, 1999; Nilsson *et al.*, 2005; NIDCR, 2014). About half of the individuals with TMD and orofacial pain perceive a need for treatment and seek consultation (Nilsson *et al.*, 2009; NIDCR, 2014). The consequences of TMD and orofacial pain for the patient are often a limitation in daily activities, lower quality of life, and personal suffering; the consequences for society include high economic costs for treatment and loss of productivity (NIDCR, 2014).

Although several professional groups routinely encounter patients with TMD and orofacial pain, it is the general practicing dentist who will initially manage the care of these patients. One problem is that general dentists are often unsure about diagnosing patients with TMD and orofacial pain (Tegelberg *et al.*, 2001). Thus, there is great need for a simplified and reliable diagnostic classification with clear instructions on how to conduct the clinical examination and which questions to ask in the history to get an overall picture of the patient's difficulties and choose suitable therapy. In addition to determining diagnoses through the examination of subjective symptoms and clinical findings, it is important to assess the patient's psychosocial status, including the consequences of chronic pain, in order to reveal an overall picture of the patient. The clinical condition (Axis I) and the psychosocial assessment (Axis II) together provide the information necessary for planning and executing suitable therapy with an optimal prognosis.

Diagnostic Classifications

There are many diagnostic systems for TMD and orofacial pain (Dworkin and LeResche, 1992; de Leeuw and Klasser, 2013; Headache Classification Committee of the International Headache Society (IHS), 2013; Peck *et al.*, 2014; Schiffman *et al.*, 2014). Of these, the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) and the American Academy of Orofacial Pain (AAOP) diagnostic criteria for TMD-related masticatory disorders have been the ones most used internationally (Dworkin and LeResche, 1992; de Leeuw and Klasser, 2013). The RDC/TMD standardized assessment of the most common TMD diagnoses and the AAOP criteria, while not as strictly defined, covered a larger range of conditions.

The RDC/TMD has been translated into more than 20 languages, and the publication that introduced it is one of the most cited in the dental literature (Dworkin and LeResche, 1992; List and Greene, 2010). After identification of some limitations of the system, the RDC/TMD was revised and the new classification system Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) (Schiffman *et al.*, 2014) was developed, which was also incorporated into the newest edition of the AAOP guidelines (de Leeuw and Klasser, 2013), thereby bringing research and clinical practice together.

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The most common temporomandibular disorders

The DC/TMD is based both on extensive multicenter clinical studies, including studies funded by the National Institutes of Health in the USA, and on international consensus conferences (Schiffman *et al.*, 2014). It is important to point out here that the DC/TMD only covers the most commonly occurring TMD conditions. The DC/TMD is comprised of two domains: a physical Axis I and a psychosocial Axis II.

The strength of the DC/TMD Axis I protocol includes reliable and valid diagnostic criteria for the common pain-related disorders and for the intraarticular disorders. The Axis I protocol provides standardized evaluation of subjective symptoms, contains clearly defined examination methods, and utilizes specific diagnostic criteria based on the clinical findings. The Axis II protocol, a psychosocial assessment, is simplified compared with the RDC/TMD version and has two options: a brief assessment and a comprehensive set of instruments for expanded assessment. The AAOP guidelines, in parallel, include the 12 common DC/TMD diagnoses.

Less common temporomandibular disorders: the expanded taxonomy

The DC/TMD covers the most common TMD conditions for which data were readily available. This created a need to expand the taxonomy to cover less common but still clinically relevant conditions. The expanded taxonomy (Peck *et al.*, 2014) is a consolidation of the common disorders in the DC/TMD and the less common disorders described in the fourth edition of the AAOP guidelines for TMD (De Leeuw, 2008). The expanded taxonomy defines the diagnostic criteria for

Table 1.1 Expanded taxonomy of the DC/TMD

I TMJ DISORDERS

1. Joint pain
   - A. ***Arthralgia****
   - B. Arthritis
2. Joint disorders
   - A. ***Disc disorders****
     1. ***Disc displacement with reduction****
     2. ***Disc displacement with reduction with intermittent locking****
     3. ***Disc displacement without reduction with limited opening****
     4. ***Disc displacement without reduction without limited opening****
   - B. Hypomobility disorders other than disc disorders
     1. Adhesions/adherence
     2. Ankylosis
        - a. Fibrous
        - b. Osseous
   - C. Hypermobility disorders
     1. Dislocations
        - a. ***Subluxation****
        - b. Luxation
3. Joint diseases
   - A. ***Degenerative joint disease****
     1. Osteoarthrosis
     2. Osteoarthritis
   - B. Systemic arthritides
   - C. Condylysis/idiopathic condylar resorption
   - D. Osteochondritis dissecans
   - E. Osteonecrosis
   - F. Neoplasm
   - G. Synovial chondromatosis
4. Fractures

Table 1.1 (*Continued*)

1. Congenital/developmental disorders
   A. Aplasia
   B. Hypoplasia
   C. Hyperplasia

II MASTICATORY MUSCLE DISORDERS

1. Muscle pain
   A. ***Myalgia****
      1. Local myalgia
      2. Myofascial pain
      3. ***Myofascial pain with referral****
   B. Tendonitis
   C. Myositis
   D. Spasm
2. Contracture
3. Hypertrophy
4. Neoplasm
5. Movement disorders
   A. Orofacial dyskinesia
   B. Oromandibular dystonia
6. Masticatory muscle pain attributed to systemic/central pain disorders
   A. Fibromyalgia/widespread pain

III HEADACHE

1. ***Headache attributed to TMD****

IV ASSOCIATED STRUCTURES

1. Coronoid hyperplasia

*DC/TMD with sensitivity and specificity.

the less common TMD conditions and includes a total of 37 disorders; for example, temporomandibular joint (TMJ) arthritis in cases of systemic inflammatory diseases, local TMJ arthritis, ankylosis, myositis, and orofacial dyskinesia (Peck *et al.*, 2014) (Table 1.1). Note that while the diagnostic criteria for the less common disorders are clearly stated such that each disorder is defined without overlap, the criteria have not yet been operationalized; in addition, there is at present no information regarding the sensitivity, specificity, reliability, or validity of the diagnoses for these less common conditions (Peck *et al.*, 2014).

Other orofacial pain conditions

Other orofacial pain conditions – such as trigeminal neuropathic pain, persistent idiopathic orofacial pain, and burning mouth syndrome – are not included in the expanded taxonomy because they are considered to be orofacial pain conditions, not TMDs. Other classification systems should be consulted in order to diagnose these conditions.

Trigeminal neuropathic pain is caused by injury or diseases of the peripheral or central somatosensory nervous system. The pain is usually constant with variations in intensity over several days, but, in rare cases, it may also occur intermittently throughout the day. Pain from normally nonpainful stimuli (such as touch, pressure, or cooling) can be a significant part of suffering in trigeminal neuropathic pain.

Treede and colleagues have published a frequently used diagnostic algorithm for neuropathic pain, proposing three levels of pain (Treede *et al.*, 2008; Geber *et al.*, 2009).

Possible neuropathic pain

This requires both of the following:

(i) Pain distribution is neuroanatomically plausible.
(ii) History suggests lesion or disease of the somatosensory system.

Possible neuropathic pain indicates that the condition is not confirmed and requires further investigation.

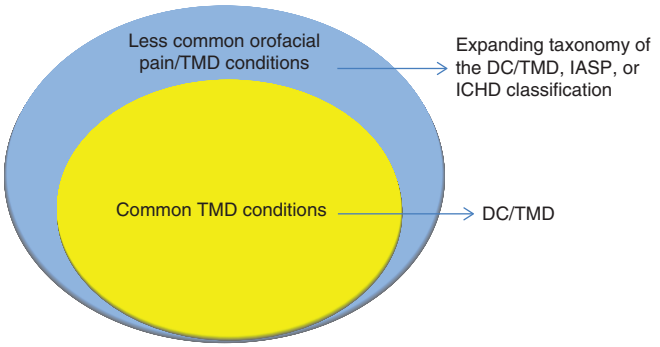


Figure 1.1 Orofacial pain and TMD conditions and the application of different diagnostic classifications.

Probable neuropathic pain
Requires (i) and (ii) with one of the following two clinical confirmatory tests being positive:

(iii) Negative or positive sensory signs confined to the innervation territory of the lesioned nervous structure (according to qualitative or quantitative sensory tests).

(iv) Diagnostic tests confirming lesion or disease explaining neuropathic pain (imaging, biopsy, neurophysiological, or laboratory tests).

Definite neuropathic pain
Requires (i) and (ii) with both clinical confirmatory tests (iii) and (iv) positive.

If a patient does not meet the criteria for any of these three levels, it is unlikely that the patient has neuropathic pain.

Figure 1.1 provides recommendations for which classification to use for orofacial pain/TMD. In summary, it is best to use the DC/TMD for the most common types of TMDs. For less common TMDs, use the expanded taxonomy of the DC/TMD. And finally, for other orofacial pain conditions, consult the classifications published by the International Association for the Study of Pain or the International Headache Society (Headache Classification Committee of the International Headache Society (IHS), 2013).

Clinical Assessment for the Most Common Temporomandibular Disorders/Orofacial Pain Conditions

It is necessary to conduct an interview to collect a comprehensive history in order to guide the clinician to make a relevant and accurate examination and provide a diagnosis, prognosis, and treatment plan for the patient. The following three steps have been recommended to simplify the clinical assessment of patients: (i) screening of all patients at general dental clinics or by other care providers to identify patients with possible orofacial pain/TMD, (ii) a brief and focused examination by the general dentist of patients identified in the screening, and (iii) a comprehensive examination by a specialist.

Since the following chapters in this book are based on diagnoses within the expanded taxonomy of DC/TMD, the focus of this chapter is to help explain the steps leading to a diagnosis. It will provide an overview of how to establish an Axis I diagnosis (physical diagnosis) and an Axis II evaluation of psychosocial distress in orofacial pain/TMD patients.

Readers who seek more detailed information on history data collection, clinical procedures, and laboratory tests in the examination of orofacial pain patients should refer to the Schiffman *et al.* (2014), Svensson *et al.* (2014), Goulet *et al.* (2014), and Ohrbach *et al.* (2014, 2015).

Screening

Screening instruments can help simplify identification of patients with TMD and orofacial pain (Nilsson *et al.*, 2006; Gonzalez *et al.*, 2011; Zhao *et al.*, 2011). One of these instruments consists of a questionnaire with a long version (six items) and a shorter version (three items) to detect individuals with TMD pain (Gonzalez *et al.*, 2011) (Table 1.2). The long version of this instrument is also integrated into the Symptom Questionnaire of the DC/TMD. All the screening instruments demonstrate good reliability and validity (Nilsson *et al.*, 2006; Gonzalez *et al.*, 2011; Zhao *et al.*, 2011), and have been used in epidemiological studies (Nilsson *et al.*, 2006).

There are several screening instruments developed to detect neuropathic pain (Mathieson *et al.*, 2015). They are most likely useful for trigeminal neuropathic pains, but none have been validated for these conditions yet.

Screening questionnaires are an important first step in detecting patients with TMD pain in the general practice, but they do not replace the need for a physical examination.

Clinical examination

Axis I diagnostics require a patient history including questionnaires and a structured clinical examination that is described below. Assessment of the patient's psychosocial situation and pain consequences are based on validated instruments (questionnaires), which are

Table 1.2 Screening questions for TMD

1. In the last 30 days, on average, how long did any pain in your jaw or temple area on either side last?
   a. No pain
   b. From very brief to more than a week, but it does stop
   c. Continuous
2. In the last 30 days, have you had pain or stiffness in your jaw on awakening?
   a. No
   b. Yes
3. In the last 30 days, did the following activities change any pain (i.e., make it better or make it worse) in your jaw or temple area on either side?
   A. Chewing hard or tough food
      a. No
      b. Yes
   B. Opening your mouth or moving your jaw forward or to the side
      a. No
      b. Yes
   C. Jaw habits such as holding teeth together, clenching, grinding, or chewing gum
      a. No
      b. Yes
   D. Other jaw activities such as talking, kissing, or yawning
      a. No
      b. Yes

A positive score of 2 or more indicates a high probability of pain-related TMD.

described under Axis II below. The DC/TMD distinguishes two levels of inquiry in assessing the patient. The first level is designed for the general practitioner using a brief questionnaire, and the second, more advanced, level uses a more comprehensive questionnaire and is designed for the specialist. At either level it is important to evaluate both clinical status and psychosocial factors in order to get as complete a picture of the patient, given the level of assessment, when making a diagnosis, determining the best therapy, or deciding upon possible referral. Table 1.3 illustrates this through two cases. Since most patients presenting in a dental setting with a facial pain complaint will have a common TMD, we will explain the standardized protocol leading to a diagnosis and psychosocial assessment of the patient with a TMD (DC/TMD).

Clinical conditions (Axis I)

History questionnaire

The instrument called the "DC/TMD symptom questionnaire," together with data from the clinical examination, is the basis for diagnosis of clinical conditions in the DC/TMD. This questionnaire solicits information relevant for Axis I diagnoses; that is, pain, joint sounds, ability to open the mouth wide, and headache. The 14-item questionnaire, together with the clinical findings, provides enough information to diagnose the most common TMD conditions.

Clinical examination

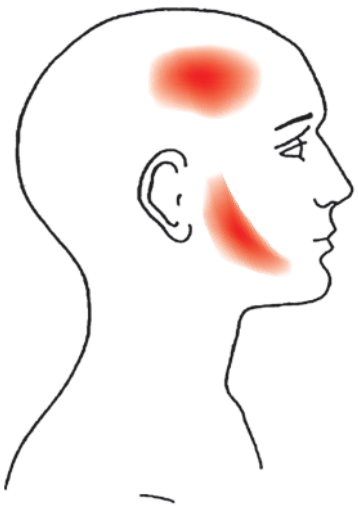
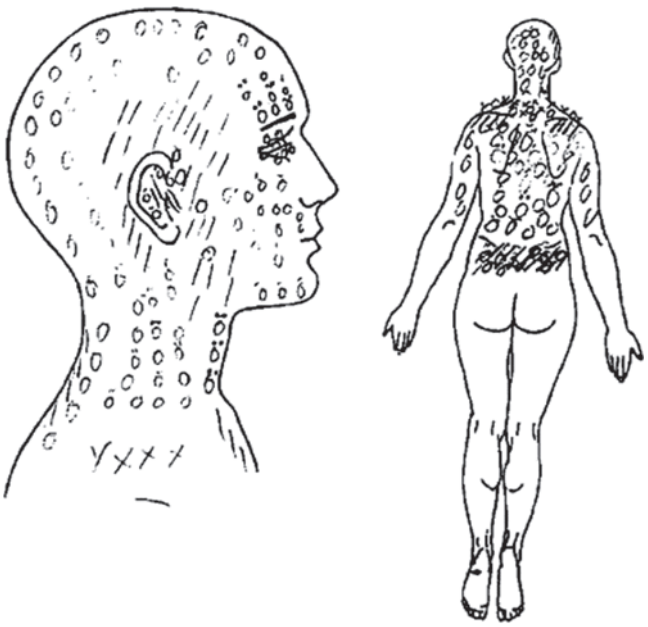
The clinical examination consists of precise verbal instructions that the care giver gives to the patient and a detailed description of the clinical measurements to be made. One example of a verbal instruction is "Open your mouth as wide as you can without feeling any pain, or without increasing any pain you may have right now." The aim of these instructions is high reliability for examinations, as studies evaluating their use have demonstrated (Schiffman *et al.*, 2014).

The DC/TMD is built on two central concepts that must be defined for the patient before the examination: (i) pain is a personal experience and responses to whether pain is present are "yes" or "no," and (ii) familiar pain is pain that the patient recognizes; that is, pain that is similar to pain that the patient may have had in the same area sometime in the last 30 days.

That the pain experienced in the clinical examination is familiar to the patient has proved to be very important for excluding irrelevant pain. Likewise, the timeframe "in the last 30 days" emphasizes a more clinically relevant pain that is both important to the individual and a part of why the patient is seeking care. These concepts are used in the provocation of pain – for example, through jaw movements and palpation – as criteria to minimize false-positive findings.

Clinical assessments evaluate pain localization, jaw movement limitations (lateral, protruding, and mouth opening), movement pain, TMJ noises, and pain upon palpation of the masticatory muscles and TMJ. The DC/TMD requires only extraoral palpation of the *musculus temporalis*, the *musculus masseter*, and the TMJ. The palpation of other regions is unreliable (Turp and Minagi, 2001) and does not increase the sensitivity or specificity of the diagnosis. Palpation of the TMJ has been expanded to include not only the lateral pole but also the area around it to increase the scope of assessment for arthralgia. The examination protocol is standardized and recommends a palpation pressure of

Table 1.3

	Anna	Cecilia
Case history	Anna is a 19-year-old girl with frequent headaches and pain in the jaw and ear region. The pain is recurrent and greater in the morning. She has been examined by her physician and her ENT status is normal. Her physician asked her to be examined by her dentist to see if the pain could be related to orofacial pain.	Cecilia is 51 years old and has had pain for 8 years in the face, head, neck, back and arms. The average pain intensity is NRS 5. The pain started after a neck trauma. She previously received several treatments (e.g., occlusal appliance, instructions in jaw exercises, and occlusal grinding) with limited improvement. She is listless and appears to be slightly depressed.
Diagnosis (Axis I)	Myalgia Arthralgia	Myalgia Arthralgia
Pain drawing		
Characteristic pain intensity	6	5
Pain-related interference	2	8
GCPS (Axis II)	I	IV
PHQ-9	Mild	Severe
GAD-7	Mild	Severe
Treatment plan	Information and education in behavioral changes Jaw exercises Occlusal appliances	Information and education in behavioral changes Antidepressant Referral to multidisciplinary pain treatment (CBT, physical therapy)

CBT: cognitive behavioral therapy; ENT: Ear, Nose, and Throat; GCPS: Graded Chronic Pain Scale; PHQ: Patient Health Questionnaire; GAD: Generalized Anxiety Disorder.

1.0 kg for the masseter muscle, temporalis muscle, and around the lateral pole of the TMJ, and 0.5 kg for direct palpation of the lateral pole. An additional test is to examine whether the patient experiences the pain provoked by pressure only under the finger or somewhere else (referred pain), which is a sign of central sensitization.

The reader who is interested in details of the examination may download written, illustrated instructions and an instructional video at http://www.rdc-tmdinternational.org.

The DC/TMD clinical examination comprises only those measurements necessary to provide a DC/TMD diagnosis. Supplemental examinations – such as neck

examination, sensory examination, cranial nerve status, occlusal measurement, or intraoral palpation of the *pterygoideus lateralis* and/or the attachment of the temporalis muscle – may be necessary for differential diagnostics, but are not part of the DC/TMD diagnoses.

Expanded Taxonomy of the Diagnostic Criteria for Temporomandibular Disorders (Axis I)

I. Temporomandibular joint disorders

Joint pain

TMJ pain (arthralgia) is defined as pain from the TMJ that is affected by jaw movements, jaw function, or jaw parafunction (Figure 1.2a). The pain should be reproducible upon provocation of the TMJ via jaw movements or palpation of the joint. Arthralgia often occurs together with a diagnosis of myalgia; only in rare cases (about 2%) is arthralgia the only diagnosis (Schiffman *et al.*, 2010). Arthritis, in contrast, is pain originating in the TMJ with clinical characteristics of inflammation over the affected joint: edema, erythema, and/or increased temperature.

Joint disorders

Disc displacement is a biomechanical disorder involving the condyle-disc complex. Clinical studies report its prevalence at 10% for healthy youths and adolescents and around 30% for healthy adults, while in clinical patients approximately 20% of youths and 40% of adults have disc displacement with reduction (List and Dworkin, 1996; List *et al.*, 1999; Anastassaki Köhler *et al.*, 2012). For the majority of individuals who experience joint sounds, the sounds are harmless, as long as there is no pain and no functional limitation due to a catch in the jaw movement.

Disc displacement with reduction and with intermittent locking includes not only clicking but also locking and catching (temporary locking) of the jaw. Patients often experience pain during locking. This group has a considerably higher risk of permanent disk displacement than the group that does not experience pain.

In disc displacement without reduction, the disc is permanently displaced. The sensitivity and specificity for a diagnosis of disc displacement without reduction and with limited mouth opening are good, while they are poor for disc displacement without reduction and without limited mouth opening. These diagnoses can be confirmed with magnetic resonance imaging (MRI), when necessary. For a definite diagnosis, MRI is required.

Hypomobility disorders other than disc disorders include intraarticular fibrous adhesion/adherence and ankylosis. These are characterized by restricted mandibular movement with deflection to the affected side on opening. They may occur as a long-term sequel of trauma, and in turn can lead to contracture of the soft tissues.

Criteria	HISTORY	1. Pain in the jaw, temple, in the ear, or in front of ear; AND 2. Pain modified with jaw movement, function or parafunction.
	AND	
	EXAM	1. Confirmation of pain location in the area of the TMJ(s); AND 2. Report of familiar pain in the TMJ with <u>at least</u> 1 of the following provocation tests: a. Palpation of the lateral pole or around the lateral pole; OR b. Maximum unassisted or assisted opening, right or left lateral movements, or protrusive movements

(a)

Criteria	HISTORY	1. Pain in the jaw, temple, in the ear, or in front of ear; AND 2. Pain modified with jaw movement, function or parafunction.
	AND	
	EXAM	1. Confirmation of pain location in the area of the temporalis or masseter muscle(s); AND 2. Report of familiar pain in the temporalis or masseter with <u>at least</u> 1 of the following provocation tests: a. Palpation of the temporalis or masseter muscle(s); OR b. Maximum unassisted or assisted opening.

(b)

Figure 1.2 Diagnostic criteria for TMD (a) arthralgia (sensitivity, 0.91; specificity, 0.96) and (b) myalgia (sensitivity, 0.84; specificity, 0.95).

Hypermobility disorders involve a TMJ dislocation in which the condyle is positioned anterior to the articular eminence and is unable to return to a closed position without a specific maneuver by the patient or the clinician.

Joint diseases

Arthrosis/osteoarthrosis is a degenerative joint disease (DJD) characterized by loss of cartilage and bone with concurrent remodeling of underlying bone tissue. Diagnostic criteria include patient reports of crepitation from the TMJ during jaw movements and clinical findings that confirm this. Arthrotic changes, combined with a positive finding for arthralgia, indicate osteoarthritis. Sensitivity and specificity are reasonably high for the clinical diagnosis of DJD. Computed tomography of the TMJ detecting sclerosis, subchondral cyst(s), osteophytes, flattening, and space reduction between joint surfaces confirms the clinical diagnosis (Ahmad *et al.*, 2009).

Systemic arthritis is when the TMJ inflammation resulting in pain or structural changes is caused by a generalized systemic inflammatory disease, such as rheumatoid arthritis or juvenile idiopathic arthritis. Clinical signs and symptoms of ongoing chronic TMJ inflammation vary between patients, and often in the same patient over time.

There are several other rare joint diseases, such as condylysis/idiopathic condylar resorption, osteochondritis dissecans, osteonecrosis, neoplasm, and synovial chondromatosis that lead to structural changes in the TMJ. More detailed descriptions will follow in their respective chapters.

Fractures and congenital/developmental disorders

Subcondylar fracture is most common and may result in malocclusion and impaired opening. Congenital developmental disorders are characterized by incomplete or overdeveloped cranial bones or mandibles. They are often associated with mandibular or facial asymmetries and malocclusions.

II. Masticatory muscle disorders

Muscle pain

Muscle pain – that is, myalgia – is the most common TMD diagnosis and occurs in about 80% of patients with TMD (List and Dworkin, 1996; Schiffman *et al.*, 2010). Myalgia is defined as pain that occurs in the masticatory muscles; changes with jaw movements, jaw function, or parafunction; and can be reproduced by provocation. Provocation tests consist of opening the mouth wide and palpitating the temporalis and/or the masseter (Figure 1.2b). During provocation, patients must also indicate that they recognize the pain, that the pain is familiar to them. Myofascial pain with referral is defined as myalgia plus referred pain beyond the boundary of the masticatory muscles being palpated, such as in the ear, teeth, or eye.

Other masticatory muscle disorders

Other masticatory muscle disorders, such as tendonitis, myositis spasm, contracture, hypertrophy, and neoplasm, are rare. A detailed description will follow in their respective chapters.

Movement disorders

Movement disorders include patients with involuntary movements that mainly involve the face, lips, tongue, and/or the jaw. The movements can be mainly choreatic (dance-like) or involve excessive sustained contractions. A detailed description will follow in the respective chapter.

Masticatory muscle pain attributed to systemic/central pain disorders

Masticatory muscle pain with concurrent widespread pain is found in patients with conditions such as fibromyalgia.

III. Headache

Headache attributed to temporomandibular disorder

Headache is common, both in adults and in youths and adolescents (Lipton *et al.*, 2007; Stovner *et al.*, 2007). Tension-type headache and TMD have overlapping symptoms. Both conditions involve the trigeminus system and are characterized by pain and tenderness upon palpation of the head and/or face (Ciancaglini and Radaelli, 2001; Ballegaard *et al.*, 2008). However, this does not mean that the pathophysiology of the pain is identical (Svensson, 2007).

Headache attributed to TMD is defined as headache that occurs in the temple region secondary to a pain-related TMD and that is affected by jaw movement, jaw function, or parafunction. The headache should be reproducible upon provocation of the masticatory system. A prerequisite for the diagnosis is eliminating other possible headache diagnoses. Sensitivity and specificity are high for the diagnosis. This new diagnosis simplifies communication between dentists, neurologists, and headache specialists. The primary

utility of this diagnosis, in contrast to a primary diagnosis (commonly, tension-type headache or migraine without aura), is that it points to TMD treatment as the therapeutic approach.

IV. Associated structures

Conditions such as coronoid hyperplasia are characterized by progressive enlargement of the coronoid process, which impedes mandibular opening when it is obstructed by the zygomatic process of the maxilla.

Psychosocial Evaluation (Axis II)

Chronic pain affects the patient's cognitive, emotional, sensory, and behavioral reactions. These can, in turn, aggravate and maintain pain. For example, a patient with chronic pain may exhibit difficulties concentrating, impaired memory function, anxiety, feelings of mild depression, dizziness, numbness, increased pain sensitivity, decreased motor functions (such as difficulties chewing and opening wide), social isolation, and absence from work due to sickness. Thus, it is very important to assess the patient's psychosocial situation when experiencing chronic pain and consider it during treatment planning and prognosis evaluation. To assess the psychosocial burden for each patient, there are instruments with structured questions and validated interpretation guidelines. Use of these instruments in treatment planning and for prognosis assessment has great patient benefit (Dworkin *et al.*, 2002a,b).

The DC/TMD Axis II includes new instruments for assessing pain behavior, jaw function, and psychosocial functioning and distress (Schiffman *et al.*, 2014). Table 1.4 shows the instruments recommended for the general practitioner (brief), and for the orofacial pain specialist (comprehensive).

Table 1.4 Recommended Axis II assessment protocol

Domain	Instrument	Brief	Comprehensive
Pain location	Pain drawing	✓	✓
Physical function	GCPS	✓	✓
Limitation	JFLS–8	✓	
	JFLS–20		✓
Distress	PHQ–4	✓	
Depression	PHQ–9		✓
Anxiety	GAD–7		✓
Physical symptoms	PHQ–15		✓
Parafunctions	OBCL	✓	✓

JFLS: Jaw Function Limitation Scale; OBCL: Oral Behaviors Checklist.

Pain and daily activities

The GCPS assesses pain intensity and the degree that pain affects daily activities. The scale has been used to evaluate a range of pain conditions, and not only for the orofacial area (von Korff *et al.*, 1992).

The GCPS records pain intensity on a 0–10 scale from three perspectives: the worst pain experienced, average pain, and current pain. The average of these values determines characteristic pain intensity, where a mean >5.0 is considered "high intensity." The GCPS also assesses the effect of pain on daily activities based on the number of days that pain interferes with daily activities and the degree to which it limits social interaction, work, or common daily activities, each rated on a 0–10 scale. High pain and a high degree of limitation of daily activities indicate a considerably worse prognosis and warrant further investigation and possibly a referral to a specialist.

The GCPS has been shown to be extremely helpful during treatment planning and prognosis evaluation in which patients with low levels of daily limitation (simple patient cases) can be treated with simpler methods while persons with greater limitations in their daily life (complex patient cases) receive more multidisciplinary treatment (Kotiranta *et al.*, 2015).

Jaw function

The masticatory system performs many tasks, including functional use (e.g., chewing, swallowing, eating, yawning) as well as emotional expression and communication (e.g., smiling, laughing, shouting, kissing). The JFLS measures global jaw function by describing limitations in opening and chewing abilities as well as communication abilities. The scale can also be used to document changes over time (Ohrbach *et al.*, 2008a).

Depression, anxiety, and physical symptoms

Many studies have shown that psychological distress (such as depression, anxiety) is usual in chronic TMD pain (List and Dworkin, 1996; Schiffman *et al.* 2010). Since pain and psychosocial distress occur together and affect each other, it is important that the overall assessment of a patient considers depression and anxiety (Schiffman *et al.*, 2014). The following instruments are in widespread use across the world and have been translated into many languages.

The PHQ-4 is a short and sufficiently reliable instrument. It contains two questions on depression and two questions on anxiety. The instrument can indicate the presence of moderate or severe distress. For interpretation of the PHQ-4, more than 3 points indicates possible distress, while a total of more than 6 points indicates moderate distress, and a total of 9 points indicates severe distress (Kroenke *et al.*, 2009).

For a more reliable assessment of depressive symptoms, the PHQ-9 assesses the core diagnostic areas underlying clinical depression. Data indicate that depression is more often a consequence than a cause of chronic pain. The presence of depression can substantially undermine a patient's attempts at self-management as well as contribute to impaired pain modulation. Scoring is simple with cut-offs of 5, 10, 15, and 20 representing, respectively, mild, moderate, moderately severe and severe levels of depression (Kroenke *et al.*, 2001).

Anxiety symptoms, also represented on the PHQ-4, can be more reliably assessed with the slight longer GAD-7. The central processes associated with anxiety increase vigilance to the body and symptoms, increase body scanning and catastrophizing interpretations, and activate tension states in the body. All of these are detrimental towards improving pain. Scoring is simple, and the GAD-7 relies on cut-offs of 5, 10 and 15 representing, respectively, mild, moderate and severe levels of anxiety (Löwe *et al.*, 2008).

The PHQ-4, PHQ-9, and GAD-7 contain a final item regarding the amount of difficulty the person has encountered due to the marked symptoms, and this response from the patient serves as an excellent starting point for discussion of the reported symptoms, by focusing on their impact on functioning.

Physical symptoms representing pain or functional problems remain one of the core methods for assessing presence of disorders that are likely comorbid with the TMD; such problems contribute greatly to chronicity, to pain facilitation, and to overall suffering (Fillingim *et al.*, 2011). The PHQ-15 is a simple checklist for the more common functional and pain disorders. Scoring is based on cut-offs of 5, 10, and 15 representing, respectively, low, medium, and high somatic symptom severity (Kroenke *et al.*, 2002).

Note that use of these instruments that assess mood, anxiety, and physical symptoms does not provide any psychiatric diagnoses. Instead, they give an indication of the degree of psychological distress and symptom dysregulation. This information, in turn, is very important for treatment planning and prognosis evaluation. It can also indicate a need to refer the patient to a doctor or recommend that the patient seeks care from a psychologist for psychosocial distress.

Parafunctions

Many studies have found that bruxism or other parafunctions are associated with TMD and orofacial pain (Manfredini and Lobbezoo, 2010). Most likely, certain types of bruxism or parafunctions lead to overloading in the jaw system and thereby trigger or maintain TMD and orofacial pain. Observation by the patients themselves or by friends and family is the most common method of identifying bruxism and parafunction and it is generally more reliable than a clinical assessment, except in cases of severe abrasions and muscle hypertrophy.

The OBCL gives an overview of parafunctions that occur during sleep and those that occur during the waking hours (Ohrbach *et al.*, 2008b; Manfredini and Lobbezoo, 2010). This indicates whether treatment should target parafunction during sleep (e.g., with an occlusal splint) or during the waking period (e.g., through behavior modification). The use of a self-report instrument for the assessment of behaviors that often occur outside of normal conscious awareness often leads to the patient testing each behavior while completing the instrument in order to assess whether the behavior is familiar or not; this leads to substantially better assessment for the presence or absence of these behaviors. Reports on the OBCL, like any self-report instrument, should be followed up with further clinical interview and, as necessary, field observation for confirmation and linking to symptom patterns.

The pain drawing

The pain drawing gives a good picture of the extent and localization of the patient's pain. The pain drawing covers the entire body in order to capture all pain conditions besides TMD and orofacial pain. The most common comorbid pain conditions are headache and neck and back pain. Co-occurrence of other pain conditions is common and indicates a higher risk of developing TMD and orofacial pain (Lim *et al.*, 2010; Marklund *et al.*, 2010; Nilsson *et al.*, 2013). Another important point is that widespread pain may indicate a need for medical assessment to investigate, for example, systemic diseases or central pain conditions.

We do not clearly understand why chronic orofacial pain often occurs together with other pain conditions, but it is clear that comorbid pain conditions maintain chronic orofacial pain (Rammelsberg *et al.*, 2003;

LeResche *et al.*, 2007; Lim *et al.*, 2010; Velly *et al.*, 2010), probably via central sensitization, while reducing treatment effects and making diagnosis extremely difficult (Velly end Fricton, Velly and Fricton, 2011).

Learn About Doing These Procedures

Download the instructional video, the documentation and the questionnaires from http://www.rdc-tmdinternational. org.

1. Use the screening questions to identify patients with TMD and orofacial pain (Table 1.1).
2. Use the DC/TMD – both Axis I and Axis II – with those patients who you identified from the screening questions.

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