The diagnostic process for temporomandibular disorders

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SUMMARY

The diagnostic process for temporomandibular disorders (TMD) is complicated by the multifactorial etiology and multiplicity of clinical signs and symptoms characterizing such disorders. Several electronic instruments and radiological techniques have been proposed over the years in the attempt to integrate clinical evaluation of TMD patients. Nonetheless, literature data still suggest that TMD diagnosis should be based on a thorough clinical assessment and international classifying scheme, also rely on standardized clinical tests to categorize TMD patients. Imaging techniques should be used to gain a better insight within the temporomandibular joint, reserving magnetic resonance to the depiction of soft tissues and computerized tomography to bone structures. EMG-based devices failed to prove effective in improving the diagnostic process for TMD, since a lack of correlation between instrumental signs and patients' symptoms has been showed. The TMD diagnostic process also relies on a psychosocial assessment of patients, which can be useful to detect a psychosocial impairment that needs to be addressed at the therapeutical level.

Key words: temporomandibular disorders; clinical features.

INTRODUCTION

Temporomandibular Disorders (TMD) is a heterogeneous group of pathologies affecting the temporomandibular joints, the masticatory muscles, or both (1). The term TMD does not refer to the complex and diversified etiology of these disorders and comprised a number of signs and symptoms, among which the most frequent are pain and/or tenderness in preauricular area and/or in the masticatory muscles; a reduction and/or an alteration of the range of joint motion; articular sounds, such as click and/or crepitius, during mandibular movements. A specific aetiology has been demonstrated only for some of these conditions, since most of them recognize a multifactorial aetiopathogenetic pattern. Indeed, temporomandibular disorders are considered to have multifactorial aetiology, in which a number of local and systemic factors can co-occur and determine the onset of a clinical symptomatology (2-4). TMD symptoms have a gaussian distribution in the general population, with a peak in the age range between 20 and 40 years for the most common forms and a lower prevalence in the young and the oldest people. Females are predominantly affected by these disorders, and the reported females: males ratio is about 3-4:1 in patients' populations (5-10).

The prevalence of TMD signs and symptoms in the general population ranged between 5% and 50%, even though a comparison of different studies is complicated by the absence of homogeneous diagnostic criteria adopted in the literature (11).

Nonetheless, in consideration of the psychosocial impact that TMD have in terms of decreased patients' quality of life and socio-economical costs (12-15), an improvement in the standardization of the diagnostic process for these disorders is strongly requested to avoid unnecessary delays in the pathways to diagnosis and, ultimately, management of TMD.

Considering this premise, the present paper is intended to summarize up-to-date evidence-based knowledge on temporomandibular disorders diagnosis.

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CLASSIFICATION SCHEMES

The history of TMD literature is rich in taxonomic and classifying proposals that failed to achieve international consensus but only prevented from gathering comparable data from one study to another (4,16).

Many epidemiological studies evaluated the prevalence of TMD signs and symptoms in different populations, such as Caucasians (17-20), Hong Kong Chinese (21), Ecuadorian Indians (22), Native American, young adults from Nigeria, Brazil and Korea (23-26), but comparison of TMD diagnoses is possible only between the few studies adopting the standardized classification system for research purpose, the Research Diagnostic Criteria for TMD (RDC/TMD) (7, 9, 10, 27, 28).

The RDC/TMD guidelines provided standardized criteria for a two-axis diagnosis. This means that, along with a physical diagnosis (axis I), the patient receives a psychosocial diagnosis as well (axis II) (27).

The axis I of the RDC/TMD classification system is a clinically-based assessment taking into account for both anamnestic and clinical parameters of evaluation. It provides criteria for the diagnosis of three main groups of disorders: muscles disorders (group I), disc displacements (group II) and other joint disorders, such as arthralgia, osteoarthritis and osteoarthrosis (group III).

A detailed description of the RDC/TMD is beyond the scope of this review, but some hints to the needed criteria for diagnoses may be helpful for the comprehension of the concepts leading to their formulation.

Muscle disorders (group I) are diagnosed on the basis of anamnestic reports of pain in the muscles of mastication and clinical assessments of pain at palpation of at least three out twenty muscular sites in the facial area (ten for each side). The only distinction among muscle disorders is made when mouth opening is less than forty millimetres. When criteria for group I diagnosis are satisfied, a diagnosis of myofascial pain has to be put, and it will be with or without restricted mouth opening on the basis of the jaw range of motion.

The diagnostic group of disc displacements (group II) aims to detect conditions in which the temporomandibular joint disc is anteriorized with respect to the mandibular condyle. Three diagnostic subgroups are identified: displacements with reduction and displacements without reduction with or without restricted mouth opening. The main criteria to diagnose disc displacement with reduction is the presence of a click sound during jaw movements that has to reciprocal (audible during both jaw opening and jaw closing movements) and not fixed (audible at different stages of motion during the jaw opening and jaw closing movements). A disc displacement without reduction is diagnosed when a history of previous click sounds is accompanied by their absence at clinical assessment and by a deflection during jaw opening. When the mouth opening is less than thirty-five millimetres a diagnosis of displacement without reduction with restricted mouth opening can be put, while a mouth opening of more than the cut-off value points toward the diagnosis of disc displacement without reduction without restricted mouth opening.

The third group of diagnoses, arthralgia, osteoarthritis and osteoarthrosis (group III), is based upon joint palpation, accordingly to the presence of pain at palpation and crepitation sounds, alone or combined.

As for psychosocial diagnosis (axis II), a rating of jaw disability, chronic pain, and depression is provided by the use of validated questionnaires, thus allowing to assess psychosocial aspects that have to be addressed at therapeutical level.

Despite the RDC/TMD guidelines do not allow a diagnosis of less frequent conditions or pathologies that do not show a clear origin and natural progression (such as traumatic injuries, neoplasm of condyle, acute traumatic injuries, polyarthritis, atypical facial pain, headaches), they actually represent the standard of reference for TMD diagnosis and classification in the research setting, also allowing cross-cultural and multicenter comparisons both in patient and non patient populations.

The points of strength of the RDC/TMD classification (standardization of criteria, simple taxonomic groups), which have led to their wide diffusion among epidemiologists and researchers, are not so helpful in the clinical setting, where the use of a wider classification system providing etiopathogenetic information as well should be more indicated.

This is the reason for the diffusion of the American Academy of Orofacial Pain (AAOP) classification system as a widely adopted scheme for TMD assessment in the clinical setting (29).

This classification divides TMD in masticatory muscle and articular disorders.

Masticatory muscle disorders include myofascial pain, myositis, myospasm or trismus, contracture and neoplasia. Articular disorders include developmental or acquired disorders, articular disc disorders, inflammatory-immune disorders, infection, osteoarthritis, condylar dislocation, ankylosis and fracture. For each of these disorders, a detailed description of

symptoms and some pathogenetic information is provided.

The quantity of potentially clinically useful information provided by the AAOP guidelines is strongly superior to that of the RDC/TMD, but most of them are empirically-based and, consequently, not suitable to be used for research purposes.

For these reasons, the two classification schemes can co-exist, and may be assumed as the current standards of reference in their respective settings.

CLINICAL VERSUS INSTRUMENTAL DIAGNOSIS

As in the case of the RDC/TMD, the AAOP classification is almost interely based on clinical observations.

Indeed, there is currently agreement among scientists that the standard of care for TMD diagnosis is a thorough clinical examination performed according to a validated diagnostic scheme and reliable and repeatable techniques (1, 27, 29).

Available evidence suggests that a clinical evaluation performed by a trained investigator according to calibrated manoevreus has a good diagnostic agreement with magnetic resonance (MR), which is the standard of reference among imaging techniques for the depiction of soft tissues, for the two main groups of joint disorders (disc displacements, inflammatory-degenerative disorders) (30, 31).

By contrast, literature data suggested that clinical assessment alone is not accurate to detect long-lasting disc displacement without reduction and without functional limitation (32).

The diagnostic process for temporomandibular joint disorders may be integrated with the adoption of appropriately selected imaging techniques.

The standard of reference for soft tissues assessment is represented by magnetic resonance, which allows depicting the exact localization of joint effusions and disc position and structure abnormalities (33).

Computerized tomography (CT) has to be reserved to the most complex post-traumatic and surgical cases requesting an accurate study of osseous structures (33).

The improvements that have been achieved in the quality of magnetic resonance images and computerized tomograms in recent years have caused an abandon of the other radiological techniques in the specialistic phase of the TMD diagnostic process. Indeed, traditional tomography and ortopantomography give no useful information for TMD specialists.

Ultrasonography has been recently introduced in the TMD literature and preliminary studies gave promising results, suggesting that it may be useful for repeated assessments of joint effusion (34-36) rather than disc displacement evaluation (37,38).

In general, the application of high-quality imaging techniques to the study of the temporomandibular joint has allowed gaining a better insight into this joint and a better correlation between joint abnormalities and pain, which is the main reason for patients to seek for TMD treatment.

As for muscle disorders, whose main symptom is pain, the absence of a gold standard instrument for pain rating makes clinical evaluation itself the most useful diagnostic approach (39).

Literature data supported the absence of a relation between pain and any instrumental sign, except than pain within the masseter muscle elicited by a pressure algometer (40).

Several instrumental and electronic devices, mainly based on the measurement of electromyographic (EMG) activity of muscles and tracking of jaw motion patterns, were proposed during the years as the definitive diagnostic tool for myofascial pain of masticatory muscles but, as in the case of other similar muscle disorders, they lack in reliability and accuracy (41). This consideration is applicable to both surface electromyography and mandibular kinesiography, which do not allow an improvement in diagnostic accuracy with respect to clinical assessment alone, mainly because no direct relation between pain and EMG levels has been well-documented (39, 41, 42). This means that pain does not depend on EMG values and prevents from establishing an evidence-based cut-off value to discriminate pathological from non-pathological EMG levels, so limiting the diagnostic validity of EMG-based instruments.

PSYCHOSOCIAL CONSIDERATIONS

It is well-recognized in the literature that temporomandibular disorders involve the biopsychosocial sphere as well, with chronic pain and functional limitation representing possible sources of interference with daily activities (3, 12-15).

For this reason, a number of psychosocial instruments have been proposed to assess TMD patients and TMD literature is plenty of study that have tried to depict a personological profile typical of such disorders.

Anxiety, depression and somatization disorders have been associated to TMD symptoms, and early findings suggesting a different psychosocial impair-

ment between the subgroups of TMD patients (43, 44) have been dismounted by recent suggestions that pain, regardless of its muscular or articular origin, is the fundamental factor that relates TMD to the presence of depressive symptoms (13).

The relation between duration of pain and severity of psychosocial impairment has also been investigated and, even in the absence of definite conclusions, there is preliminary support to the hypothesis that depressive disorders seem to be mostly associated with chronic TMD and anxiety disorders with the acute phase of symptoms onset (45, 46).

The main shortcoming of available literature is due to the cross-sectional design of most investigations, which prevent from drawing conclusions about the temporal relation between pain and psychosocial impairment. Nonetheless, a systematic literature review suggested that, as for the pain-depression relation, there is more evidence for the "consequence hypothesis" (depression followed chronic pain) than for the "antecedent hypothesis" (depression preceding pain), even if there is also some support to the hypothesis that an history of depression can cause vulnerability to pain disorders (47).

These issues have therapeutic rather than diagnostic implications for the TMD specialist. Indeed, the co-occurrence of physical symptoms and psychosocial disorders in TMD patients has to be addressed in the treatment phase with the adoption of appropriate cognitive-behavioural and educational approaches.

At the diagnostic level, a detailed psychosocial and psychiatric assessment of TMD patients is beyond the tasks of the TMD specialist, and a diagnosis as simple as that provided by the RDC/TMD axis II is sufficient to detect a psychosocial impairment that needs to be addressed wth treatment.

CONCLUSIONS

The heterogeneity of symptoms of temporomandibular disorders has put up some problems at the diagnostic level that may reflect in treatment planning difficulties and be responsible for the taxonomic complexity of such disorders.

The current evidence-based knowledge on TMD diagnosis can be summarized as follows:

• The diagnostic process for temporomandibular disorders has to be primarily based on a thorough clinical assessment performed by a trained operator and conducted in accordance with standardized tests;

• TMD patients should be classified according to a widely diffused scheme, such as the RDC/TMD guidelines for research and epidemiological purposes and the AAOP classification in the clinical setting;

• Imaging techniques can be used to gain a better insight into the temporomandibular joint in the attempt to correlate clinical symptoms with specific intrarticular disorders;

• Magnetic resonance is the gold standard for soft tissues allowing to depict disk position abnormalities and joint effusion, while computerized tomography has to be reserved to the pre-surgical phase of treatment planning;

• Promising results came from early studies on the adoption of ultrasonography, which has potential advantages over MR in terms of costs and availability and is worthy to be further evaluated as an alternative imaging technique for TMD patients;

EMG-based instruments and jaw tracking devices have no place in the diagnostic process for temporomandibular disorders due to the impossibility to correlate instrumental signs with patients' symptoms and to their poor reliability and repeatability.

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