Current recommendations for the diagnosis of temporo-mandibular joint disorders – Review paper

Part one

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ABSTRACT

The present article is based on recent literature review and proposes evidence-based diagnostic guidelines for temporo-mandibular joint (TMJ) disorders. The diagnosis of TMJ disorders must be first clinical and not only paraclinical.

Key words: TMJ disorders – diagnostic guidelines

INTRODUCTION

TMJ disorders are an important problem in public health because of the high prevalence of the head and neck disorders; thus, it is of critical importance to have the “support of evidence based” diagnostic recommendations, not only in order to obtain the best results, but also to avoid over-treatment, a situation most often encountered.

The aim of the present study is to suggest diagnostic recommendations based on a review of present day specific literature, taking into account evidents-based criteria and ideas of sensibility and specificity.

The special characteristics, anatomical (structure of the bone, of the cartilage, of the ligaments, of the muscles and of the nerves) and physiological, mandible and tongue mobility, involvement of the cervical posture, of the TMJs, which are not to be remembered herein, explain, to a great extent, the specificities of these disorders, and the accompanying symptoms.

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CURRENT RECOMMENDATIONS FOR THE DIAGNOSIS OF TEMPORO-MANDIBULAR JOINT DISORDERS – REVIEW PAPER. PART ONE

BRIEF REVIEW OF THE ETHIOPATHOGENY

The ethiopathogenesis should actually be considered as being multi-factored, having as main factors the following:

- lack of muscular coordination and/or tension; posture problems;
- micro- and macro-trauma, among which: dental occlusion dysfunctions, bruxism and the classical Whiplash “rabbit’s hit” (responsible for more than 8 times for the TMJ disorders);
- several bad habits, (be those placed in the mouth, in the throat or connected to psychic disturbances);
- disturbances connected to psycho-social behavior; stress, depression, and somatisation;
- cephalometric criteria, with a disturbed vertical dimension of occlusion, an anti-clockwise rotation in the development of the mandible, a mandible retroposition.

Briefly, the literature reports that 30% to 50% of the population present, at some point in their lives, a TMJ disorder, which is generally associated with a sexual equivalent incidence (sex-ratio 1:1). The most often affected are caucasians: women report symptoms more often and 5% to 15% of the symptoms are reported spontaneously by patients. The most commonly affected age group is between 20 to 40 years, but children are more often affected than it is generally believed (34%) (14, 15), with muscle pain (1-9%), joint pain (1-5%), headache (7%), and joint noise (3%). Girls seem more prone than boys, between the ages of 10 to 16 (with 2 different peaks of incidence). No predictive elements seem to have been identified (16) so far.

The simultaneous osteoarthrosis and a displaced disc are present in a number of patients suffering from a TMJ disorder (11,12).

The specific literature overemphasizes the critical importance of a good clinical examination, not of imaging techniques. The last international agreement on which practice can be based dates back to 1998.

The main clinical hallmarks (which will be explored in detail) and should be included in a diagnostic protocol are: clinical examination (unfortunately not evidence-based) (18), palpation, auscultation, or both (19), medical history; assessment of pathologic severity (20), imaging techniques and further tests are necessary.

Clinical examination allows identification of the following signs:

- mialgia, muscle pain with or without muscle fatigue, palpable muscle lumps, muscle contraction, pain worsened by chewing, irradiating to special sites;
- arthralgies, inflammatory pain, which may involve the joints, exacerbated by active and passive movement of the mandible, well localized (in or in front of the ear);
- joint noise which can sound like cracking, slapping;
- limited movements of the mandible: trismus, or asymmetric movement;
- non-specific symptoms such as vertigo, headaches, accuphenes, cervix pain, etc.

Headaches (21,22) are a common symptom in the population, which makes the differential diagnosis difficult. It is therefore difficult to always consider it caused by TMJ and requires a thorough clinical examination.

Half the patients with TMJ disorders suffer from headaches, a third of them being migraineurs. The importance of differential diagnosis should be remembered here, the most commonly classified is that of the International Headache Society, IHS-II.

Except for the types of pain already mentioned, a hypersensitivity in the front area of the ear (which diminishes after arthrocentesis) (23), a resistance test to forced opening (dyskinesya), a positive test to the wooden Krogh-Poulsen stick (Figure 1) and a movement of distention (Figure 2) causing arthralgy can sometimes be found on palpation.

The non-specific symptoms most often encountered are the following: ear aches, accuphenes, vertigo and partial hearing loss. Forty-two percent (42%) of accuphenes (25, 26) can be improved 2 years after treatment, but the information is still controversial.

THE DIAGNOSIS OF TMJ DISORDERS

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The entire range of these symptoms can be grouped so as to determine the Helkimo index, which very clearly mirrors TMJ disorders.

Diagnosis through imaging techniques (27) is secondary and follows clinical examination. German studies recommend them only after the following clinical findings: problems connected with growth of the mandible, severe mandible asymetry, a suspicion of systemic pathology or of a tumor, trauma, when there is a preauricular tumefaction, pain when palpating the mandibular condyle, hindered mobility of the condyle, unexplained or badly explained occlusal problems (for example an inoccclusion on one side) (48, 49).

The German authors recommend the following imaging techniques, in the chronological order in which they should be performed: an orthopantogram to obtain a complete diagnostic image, a CT scan to highlight the bone problems, an MRI for any other problems. Diagnostic arthroscopy is used only in those cases which require an arthroscopic therapy.

The orthopantomogram can highlight an angulation of the condyle cervix in relation to the ramus, and morphological changes of the condyle head: these signs are related to the intra-articular disc displacement (28).

The orthopantomogram has no better diagnostic value, than a clinical examination (29).

The CT scan (30) is the imaging test recommended in case bone problems are suspected (Figure 3).

The Cone beam technique (31) of volume tomodensiometry, a most recent technique, has a sensitivity of 80%, a specificity of 100% and is 90% precise; these figures are comparable to those obtained from a classical helicoidal CT scan, but the latter has the disadvantage of more irradiation (12 times more) and slower.

The MRI has many advantages over the above-mentioned irradiation techniques; nevertheless, it must be remembered that it can show abnormalities in healthy subjects with no subjective symptoms.

The most common abnormalities disclosed by MRI for TMJ disorders are:

1. abnormalities of position, mobility, morphology of the disc (40). In 77% of cases, there is a relationship between the position of the disc identified by MRI and clinical examination (32, 40);
2. changes in the synovial liquid, in relation to a necrosis of the condyle head, to an irreducible disc displacement or to pain (33);
3. morphologic abnormalities of the bony cortex;

Figure 3. CT scan frontal cut highlights a right condilar osteoarthrosis.
4. structural abnormalities (muscle atrophy and different morphology) of the insertion of the external pterygoidian muscle (38);
5. a rupture of the posterior fraenum (with a signal increase in T1) (37);
6. a different medullary signal indicating a medullary oedema (most often painful) (36), which is an early stage of osteonecrosis (34) partially related to symptoms (35). (Figure 4, 5)

OTHER IMAGING TECHNIQUES

Many other imaging techniques, irradiating or not, can be found in literature, which indirectly points to low efficiency of classical techniques.

The SPECT/CT technique has 100% sensitivity and 90.9% specificity, and has 96.9% precision in case of pathologic dysfunctions of the TMJ (43).

Electrosonic investigations have been equally well used; in reducible disc displacements, the authors mention a sensitivity of 77.2% and a specificity of 93.3% (44), whereas in the non-reducible disc displacements, sensitivity is 81.6% and specificity only 64.7%. We should remember, in these cases, that the noise investigations have nothing in common with the sound which can sometimes be heard clinically.

Ultrasounds, used especially in the dynamic technique of high resolution, have a sensitivity of 90%, a specificity of 100% and a precision of 95% (45).

Ultrasonic techniques, used in a tridimensional way, reach a sensitivity of 70%, a specificity of 76% and a precision of 75% (46).

It must be remembered that all imaging techniques using ultrasounds are largely dependent on the operator.

COMPLEMENTARY TESTS

Some supporting paraclinic tests are absolutely necessary in complex cases for differential diagnosis of the main symptoms (such as headaches, for example) and require the advice of other specialists, such as ORL specialists, neurologists, rheumatologists, and physiotherapists (for the back of the head, for example). Among laboratory tests, we mention only the electromiographic test for exteroceptive suppression of the temporal muscle (47), classically performed by neurologists in order to rule out the tension headache; this was introduced in our department to try and reach a better differential diagnosis of different types of headaches and TMJ disorders (Figure 6). So far differential diagnosis in clinical activity has been absent.

Taking into account the rich literature, it is difficult to get a clear idea regarding the importance of an MRI for diagnosing TMJ disorders: to some authors, it has no diagnostic value because of the many false-positive results; to others (41, 42), it is necessary because of the many false negative conclusions during clinical examination, allowing thus the identification of intra-articular disc disorders, the idiopathic osteonecrosis and its early, even asymptomatic, stages. (A therapeutic approach is necessary in all cases).

FIGURE 4. MRI showing a reducible anterior disc luxation in maximal mouth opening.

FIGURE 5. MRI showing an irreducible anterior disc luxation with a condilar beginning osteoarthrosis.
We could also mention the so-called “instrumental diagnosis” among the laboratory tests (48). This refers to the axiography, which has no proven interest for clinical practice of TMJ disorders and should be confined to teaching and research in this particular field (49,50) (Figure 7).

**OUR DIAGNOSTIC RECOMMENDATIONS**

Taking into account the review of specific literature with its evidence-based data, as well as our own experience of over 25 years in the field of TMJ disorders, we think we can suggest the following diagnostic recommendations:

- a detailed and thorough clinical examination should always be performed and followed by a plan established by a kinesitherapist who is able to refine the diagnosis of arthralgy and mialgy, of anterior (and/or lateral) disc sprains reducible and/or non-reducible;
- an orthopantogram is systematically performed on all new patients suffering from TMJ disorders, with the aim of identifying certain indicative factors, getting a thorough image of the dental and parodontal stage (which might play a part in therapeutic planning) and possibly deciding on the diagnosis of osteoarthrosis of the mandibulary condyle;

**FIGURE 6.** Temporal muscle electromyography

**FIGURE 7.** Axiographic examination of the TMJ.
• an MRI should only be performed several months after the failure of well-controlled conservative treatment which was also followed by the patient. The only other recommendation for the MRI is to confirm the presence of a “stuck disc” in case of a non-reducible anterior disc displacement which does not respond to conservative treatment.

REFERENCES

16. Huddleston Slater JJ et al. – Anamnestic index severity and signs and symptoms of TMD. Cranio 2006; 24:112-118
20. Bevilaqua-Grossi D et al. – Anamnestic index severity and signs and symptoms of TMD. Cranio 2006; 24:112-118
23. Eliav E et al. – Facial arthralgia and myalgia: can they be differentiated by trigeminal sensory assessment? Pain 2003; 104:841-940
31. Hondaz K et al. – Osseous abnormalities of the mandibular condyle: diagnostic reliability of cone beam CT compared with helical CT based on an autopsy material. Dentomaxillofac Radiol 2006; 35:152-157
33. Yano K et al. – Differences in TMJ pain and age distribution between narrow edema and osteonecrosis in the mandibular condyle. Cranio 2004; 22:283-288
34. Chiba M et al. – The relationship of bone marrow edema pattern in the mandibular condyle with joint pain in patients with TMJ disorders:


42. Larheim TA – Role of MRI in the clinical diagnosis of the TMJ. *Cells Tissues Organs* 2005; 180:6-21


46. Landes CA et al. – 3-D sonography for diagnosis of disc dislocation of the TMJ compared with MRI. *Ultrasound Med Biol* 2006; 32:627-639


50. Schmid-Schwap M et al. – Correlation between disk morphology on MRI and time curves using electronic axiography. *Cranio* 2005; 23:22-29