JOURNAL OF SOCIAL SCIENCES AND HUMANITIES RESEARCH FUNDAMENTALS

VOLUME04 ISSUE11
DOI: https://doi.org/10.55640/jsshrf-04-11-08 Pages: 40-49

METHODS OF DIAGNOSIS OF TMJ DISEASES

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ABOUT ARTICLE

Key words: Diagnosis, TMJ Diseases, osteoarthritis, infectious and traumatic arthritis, chondromatosis, tumors.

Received: 13.11.2024
Accepted: 18.11.2024
Published: 23.11.2024

Abstract: Lesions of the temporomandibular joint have a different nature. Conditionally, all TMJ pathologies can be divided into independent diseases (osteoarthritis, infectious and traumatic arthritis, chondromatosis, tumors), internal and functional disorders.

INTRODUCTION

Lesions of the temporomandibular joint have a different nature. Conditionally, all TMJ pathologies can be divided into independent diseases (osteoarthritis, infectious and traumatic arthritis, chondromatosis, tumors), internal and functional disorders.

Most often, patients are diagnosed with TMJ dysfunction, which is treated by dental gnathologists. To determine the cause of partial or complete joint damage, a diagnosis is prescribed.

TMJ cancers are a common pathology, ranking third after caries and periodontitis. Diagnosis and treatment of dysfunction is carried out by a gnathologist and other specialized specialists. The group of temporomandibular diseases includes a large number of dysfunctions that can be caused by problems of the masticatory muscles, structural and degenerative lesions of the temporomandibular joint (TMJ), as well as nerve fibers. The temporomandibular joint is a complex mechanism by which the lower jaw connects to the bones of the skull. It consists of two bones – the lower jaw and the temporal bone. The TMJ is one of the most complex joints in the human body and an important component of the chewing system.

A prerequisite for good functioning of the TMJ is the correct anatomical location of the joint, the integrity of its structure and the operability of the masticatory muscles. Only in the presence of these three components does it function without pain syndrome.

If there is a lesion on at least one point, then the work of the temporomandibular joint is disrupted in a person, a number of clinical manifestations occur, leading to a violation of normal life and problems with eating and talking.

The presence of pathology of the temporomandibular joint can be suspected if there are some symptoms, signs indicating the disease. The International Association of Gnathologists has identified the following mandatory signs of TMJ damage: The presence of myofascial pain. This is a pain syndrome that is almost always observed in TMJ pathologies. The pain can be localized not only in the joint area, but also with the transition to the neck, shoulders and spine. Diffuse pain is caused by the involvement of other nerve fibers in the inflammatory process.

• Lesions of the temporomandibular joint from the inner surface. In the joint between the mandible and the temporal bone there is an articular disc – an articular cushion that prevents the friction of the head of the mandible with the articulation of the temporal bone. If a TMJ injury occurs, the articular disc changes its position, causing the bones to rub against each other, which leads to destruction of the joint structure.

• Inflammation. The word inflammation means a violation of temperature, soreness of the joint itself. It occurs as a result of degenerative changes in the joint itself or as a result of infection in the TMJ.

Diagnosis of TMJ dysfunction

Assessment and examination of the patient's temporomandibular joint can determine the presence of the disease. Diagnosis of TMJ diseases includes consultation with the patient's attending physician:

• Examination of the jaw joint for soreness.
• Listening for clicks, pops, or grating when the jaw moves.
• Examination of teeth and alignment of jaw joints.
• Checking for problems such as high fillings, misaligned teeth, caries and uneven tooth surfaces.

• Checking the bite.
• Checking for gnashing and clenching of teeth.
• Measurement of mouth opening.
• Checking for problems with facial muscles.
• Examination of the muscles around the shoulders, arms and back.
• Radiography of the entire face, computer or magnetic resonance imaging to view the mandible and TMJ.
• Exclusion of other conditions (infections, ear diseases, nerve problems and headaches) after consulting a doctor.

METHOD

Methods of diagnosis of TMJ diseases

TMJ is a clinical diagnosis. It is necessary to carefully collect an anamnesis and conduct a thorough diagnosis of TMJ dysfunction, paying special attention to the localization, onset, nature, irradiation, duration of pain and other concomitant symptoms.

As a rule, patients describe pain in the TMJ or mandible as the predominant symptom. It can spread to the scalp or neck, becoming worse when chewing, yawning or talking for a long time.

It is also often reported about difficulty opening the mouth, clicks, pops or crepitation in the TMJ itself, short-term blocking of the lower jaw when opening and closing it.

Orofacial pain (i.e., any pain that is felt on the face, mouth, or jaws) that is not associated with jaw movement may indicate another cause of discomfort. Primary headache, especially tension headache, is a comorbid disease capable of exacerbating another type of pain.

Otological symptoms, including otalgia, tinnitus, ear congestion, dizziness and subjective hearing impairment, are noted in patients with TMJ. These symptoms are more common in patients with myofascial disorders than in patients with intraarticular disc lesions, possibly due to the common embryonic origin of the masticatory muscles and some structures of the middle ear.

Functional diagnosis of TMJ includes careful palpation of the temporomandibular joint and masticatory muscles, noting any abnormal movements of the mandible, soreness and signs of bruxism. The normal values of jaw opening are 35-45 mm; a value less than 25 mm indicates dysfunction without movement inside the joint. Gnatology and functional diagnostics of TMJ are more likely to establish an accurate diagnosis.

TMJ examination can be improved by placing one finger in the ear canal and palpating the anterior wall of the canal when the patient opens and closes his mouth. Crepitation in this place is associated with a violation of the articular surface and may indicate the presence of osteoarthritis.

The use of a stethoscope for auscultation over the TMJ is a useful addition to confirm the presence of crepitation. The sensation of a click or pop when opening the mouth may indicate a dislocation of the articular disc.

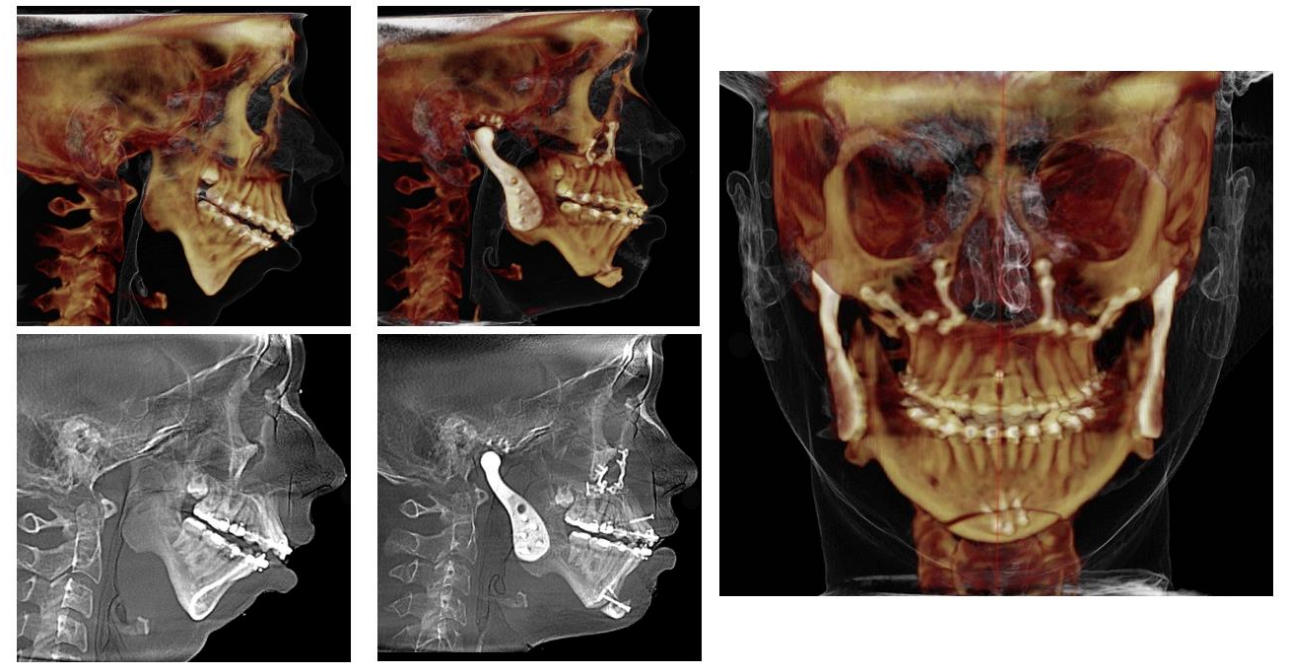
Malocclusion of teeth does not contribute to the manifestation of TMJ, and orthodontic treatment is not recommended if only this sign is detected.

Pain during palpation of the TMJ, clicking in the joints and crepitation are signs of intraarticular disorder, while pain during jaw movement, headache and radiating pain indicate a muscle problem. The examination should also include otoscopy to exclude pathological causes, an examination of the oral cavity, palpation of the neck muscles.

These are basic studies that can help to suspect TMJ pathology. For the accuracy of the determination, it is necessary to use X-ray diagnostic methods for diseases that allow visualization of internal

structures. Such methods include CT and MRI. They allow you to structurally disassemble the joint and look at tissue lesions to accurately establish the pathology and further choose an effective treatment method.

Temporomandibular joint disease (TMJ) occupies a special place among dental diseases due to its significant prevalence, extremely diverse and complex clinical picture. According to clinical studies, TMJ pathology occurs in 70-80% of the healthy population and ranks third after caries and periodontal diseases.[1,2,3] Throughout life, each person has experienced certain symptoms of dysfunction, manifested by pain in the masticatory muscles or clicking in the TMJ [3]. The complexity of the anatomical structure, the large number and originality of the course options, the variety of clinical symptoms of pathological processes make it difficult to diagnose diseases of the temporomandibular joint. Diagnosis of diseases of the temporomandibular joint remains one of the most difficult issues in dentistry and requires the use of modern research methods. [2]



Methods of diagnosis of TMJ diseases can be divided into groups:

– Radiological.

– Graphic.

– Functional [2,5].

Radiological

The main role in the diagnosis of diseases of the temporomandibular joints belongs to X-ray research methods [3].

X-ray research methods provide diagnostics of at least 95% of cases of diseases of the temporomandibular joint, especially considering that at the same time they visualize the condition of its bone fragments. Unfortunately, the program available on most orthopantomographs, as well as the orthopantomographs themselves, distort the articular gap in the X-ray image, since they display the temporomandibular joint in an oblique projection [3,6].

Kinds:

Overview radiography of the temporal joint is a complex study due to the layering of other bones of the skull, but it makes it possible to recognize a number of TMJ diseases (dysfunctional syndromes,

arthrosis, fractures of the articular process, etc.). To obtain overview radiographs, a special technique has been developed and applied to obtain an image of the joint in a lateral projection with the mouth closed and maximally open [4].

Tomography has significant advantages over X-ray imaging, as it allows you to identify the most subtle changes in the joint without projection distortions, to analyze measurements of articular elements and their ratios during treatment. When evaluating radiographs, the anterior, central and posterior position of the mandibular head can be detected [6].

Magnetic resonance imaging (MRI) is currently the gold standard for imaging soft tissue structures. This method is easily tolerated by patients and provides high contrast of soft tissues, three-dimensional image and no side effects. Magnetic resonance imaging allows you to obtain a layered image in various projections, with a step size of 1.5–3 mm, and is used to visualize both bone (head of the mandible, articular tubercle and mandibular fossa) and soft tissue structures of the temporomandibular joint (capsular ligamentous apparatus, articular disc) and masticatory muscles. This technique allows you to identify changes in the position of the articular disc, effusion into the joint cavity, changes in articular cartilage, soft tissue tumors of the joint and parotid tissues, and even hypertrophy of the masticatory muscles. The main indications for MRI are suspicion of an unrecoverable displacement of the articular disc, tumors of the joint and the fossa, persistent joint pain that does not respond to traditional therapy [8].

Computed tomography of the temporomandibular joint is a type of X-ray examination of the anatomical area, which is based on the absorption of part of the radiation by the tissues of the human body. The radiation dose during joint tomography usually does not exceed 0.02 Gy. However, even despite this level of radiation, diagnosis is used only according to strict indications to exclude effects on the parotid salivary glands sensitive to radiation [4].

The method has a fairly high resolution, due to which it is possible to differentiate anatomical structures that differ from each other in density within 1-2%. If we compare tomography with a conventional X-ray, then in the latter case this indicator ranges from ten to twenty percent [4].

Computed tomography of the TMJ allows to obtain an image in three mutually perpendicular planes: sagittal, frontal and axial, in addition, measurements and volumetric reconstruction of articular elements can be carried out [2,3].

Graphic

Recording of dynamic jaw movements

The functionography. To register the movements of the lower jaw, an intraoral device is used (a functionograph, consisting of a horizontal plate, which is located on the lower jaw, and a set of pins (rigid and springy), located on the horizontal plate of the upper jaw [7].

Functionography is used at the stages of determining the central ratio of the jaws and analyzing the movements of the lower jaw both in intact dentition and in tooth loss. In this case, the recording pin is fixed either on the upper or lower jaw, and the pad is on the opposite jaw. As a result of using a functionograph, a functionogram is obtained. Normally: the right side is identical to the left, the trajectory of the pin is smooth. The top of the angle corresponds to the central position of the jaws, its right side corresponds to the movement of the jaw to the left, the left side corresponds to the movement to the right; when moving forward, the pin records the path from the top of the corner back.

With this method, it is possible to study the function of the temporomandibular joint, diagnose joint pathology and masticatory muscles. The shape of the Gothic angle allows you to evaluate the function

of the joint, chewing muscles and determine whether the movements of the lower jaw are symmetrical to the right and left, whether there is a restriction of movements in one or both directions.

Axiography is an out–of-mouth recording of movements of the mandible, which allows you to record the trajectory of movement of the transversal hinge axis of the temporomandibular joint during movements of the mandible. The examination is carried out using an axiograph, a mechanical or electronic device for conducting research and obtaining axiograms in three mutually perpendicular planes [7,14].

The method of axiography allows you to: fix the initial state of the maxillofacial system; make a diagnosis before the start of treatment; dynamically observe during and after treatment; determine the central ratio of the jaws.

Electromyography (EMG) is the only objective and informative method of studying the functional state of the peripheral nervous system, the pathology of which occupies a leading place in the structure of neurological diseases. Electromyographic studies allow not only to establish the nature of the disease, to carry out its topical diagnosis, but also to objectively monitor the effectiveness of treatment, predict the time and stages of recovery. Automated systems for measuring and processing biomedical information using modern software tools significantly expand the diagnostic capabilities of modern medicine. This also applies to electromyography, a method of studying the neuromuscular system by registering the electrical potentials of muscles [10]. Electromyography of the masticatory muscles is performed using functional tests: closure of the dentition in the central occlusion, arbitrary and predetermined chewing. In addition, electromyograms are recorded at physiological rest of the mandible, and the time of reflex inhibition of the activity of the masticatory muscles during jaw compression in central occlusion is studied when tapping with a neurological hammer on the chin [9].

Rheoarthrography. Changes in hemodynamics of the parotid-articular region play an important role in the pathogenesis of functional disorders of the dentition system. In dentistry, rheography, laser Doppler fluorometry, and biomicroscopy are used to study the microcirculation of various tissues. The electrode holder for rheography of the temporomandibular joint consists of a base made of plastic with electrical contacts reinforced in it from four silver plates measuring 55 mm, the distance between which is 5 mm. The inner surface of the electrodes is concave, which ensures maximum contact with the skin of the face in the joint area. Sticky tape is used to fix the electrodes on the skin of the face. As functional tests, a static load of teeth in the position of central occlusion is used for 30 seconds, as well as a dynamic load – chewing gum for 2 minutes. The dynamics of rheography indicators are studied before, on time and at various times after the load [6,8].

Rheovasograms on the habitual and opposite side of chewing are evaluated qualitatively and quantitatively. In the quantitative analysis of rheograms, the main amplitude of the rheogram, the amplitudes of the slow filling of the lowest point of incision and the dicrotic wave are measured. Based on these indicators, indices are calculated: vascular elasticity (IE), vascular tone (IT), rheographic (RI), dicrotic and diastolic (DS). Rheographic index characterizes the magnitude and speed of systolic blood flow to the study area; diastolic – venous outflow (decreases with improved venous blood outflow). The coefficient of asymmetry of rheograms is determined. The lower indicator is taken as 100%, the difference in rheovasograms is calculated as a percentage. It is taken into account that, normally, the asymmetry coefficient does not exceed 25%. [7]

Phonoarthrography is a method for determining articular noise, which is observed in intra-articular disorders: joint hypermobility, dislocation of articular heads and discs, arthrosis. When listening to the temporomandibular joint with a stethoscope, slightly pronounced sounds of rubbing surfaces are

normally detected during movements of the lower jaw. Articular sounds may be absent in arthritis of the temporomandibular joint (excess articular fluid). In osteoarthritis of the temporomandibular joint, articular sounds are associated with deformation of the articular surfaces.

Normally, uniform, soft, sliding sounds are detected during functional tests. With violations of functional occlusion, the amplitude of articular noise increases 2-3 times, with osteoarthritis of the temporomandibular joint, clicking sounds of varying severity are observed [2,3,11].

Gnathodynamometry, which provides for the registration of compression efforts of the antagonizing pairs of teeth of the anterior group before the appearance of pain in the temporomandibular joint, allows in the vast majority of cases to identify pain dysfunction of the temporomandibular joint and differentiate it from manifestations of osteochondrosis of the cervical spine. It was found that with the development of dysfunction, the compression force decreases by 2 times compared to the norm and usually amounts to about 50 N. [1]

CONCLUSIONS

Thus, an analysis of the literature on examination methods for adult patients with TMJ dysfunction showed the need for a complex of clinical and special research methods: analysis of diagnostic models of jaws in an articulator, orthopantomography, telerentgenography, tomography of the temporomandibular joint, magnetic resonance imaging of the temporomandibular joint, electromyography of masticatory muscles and functionography, allowing to establish the correct diagnosis diseases and make a treatment plan.

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