
CLASSIFICATION OF TEMPOROMANDIBULAR DISORDERS

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Abstract: Temporomandibular joint (TMJ), also known as jaw joint or mandibular joint, is a bilateral synovial articulation between the temporal bone above and the mandible below. The TMJ is certainly one of the most complex joints in the body. The movements in both joints are synchronized and allow movement of the lower jaw.

The term temporomandibular joint dysfunction is used for structural and functional disorders related to the temporomandibular joints, masticatory muscles, and surrounding structures. It is characteristic that all the signs and symptoms worsen with the movement of the lower jaw, which occurs: limited mobility of the lower jaw, increased sensitivity to palpation and pain in the masticatory muscles, increased sensitivity and pain in the joint, locking and squeaking when moving the lower jaw, pain during movement, improper movement of the lower jaw, headache, neck pain, possible hearing and balance problems.

Temporomandibular disorders (TMDs) can be classified into the following categories: Masticatory muscle disorders (muscle pain, muscle spasm, myositis and tendonitis); Derangements of the condyle-disc disorders (disk displacement with reduction, disc displacement without reduction, disc perforation, structural changes in the articular surfaces of the temporomandibular joint and temporomandibular joint dislocation); Inflammatory and degenerative disorders (arthritis and osteoarthritis); Limited mobility of TMJ – hypomobility (forward disc displacement, ankylosis and trismus) and Congenital and developmental anomalies.

In order to successfully manage the temporomandibular disorders, we must consider that here are numerous types of problems and variety of etiologies that cause them. Separating these disorders into common groups of symptoms and classifying them is a process called diagnosis. This is very important because for each diagnosis there is an appropriate treatment. There is no treatment that is universal and appropriate for all temporomandibular disorders. In many situations, the success of therapy depends less on how the treatment is performed than on whether the therapy is appropriate and correct for the disorder. Therefore, making a correct diagnosis is extremely important for proper treatment.

Keywords: classification, temporomandibular disorders, temporomandibular joint dysfunction.

1. INTRODUCTION

Temporomandibular joint (TMJ), also known as jaw joint or mandibular joint, is a bilateral synovial articulation between the temporal bone above and the mandible below. The TMJ is certainly one of the most complex joints in the body. The movements in both joints are synchronized and allow movement of the lower jaw. The temporomandibular joint consists of bony and soft tissue components. Bony components are: capitulum mandibulae and fossa mandibularis ossis temporalis. Soft tissue components are: discus articularis, capsula articularis and ligaments.

TMJ is anatomically and functionally related with the teeth, the muscles of the head and neck, and the surrounding organs. The function of the temporomandibular joint is provided by the masticatory and digastric muscles. The masticatory muscles are a group of muscles that are directly involved in the movement of the lower jaw, the movement of the tongue and the floor of the oral cavity. The masticatory muscles are four pairs in number: m.masseter, m.temporalis, m.pterygoideus (medialis and lateralis). The complex movements of the

temporomandibular joints provide several functions: speaking, tearing food, chewing, sucking, swallowing, facial expressions, breathing, protrusion, retraction and lateralization of the jaw, opening the mouth and maintaining proper pressure in the middle ear.

From a functional point of view, the movements made by the lower jaw can be: functional - made by the lower jaw when chewing, swallowing, speaking and breathing, parafunctional - made by the lower jaw when grinding and clenching teeth and border movements - occur during maximal propulsion, retropulsion, lateral movements, and maximal opening of the oral cavity. (Okeson J.P, 2019)

2. TEMPOROMANDIBULAR DISORDERS (TMDs)

The term temporomandibular joint dysfunction is used for structural and functional disorders related to the temporomandibular joints, masticatory muscles, and surrounding structures. (Shore N.A. et al, 1979) It is characteristic that all the signs and symptoms worsen with the movement of the lower jaw, which occurs: limited mobility of the lower jaw, increased sensitivity to palpation and pain in the masticatory muscles, increased sensitivity and pain in the joint, locking and squeaking when moving the lower jaw, pain during movement, improper movement of the lower jaw, headache, neck pain, possible hearing and balance problems. (Okeson J.P, 2019)

2.1 CLASSIFICATION OF TEMPOROMANDIBULAR DISORDERS

Temporomandibular disorders can be classified into the following categories:

1. Masticatory muscle disorders;
2. Derangements of the condyle-disc disorders;
3. Inflammatory and degenerative disorders;
4. Limited mobility of TMJ (hypomobility);
5. Congenital and developmental anomalies.

2.1.1 MASTICATORY MUSCLE DISORDERS

The most common masticatory muscle disorders are: muscle pain, muscle spasm, myositis and tendonitis.

Muscle pain - Local myalgia - is a primary, non-inflammatory myogenic painful disorder. Pain is caused by the accumulation of substances (histamine, bradykinin and substance P) in which the sarcoplasm inhibits and swells, as a result of which the compression of nerve endings occurs which contributes to increased muscle tone and pain. (Kobuch S. et al, 2017) Patients with local myalgia have the following clinical signs and symptoms: minimal resting pain and increased function pain, local muscle hypersensitivity, compromised full opening of the oral cavity, slow opening of the oral cavity. (Svensson P. et al, 2001) The most common causes of this condition are trauma, increased emotional stress, prolonged contraction and unknown causes.

Myofascial pain – is a local myogenic painful condition, characterized by local conditions of solid hypersensitive bundles of muscle tissue known as trigger points. These localized areas of muscle tissue or their tendon tightness often feel like tight muscle bundles and cause pain on palpation. (Fischer A.A, 1988) Conditions that are clinically associated with myofascial pain are: increased emotional stress, prolonged muscle tenderness, persistent deep pain, sleep disturbances, local factors (tension, cold, bad habits, improper posture) and systemic factors (viral infection, fatigue). (Schmitter M. et al, 2015) Treatment is aimed at removing or reducing the impact of the causes and physical therapy. (Vecchiet L. et al, 1991)

Muscle spasm - During muscle spasm, involuntary muscle contractions occur for a long time, which can occur at rest and during function. Muscle spasms occur due to CNS stimuli that lead to muscle hyperactivity, but most often occur secondarily in response to a local muscle injury. The muscle is shortened during muscle spasm and the pain is experienced when the person tries to stretch the muscle. (Okeson J.P, 2019) In this muscle condition, the application of anesthetic blockade is a diagnostic and therapeutic method.

Myositis - An acute or chronic inflammation of the muscles that originates from various etiologies (infection, autoimmune diseases, drugs, cocaine addiction). In collagenosis, secondary myositis occurs in which the pathological process is localized in the basic substance of the connective tissue, while in dermatomyositis the pathological process is localized in the muscles and skin. There is also traumatic myositis localized at the site of injury and locally ossifying myositis localized to severely injured tissue where calcification and ossification begin. The diagnostic criterion is continuous pain accompanied by infection, diffuse tenderness of the whole muscle, limited mobility, pain that increases with muscle activity and swelling. (Abe S. et al, 2020)

Tendonitis - This condition is an inflammation of the ligaments. Tendonitis of the temporalis occurs due to constant and prolonged activity, caused by bruxism or constant deep internal pain (intercapsular pain). Tendonitis of the m.temporalis usually causes pain whenever this muscle is activated. (Dupont JS. et al, 2012) Intraoral palpation of the tendon of this muscle causes intense pain. Inflammation of the stylomandibular ligament can be clinically

recognized by placing the index finger at the corner of the lower jaw while trying to reach the medial, inner part of the lower jaw where the stylomandibular ligament is involved, causing severe pain.

2.1.2 DERANGEMENTS OF THE CONDYLE-DISC DISORDERS

Derangements of the condyle-disc disorders are characterized by disturbances in the mechanics of the joint and anatomical changes in the joint with the disc. The most important subjective symptom is capsular pain that progresses to muscle pain. Clinical signs that occur are: sounds coming from the joints, unexpected stiffness in the joint, inconsistency in the bite in the area of the molars and reduced joint space. (Nickerson JWB, 1989)

Disk displacement - Is a displacement that occurs as a result of stretching or breaking the rear attachment of the disc. Disc dislocation is defined as the forward displacement of the entire disc after the insertion of the lateral part of the condyle is loosened. If the disc is dislocated for many years, fibrous adhesion occurs between the disc and the joint nodule which prevents its normal repositioning. The pain in the temporomandibular joint that follows the dislocation of the disc occurs due to compression of the nerve endings in the capsule. (Isacsson G. et al, 1989)

• Disk displacement with reduction

In this disorder the discus articularis is displaced forward relative to the head of the articular condyle. The discus articularis maintains in this position as long as the oral cavity is open. When the oral cavity is opened, the intermittent zone of the disc articulates again with the head of the articular condyle, the condyle jumps over the back of the disc and reaches below the intermittent zone. The movement of the condyle through the posterior surface of the disc results in a clicking sound, but not every movement of the mandible. Etiological factors are abnormal biomechanical forces applied to and through the mandibular condyle, which alter the shape and function of joint tissues. (Manfredini D, 2009) Risk factors that can lead to dislocation of the disc with reduction are: emotional stress, bruxism, parafunctional movements, trauma, excessive chewing, change in the shape of the joint surfaces of the joint, decreased lubrication of the joint, hypermobility and unbalanced occlusion. (Poluha R.L. et al, 2019)

• Disk displacement without reduction

This condition is represented by disturbed relationship between the discus articularis and the articular condyle during mandibular translation, and the patient is unable to return the dislocated discus articularis to its normal position on the articular condyle. The disc remains permanently in the anterior position. In this condition, there are no sounds coming from the joint (clicking) because the joint does not jump over the surface of the joint disc. Acute dislocation of the disc without reduction is most often caused by trauma. It is characterized by deviation of the mandible to the disturbed joint, limited lateral movement, and lack of sounds in the disturbed joint. This condition can also be chronic in nature, characterized by the presence of sounds coming from the joints, and the patient has previously had situations in which he could open his mouth to a limited extent. Chronicity of this condition can lead to osteoarthritic changes. (La Touche, R. et al, 2020)

Disc perforation - Perforation occurs due to displacement of the disc forward and chronically traumatized posterior attachment of the head to the joint. The most common cause of distal perforation of the articular disc is anterior dislocation of the disc, while chronic inflammatory changes are the cause of central perforation of the articular disc. (Machon V, 2017)

Structural changes in the articular surfaces of the temporomandibular joint

These changes can be divided into deviation of the shape of the joint surfaces, adherence and adhesion. (Valentić-Peruzović M, 2010)

Deviation in form of the joint surfaces is a consequence of direct trauma and developmental abnormalities. These changes can occur on the articular disc, articular condyle, or articular fossa. The history associated with deviations in form is usually a long-term dysfunction that may not present as a painful condition. Often the patient has learned a pattern of mandibular movement that avoids the deviation and therefore avoids painful symptoms. Most deviation in form cause dysfunction at a particular point of movement. The dysfunction becomes a very repeatable observation at the same point of opening. During opening the dysfunction is observed at the same degree of mandibular separation as during closing. (Okeson J.P, 2019)

Adherence is a temporary adhesion of the joint surfaces. It can be located between the articular condyle and the articular disc or between the disc and the fossa. This condition is due to reduced lubrication resulting from prolonged static loading of the joint structures. Adherences are normally temporary and they are eliminated when sufficient force is applied during movement to free the sticking. (Nitzan, D.W, 2001)

Adhesion is the permanent adhesion of joint structures, caused by the development of fibrous connective tissue between the joint surfaces. Adhesion also occurs due to reduced lubrication between the joint surfaces. It may occur secondarily after hemarthrosis caused by surgery or macrotrauma. During adhesion normal translation of the condyle-disc complex is inhibited. Therefore, movement of the condyle is limited only to rotation and the patient presents with a mandibular opening of only 25 to 30mm.

(Murakami K. et al, 1992)

Tempromandibular joint dislocation (discus-condylar complex)

Subluxation occurs due to coordination of movements of the articular head and discs due to weakened joint connections. The articular head comes into position below and in front of the tuberculum articulare, followed by crepitations when the oral cavity is opened, and when the oral cavity is closed the capitulum mandibulae spontaneously returns to the articular fossa. Subluxation can be unilateral or bilateral. In unilateral subluxation, deviation of the lower jaw towards the healthy side is expressed and an empty space is palpated in front of the tragus, crepitations are heard when the oral cavity is opened. In bilateral luxation there is no deviation of the jaw, crepitations are present in both joints at the maximum open mouth. Luxation can usually be: anterior, unilateral or bilateral. Habitual luxation usually occurs unexpectedly with yawning and laughing, or patients can induce it on their own by repositioning the joint on their own as a result of weakened joint connections. (Prechel U. et al, 2018)

2.1.3 INFLAMMATORY AND DEGENERATIVE DISORDERS

Inflammatory processes of the joint occur as a result of inflammation spread from close regions such as the external auditory canal, middle ear, pterygomandibular space, odontogenic infections, less often from penetrating injuries or in combination with systemic disease. Arthritis can be acute or chronic. The causes of acute inflammatory processes are staphylococci and streptococci. Acute ones usually occur unilaterally and are characterized by difficult and limited movements of the joint, swelling, pain, difficulty speaking and eating, disturbed occlusion (open bite on the side of inflammation) and disturbed general condition with fever. Swelling and redness are clinically observed in the joint area. Chronic inflammatory processes are usually bilateral and are characterized by prolonged pain, limited mobility, and clinical fistula of the skin in the area of the joint and the external auditory canal. Chronic inflammation causes deformation of the bones and leaves sequelae. (Okeson J.P, 2019)

Non-inflammatory diseases (osteoarthritis)

Non-inflammatory diseases develop as part of systemic diseases, they are a consequence of numerous lesions on the joint surfaces. These diseases include osteoarthritis and rheumatoid arthritis. The clinical picture is dominated by swelling and pain in the joint area, difficult and limited movements of the joint followed by crepitations and locking. (Back K. et al, 2017) The diagnosis is made on the basis of anamnesis, radiographs, and laboratory tests confirming systemic disease (increased sedimentation and rheumatoid factor). The therapy is symptomatic (salicylates, antirheumatics), physical therapy, topical application of corticosteroids, application of hyaluronic acid intraarticularly. (Tanaka E. et al, 2008)

2.1.4 LIMITED MOBILITY OF TMJ (HYPOMOBILITY)

Hypomobility of TMJ is limited movement when opening the mouth. There is an inability to open the oral cavity and an inability to insert two fingers into the area of the central incisors. The cause may be intracapsular or extracapsular, unilateral or bilateral, and it may also be caused by inflammation, trauma, infection, dislocation of the disc forward, and prolonged immobilization. (Savtekin G. et al, 2018) Hypomobility of the joint includes: forward disc displacement, ankylosis, and trismus.

Ankylosis - Temporomandibular joint ankylosis is a pathological condition in which the lower jaw fuses into the articular fossa with fibrous or bone tissue depending on the cause. Patients with ankylosis complain of a lack of lower jaw movement, difficulty chewing and speaking, and difficulty maintaining oral hygiene. Restricted opening of the oral cavity and absence of movement in the joint favors true ankylosis, and if the patient has minimal movements of the lower jaw when opening the oral cavity favors fibrous ankylosis. Ankylosis can be unilateral or bilateral. (Taleuan, A. et al, 2019)

Bone ankylosis - Bone ankylosis of the jaw joint is rare condition and can be true and false. True ankylosis is caused by infection, trauma - fractures, surgery on one of the temporomandibular joints, rheumatoid arthritis and inflammation. True ankylosis can occur in children and adults, in one or both joints. False ankylosis can be divided into four groups: neurogenic causes associated with CNS lesions, a psychogenic group in which the main cause is hysterical trismus, myogenic causes resulting from postoperative inhibition of mandibular movement due to pain, and bone obstruction which is extracapsular malformation. Bone ankylosis can be visualized on a radiograph or cone beam computer tomography (CBCT).

Fibrous ankylosis - In fibrous ankylosis, the disc is fixed in the anterior medial direction. Leading causes are trauma and infection. This condition prevents normal functioning in everyday life by having difficulty in chewing, swallowing, speaking, aesthetics and maintaining oral hygiene. After the trauma, there is a slight damage to the disc which is caused by increased friction or a defect on the surface of the condyle and intracapsular bleeding occurs. Intracapsular hemorrhage results in fibrous adhesion that turns into solid tissue. (Khanna J.N. et al, 2019)

2.1.5 CONGENITAL AND DEVELOPMENTAL ANOMALIES

Congenital anomalies are rare conditions in temporomandibular disorders. These are: aplasia, hypoplasia and hyperplasia. Congenital anomalies are most commonly associated with hemifacial microsomia syndrome and Treacher-Collins syndrome. (Galea C.J. et al, 2018)

3. CONCLUSION

In order to successfully manage the temporomandibular disorders, we must consider that here are numerous types of problems and variety of etiologies that cause them. Separating these disorders into common groups of symptoms and classifying them is a process called diagnosis. This is very important because for each diagnosis there is an appropriate treatment. There is no treatment that is universal and appropriate for all temporomandibular disorders. In many situations, the success of therapy depends less on how the treatment is performed than on whether the therapy is appropriate and correct for the disorder. Therefore, making a correct diagnosis is extremely important for proper treatment.

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