TEMPOROMANDIBULAR JOINT, DISORDERS AND APPROACHES

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ABSTRACT

The study of temporomandibular joint (TMJ) and its relationship to function of the stomatognathic system has been a topic of interest in dentistry for many years. This relationship has proved to be quite complex. The TMJ is certainly one of the most complex joints in the body. As knowledge of the anatomy and physiology of the TMJ increases, and instruments and techniques for measuring dynamic skull-fossa-mandibular factors are developed, many more general dentists are attempting to—and are expected to—diagnose and treat TMJ-oriented problems. Temporomandibular disorders (TMD) include clinical disorders involving the masticatory muscles, the TMJ and the adjacent structures. TMD was recognized as a main source for pains in the orofacial area, which are not caused from dental origin, and is defined by the American Academy of Orofacial Pain (AAOP) as a sub-group within the frame of musculoskeletal disorders. The main etiology for TMD has not been found yet.

Introduction

The temporomandibular joint (TMJ) is critical functional components in the physiology of the stomatognathic system (4, 23). It has some unique features that distinguish it from all others (10). First, the joints on both sides always function simultaneously. Since an extremely large force is applied per unit area of the joint, it is covered with fibrocartilage, which makes it different from the surface of most other joints. The greatest distinguishing characteristic however, is the existence of teeth, which restrict the movement of the TMJ (10, 16).

The area where craniomandibular articulation occurs is called the TMJ (17, 23). Within certain border limits imposed by structure, the joints permit complete freedom of mandibular movement in (1) opening and closing, (2) protrusion and retraction, and (3) lateral excursive movements. The TMJs aid in stabilizing the mandible against the maxilla during the complex interaction of muscular forces exerted in chewing, swallowing, and parafunctional activities (3, 4, 16, 23).

The human TMJ is classified as a diarthrosis, or freely movable joint (10, 23). TMJ provides for hinging movement in one plane and therefore can be considered a ginglymoid joint. However, at the same time it also provides for gliding movements, which classifies it as an arthroidal joint. Thus it has been technically considered a ginglymoarthroidal joint (3, 17). So that inputs from these joints to the central nervous system (CNS) require integration that is probably somewhat different from other joints (1, 10).

The TMJ consist of the condyle of the mandible, separated by the meniscus or interarticular disc, which is articulated with the glenoid fossa of the inferior border of the temporal bone and mediated by ligaments and muscles (23). The TMJ is classified as a compound joint. By definition, a compound joint requires the presence of at least three bones, yet the TMJ is made up of only two bones. Functionally, the ar-
The particular disc serves as a nonossified bone that permits the complex movements of the joint. Since the articular disc functions as a third bone, the craniomandibular articulation is considered a compound joint (3, 17, 23).

The following are important characteristics of the joint:
1. The articular surfaces (condyles and eminences) are regular and smooth.
2. The condyle is well centered in the fossa (Table 1).
3. There is a uniformity of the interarticular surfaces (23).

Unlike most synovial joints, the articular surfaces of the TMJ are not composed of hyaline cartilage (4, 10, 16). The articular surfaces, as well as the central portion of the articular disc, composed of dense fibrous connective tissue devoid of any blood vessels or nerve fibers (3, 4, 17).

The articular capsule envelopes TMJ structures and the lateral ligament and the associated ligaments, the sphenomandibular and stylomandibular ligaments, protect the joint and prevent excess movement of the joint (10). Many muscles are involved with the function of the TMJ, namely the masticatory muscles, including the lateral pterygoid muscle that inserts directly into the pterygoid fovea if the condylar neck and the articular disc, the facial muscles, and the muscles in the anterior part of the neck (7, 10).

**Temporomandibular Disorders**

Temporomandibular disorders (TMD) are, according to the Guidelines of the American Academy of Orofacial Pain, a collective term embracing a number of clinical problems that involve the masticatory musculature, the temporomandibular joints and associated structures, or both (3, 5, 16, 19).

More than 100 diseases can affect the musculoskeletal system, and many of these may also involve the TMJ. Some of these diseases are relatively common and well-known, such as osteoarthritis/osteoarthritis and rheumatoid arthritis, while others, such as infectious and metabolic diseases, are rare and of less clinical interest to the general practitioner (2, 3, 17). Common diseases of the TMJ; disc interference disorders, traumatic diseases, osteoarthritis/rheumatoid arthritis (3, 17). The classification used for diagnosing TMD is summarized in Table 2.

One of the most important challenges that the dental profession faces is to teach all dentists:
1. To recognize the symptoms of temporomandibular joint-related syndromes
2. To diagnose the cause
3. To treat the problem in the most conservative way that is practical (4).

**Symptoms and signs**
1. Pain, headache, and muscle spasms.
2. Clicking, snapping, popping, grating noises in the TMJ.
3. Dizziness and possible nausea.
4. Earache, ringing in the ears (tinnitus), a fullness or pressure backlog in the ear.
5. Pain or burning sensation of tongue.
6. Partial or complete inability to open the mouth.
7. Limited range of function of the mandible in one or more directions, with or without pain.
8. Tender areas on face and head where palpation elicits painful response either in the area palpated or to a referred pain area.
9. Neckaches and backaches (3, 4, 17, 23, 26).

**Etiology of Temporomandibular Disorders**

Three main groups of etiologic factors were proposed: anatomic (including the occlusion and the joints), neuromuscular,
The classification of temporomandibular disorders

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<tr>
<th>I. Masticatory muscle disorders</th>
<th>II. Temporomandibular joint disorders</th>
<th>III. Chronic mandibular hypomobility</th>
<th>IV. Growth disorders</th>
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<td>2. Local muscle soreness</td>
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and psychologic (3, 5, 18).

Etiologic factors such as trauma, emotional stress, orthopedic instability, and muscle hyperactivity were implicated as significant components (17, 19). A further development has been to talk about contributing as well as etiologic factors and to classify these as either predisposing, initiating, or perpetuating. Predisposing factors can be systemic (general health), psychological (personality, behaviour), or structural (occlusion, joint). Initiating (or precipitating) factors usually involve trauma, overloading, or parafunction. Perpetuating (or sustaining) factors often include behavioral, social and emotional problems and other forms of stress and general health. Signs and symptoms of TMD often become chronic and continue long after the precipitating factor occurred. Therefore, among the etiologic components, perpetuating factors may be even more important than precipitating ones (3, 5, 7, 16).

It is important when evaluating a patient to identify both signs and symptoms clearly. A sign is an objective clinical finding revealed during an examination. A symptom is a description or complaint by the patient. Patients are acutely aware of their symptoms, yet they may not be aware of their clinical signs (5, 17).

**Trauma**

Two general types of trauma need to be considered: macrotrauma and microtrauma. A force that exceeds normal functional loading can lead to injury of the affected structures (3, 7). Macrotrauma is any sudden force to the joint that causes structural alterations (4, 17). Macrotrauma can also occur when the teeth are together (closed mouth trauma) or can produce a sudden displacement of the condyle within the fossa (open mouth trauma) (7, 16, 17).

**Occlusion**

The question of what role occlusal factors play in the etiology of TMD has been an-
answered with conflicting statements over the years (3, 7, 21). Previous studies have supported the concept of a multifactorial etiology of TMD, the occlusal factor in general being of minor importance (5, 19).

Some malocclusions were associated with signs or symptoms of TMD but tended to occur only rarely:
- overbite
- overjet
- symmetry of retruded contact position (RCP)
- crossbite
- skeletal anterior open bite
- posterior occlusal support (7, 8, 9, 19, 21, 23)

In terms of the multifactorial problem of temporomandibular disorders they should be seen as cofactors. The results, together with those of other population-based studies, revealed no specific, i.e. recurring malocclusions (or other occlusal factors) presenting as risk markers and it has been suggested that occlusal interference may increase habitual activity in the jaw muscles and may lead to temporomandibular disorders (TMD) (15, 20).

Several activities of the masticatory system seem to have no functional purpose and are therefore referred to as parafunctions (3). Occlusal parafunctions include bruxism (teeth grinding or clenching), lip-biting, thumb-sucking, and abnormal posturing of the jaw (4, 16, 23). Bruxism has been suggested as an initiating or perpetuating factor in a certain subgroup of temporomandibular disorders (TMD), however, the exact association between bruxism and TMD remains unclear (6, 11).

Occlusion is of great importance in all aspects of clinical dentistry, and the risk of introducing unfavorable occlusal relationships in restorative dental procedures must be minimized (3, 9, 18, 22).

**General Health**

Several epidemiologic studies have shown that individuals with impaired general health tend to suffer more frequent and severe TMD signs and symptoms than healthy people. The most common systemic conditions are rheumatologic diseases (3, 4, 7, 23).

**Psychosocial Factors**

The role of psychologic disturbances in the etiology of TMD also is controversial (3, 8, 14). It is widely recognized that psychologic factors may be involved in the pain perception process. Although the etiology of TMD has not been established, psychologic factors have been implicated in the predisposition, initiation, and perpetuation of TMD and psychologic therapies have been found to be beneficial for some TMD patients (6, 12, 15, 26).

**Congenital Anomalies**

The TMJ can be affected by several developmental anomalies, embryonic and postembryonic. Congenital anomalies of the TMJ are rare (4, 16).

**Treatment plan**

The ultimate goal of any dental treatment should be to provide optimum oral health (4). When optimum oral health is the goal, diagnosis and treatment planning can be condensed into two fundamental objectives.

1. Finding all factors that contribute in any way to deterioration of oral health
2. Determining the best method of eliminating each factor of deterioration (4, 16).

Over the past 70 years, temporomandibular disorders (TMDs) have been subject to shifts in conceptual understanding. Unable to account for disease patterns, the mismatch between case assignment and treatment need, and very different interventions producing similar treatment outcomes (except for the risk to patients), emerging theories make persuasive arguments in support of alternative explanations (22, 25).

The dentist should evaluate the joint or muscular problem, and seriously consider the various available treatments before deciding to use the appliance as a means of treatment.
The major treatment objectives for TMD are:

1. Control of pain and discomfort, usually by symptomatic reversible treatment
2. Improvement of impaired function by controlling precipitating or supporting factors
3. Treating the residual pathological sequelae (16).

Initial symptomatic treatment can be limited to reversible measures, such as counseling/reassurance, medication, and physical therapy (3, 4, 16, 17, 23).

The customary treatments for this disorder include treatment with occlusal splints, physiotherapy, behavioral-cognitive treatment, hypnosis, acupuncture and surgery that should be considered only if all conservative treatments were unsuccessful.

Occlusal splint is the most common and efficient treatment for TMD patients proved by many studies with a successful rate of 70-90% (13).

Stabilization splints are often used to treat musculoskeletal disorders of temporomandibular joints. Historically, the centric relation is advocated as the reference position for a stabilization splint. Centric relation as the reference position is subject of discussion, since this position has been defined for a healthy stomatognathic system. In case of temporomandibular disorders, the temporomandibular joints and muscles are compromised. Apart from degenerative changes in all components of the temporomandibular joints, the presence of pain may influence the establishment of a therapeutic position (24).

The increased knowledge in TMJ, pain and chronic pain disorders has taught that some patients who present with long-standing signs and symptoms associated with TMD require treatment in specialist clinics.

REFERENCES