

Etiology of temporomandibular disorder pain

Temporomandibular rahatsızlıklarda ağrının etyolojisi

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Summary

Pain in the masticatory muscles and temporomandibular joint is the main symptom of temporomandibular disorders. The etiology of temporomandibular disorder pain is multifactorial. Several studies have reported that there are predisposing, initiating and aggravating factors contributing to this disorder. Although factors such as trauma, occlusal discrepancies, stress, parafunctions, hypermobility, age, gender, and heredity have been implicated in the maintenance of temporomandibular disorder pain, there are still controversies regarding the actual etiology. This review will summarize the past and current concepts related to the etiology of arthrogenic- and myogenic-originated temporomandibular pain.

Key words: Temporomandibular disorder/pain/etiology.

Özet

Çiğneme kasları ve temporomandibular eklemden görülen ağrı, temporomandibular rahatsızlıkların en belirgin semptomudur. Temporomandibular rahatsızlıklarda meydana gelen ağrının oluşmasında birçok faktörün etkili olduğu düşünülmektedir. Yapılan çalışmalar hastalığın oluşumunda hazırlayıcı, başlatıcı ve ilerletici faktörler olduğunu belirtmektedir. Travma, oklüzal uyumsuzluklar, stres, parafonksiyon, hipermobilité, yaş, cinsiyet ve kalıtım gibi faktörlerin temporomandibular rahatsızlıkların oluşumunda etkili olduğu öne sürülmekle birlikte, etkinliği tartışmalıdır. Bu derlemede, eklem içi ve kas kaynaklı temporomandibular ağrının etyolojisi ile ilgili geçmiş ve yeni görüşler özetlenecektir.

Anahtar sözcükler: Temporomandibular rahatsızlık/ağrı/etyoloji.

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For more than 40 years, the contributing factors and actual underlying etiology for temporomandibular joint (TMJ) pain and myofascial pain (MFP) have been the subject of debate.^[1] The etiology of temporomandibular disorders (TMDs) is multidimensional. Biomechanical, neuromuscular, biopsychosocial, and neurobiological factors may contribute to the disorder.^[2] These factors are classified as predisposing (structural, metabolic and/or psychologic conditions), initiating (e.g. trauma or repetitive adverse loading of the masticatory system) and aggravating (parafunction, hormonal, or psychosocial factors) to emphasize their role in the progression of TMD.^[3]

The aim of this review was to summarize the earlier integrated multifactorial concepts and to present the new and current concepts that support the traditional thinking in the etiology of arthrogenic- and myogenic-originated TMDs. It is essential to look at some potential etiologic factors (Table 1) and try to analyze their role in the etiology of TMD pain (English-language peer-reviewed articles were identified using Medline [1997-2008]).

Occlusal factors and their association and contribution to TMD have been and continue to be the subject of an intense discussion within the dental community. For example, reverse articulation is thought to lead to an asymmetric muscular function,^[5] but whether or not it is directly related to TMD has not yet been established.^[6,7] The presence of a large horizontal or vertical overlap is a source of contrasting opinions.^[8,9] A large slide between centric relation and maximum intercuspation seems to be weakly associated with some forms of TMD.^[7,10-13] The presence of mediotrusion interferences is considered a predisposing factor by some authors,^[14,15] while others have suggested that such interferences may act as a protective factor.^[16] Some authors state that the anterior open occlusal relationship may be a consequence of articular remodeling rather than a predisposing factor for TMD;^[17,18] others emphasize open bite as the predisposing factor.^[19] Obviously, the controversies existing in the literature represent a serious limitation for the clinicians treating these disorders.^[20-22] In recent years, the acceptance of theories about the multifactorial etiology of TMD have

Table 1. Possible risk factors contributing to TMJ pathologies

Occlusal factors
Parafunction (bruxism)
Trauma
Hypermobility
Stress
Personality
Age
Gender
Heredity
Systemic diseases ^[4]

resulted in less emphasis being placed on occlusion as a TMD-related factor.^[7,23,24]

Bruxism has also been suggested as an initiating or perpetuating factor for TMD. Previous studies indicate that 87.5% of combined MFP and disc displacement patients and 68.9% of MFP patients reported that they clench their teeth.^[25] This led to the speculation that bruxism may constitute a risk or an etiologic factor for myofascial tenderness, pain of the masticatory muscles and pain from the TMJ.^[26-30] There are also researches based on the hypothesis that parafunctions (e.g. clenching alone, bruxism, nocturnal grinding) are the source of internal derangements of TMDs and MFP disorders.^[28,31,32] In a study evaluating the effect of bruxism, taking into account the effect of clenching only, grinding only and clenching combined with grinding, the authors concluded that there was no association between chronic MFP and grinding only, but rather with clenching-grinding.^[31] The association between bruxism and TMD signs supports the theory that repetitive adverse loading of the masticatory system may cause functional disturbances.^[33]

Whether bruxism is related more to MFP or TMJ pain has also been investigated. In general, it is suggested that bruxism has a stronger relationship with muscle disorders than with disc displacement and joint pathologies, and that such a relationship seems to be independent of the presence of other Research Diagnostic Criteria (RDC)-TMD diagnoses along with MFP.^[26]

Since a higher prevalence of condylar bony changes occurs in reducing joints in patients with bruxing behavior,^[34] parafunctional masticatory activity and its influence on joint loading contribute to osteoarthritis of the TMJ. Arthroscopically diagnosed synovitis is not specifically associated with parafunction, and it appears that numerous other causative factors may contribute to its development in the TMJ. Because abnormal joint loading is a major causative factor in cartilage degradation, biochemical and biomechanical abnormalities, and intraarticular temporomandibular pathology, clinicians must identify and address parafunctional masticatory activity during nonsurgical, surgical, and post surgical treatment regimens.^[35] Although some studies support the association between bruxism and MFP or TMD, others do not find a causal etiological mechanism between the occurrence of TMD symptoms and bruxism, although a relationship between those two conditions has been described.^[18,33,36-40]

The role of trauma in the etiology of TMDs is also controversial. Whiplash injury to the head or neck is often considered a significant risk factor for development of TMDs, and has been proposed to produce internal derangements of the TMJ.^[32,41-44]

Salé^[45] suggested that one in three people exposed to whiplash trauma is at risk of developing delayed TMJ symptoms that may require clinical management. Neck injury is also the most common cause of post-traumatic headache.^[46] Traumas caused only by motor vehicle accidents are associated with MFP.^[32,42,44]

Few studies, however, have examined TMD-related pain in acute whiplash patients compared with a matched control group. TMD pain after whiplash injury is rare, suggesting that whiplash injury alone is not a major risk factor for the development of TMD problems.^[19,47-49] Endotracheal intubation has also been proposed as a risk factor for TMJ dysfunction in a limited number of published case reports and systematic studies. Any association between endotracheal intubation and the development of short-term TMD symptoms is likely to be found in patients with prior report of such conditions.^[50]

The role of stress and personality in the etiology of the temporomandibular pain dysfunction syndrome has undergone extensive scrutiny. Psychological studies have shown that patients with functional disorders of the temporomandibular region have similar psychological profiles and psychological dysfunction as other chronic musculoskeletal pain disorders, such as tension type headache and back or arthritic pain.^[51-53] There is considerable evidence that psychological and psychosocial factors are of importance in the understanding of TMD as with other chronic pain disorders,^[1,54] but there is less evidence that these factors are etiologic. Even though studies have indicated the role of stress in the etiology of TMD, the issue of whether psychological factors cause TMD or reflect the impact of TMD on the person remains unknown, due largely to the absence of longitudinal incidence studies designed to test the relationship of the onset of TMD pain to the onset of psychological and psychosocial factors.

Today, the association between depression and stress and different physical symptoms of TMD is widely acknowledged.^[54-61] TMD symptoms, especially pain, are also discussed as being a causative or intensifying factor in the development of depression and psychic diseases.^[62] At this time, one cannot answer whether psychological disturbance is a source or consequence of chronic pain. The relationships between psychological aspects and parafunctions have been emphasized in many studies.^[1,63-65] Primarily, psychological factors affect TMD symptoms more indirectly than directly. The overall level of anxiety and/or depression could modify the clenching and grinding habits.^[31]

Females present a greater risk of chronic MFP^[31] and may present with characteristics (e.g. hormonal, constitutional factors, behavioral or psychosocial differences) that contribute to chronic TMD.^[60,66] Even though the lower prevalence of pain conditions in TMJ dysfunction in men has not yet been clarified, the reduction in TMJ pain with testosterone at supraphysiological serum levels can be helpful in explaining this gender difference.^[67] It has also been shown in a study that the appearance of pain in TMD increases approximately 30% in patients

receiving hormone replacement therapy (HRT) in postmenopausal women (estrogens), and approximately 20% among women who use oral contraceptives.^[54]

The relationship between hypermobility and TMD has also been examined. An association was determined between loose joint syndrome and TMJ symptoms. Although Conti et al.^[68] did not show any association between the intraarticular disorders and systemic hyperlaxity, or between TMJ mobility and systemic hypermobility, a positive relationship between generalized joint hypermobility and TMD (myofascial pain dysfunction, arthralgia) was found in another study.^[69] Kavuncu et al.^[70] found that both local and general hypermobility are more frequently detected in patients with TMD than in the controls, and that the risk of TMJ dysfunction is greater if the patient presents both alterations simultaneously; they concluded that both situations may play a role in the etiology of TMD.

Michalowicz et al.^[71] evaluated the hypothesis that signs and symptoms of TMD may be hereditary, but in a recent study the authors concluded that genetic factors and the family environment exert no relevant effect upon the presence of symptoms and signs of the TMJ. Age is also not associated with the risk of MFP.^[31,72]

In conclusion, this review has attempted to emphasize the etiologic factors of temporomandibular joint and myofascial pain. The pathophysiology and etiology of most craniofacial muscle pain conditions and TMJ-related pain are far from being completely understood. It is accepted to be a multifactorial problem that requires a comprehensive examination. One has to be cautious while examining patients and acquiring medical history in order to clarify the picture and clearly address the problem. Since some of the etiologic factors of TMD are predisposing, initiating or aggravating, it is important to emphasize that awareness of this fact will help in understanding each case accordingly.

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