Atatürk Üniv. Diş Hek. Fak. Derg.
J Dent Fac Atatürk Uni
Cilt:24, Sayı:3, Yıl: 2014, Sayfa: 386-390

Araştırma/ Research Article

SIGNS AND SYMPTOMS OF TEMPOROMANDIBULAR DISORDERS AND THEIR RELATIONSHIP WITH THE DISTANCE OF MIDLINE MOVING IN CANINE-GUIDED OCCLUSION

TEMPOROMANDİBULAR RAHATSIZLIKLARIN İŞARET VE SEMPTOMLARI VE KANİN KORUYUCULU OKLÜZYONDA ORTA HAT KAYMA MESAFESİ İLE İLİŞKİSİ

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Makale Kodu/Article code: 1660
Makale Gönderilme tarihi: 30.04.2014
Kabul Tarihi: 18.06.2014

ABSTRACT

Objectives: This study was done with the objective of determining the distance of movement between the maxillary and mandibular midline (DMM) and its relationship with the signs and symptoms of temporomandibular disorders (TMD) in canine-guided occlusion and to compare the obtained values between the right and left sides.

Materials and Methods: One hundred females showing canine-guided occlusion and Angle's class I canine and molar relation were chosen for the study. The maxillary midline's corresponding line was marked on the mandible with a marker pen in the patient's mouth, both during maximum intercuspation and at the edges of maxillary and mandibular canine contact. DMM was considered as the distance between the two lines (measured using a digital caliper). The percentages of signs and symptoms were compared using the chi-square test to determine the differences among the groups for the rates of TMD symptoms, bruxism, joint sounds and unilateral chewing.

Results: The mean value of the DMM for all subjects was found to be 3.61 mm on the right side and 3.64 mm on the left side. The values were subjected to a paired *t*-test, and the *P* value was statistically insignificant (P>0.05). Reported TMJ(temporo mandibular joints) clicking at the start was the only significant predictor (P<0.01) for TMD symptoms (pain in jaw), and bruxism was a marginally significant predictor for pain in the jaw (P=0.055). Other predictors from the baseline examinations (unilateral chewing, missing teeth) were insignificant.

Conclusion: It can be concluded from this study that these values of DMM cannot be used for predicting the manifestation of TMD.

Keywords: Canine-guided occlusion, midline moving, tmj disorders

ÖZET

Amaç: Bu çalışma, bireylerde kanin koruyuculu oklüzyonda, maksiller ve mandibular orta hat arasındaki kayma miktarını(DMM) ve temporo-mandibular rahatsızlıkların(TMD) işaret ve semptomları ile ilişkisini belirlemek ve sağ ve sol taraftan elde edilen değerleri karşılaştırmak için yapıldı.

Gereç ve yöntem: Bu çalışma için, kanin koruyuculu oklüzyonu, Angle sınıf I kanin ve molar ilişkisi olan, yüz bayan seçildi. Bireyin ağzında hem maksimum interküspidasyonda hem de maksiller ve mandibular kaninlerin vestibül tepeleri temasta olduğu zaman, işaret kalemi ile maksiller orta hattın mandibulada tekabül ettiği çizgi işaretlendi. DMM, bu iki çizgi arası mesafe olarak sayıldı (dijital kumpas kullanılarak ölçüldü). İşaret ve semptomların yüzdesi, TMD semptomları, bruksizm, eklem sesleri ve tek taraflı çiğneme oranları için gruplar arasındaki farklılıkları belirlemek amacıyla, chi2 testi kullanılarak karşılaştırıldı.

Bulgular: Bütün bireyler için, DMM ortalama değeri, sağ tarafta 3.61mm, sol tarafta 3.64mm olarak bulundu. Değerler paired *t*-testine tabi kılındı ve *P* değeri istatistiksel olarak anlamlı değildi(P>0.05).TMD semptomları(çenede ağrı)ve bruksizm için tek anlamlı öngörücü, başlangıçta rapor edilen TMJ klik sesi idi(P<0.01) ve bruksizm ise çenede ağrı için marjinal anlamlı öngörücü idi (P=0.055). Başlangıç incelemesindeki diğer öngörücüler(tek taraflı çiğneme, eksik diş) anlamsızdı.

Sonuç: Bu çalışmadan şu sonuca varılabilir; bu DMM değerleri, TMD için öngörücü olarak kullanılamaz.

Anahtar kelimeler: Kanin koruyuculu okluzyon, orta hat kayması, tme rahatsızlıkları

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INTRODUCTION

The prevalence of temporomandibular disorders (TMD) is very high. Recent epidemiologic studies have found significantly more frequent and more severe TMD signs and symptoms such as pain and tenderness in the temporomandibular joints (TMJ) and masticatory muscles, sounds in the TMJ, and a limitation of or other disturbances of mandibular movement.[1]

In physical examinations for temporomandibular disorders, measurement and recording of mandibular movements should be completed for opening and lateral and protrusive movements. The quality and symmetry of jaw movement should be noted and diagrammed.[2]

The dynamics of a moving lower jaw are expressed by its position, its velocity, and its acceleration.[2] Every moving body, including the lower jaw, obeys Newton's laws. Movements are caused by forces acting on the jaw. They may be active muscle forces and also passive (reaction) forces generated by joints, ligaments, or dental elements.[2]

Mandibular movements have been analyzed extensively in the past for prosthodontic reasons, and more recently, to study the function of the masticatory system. The aim of this study was to investigate the range of some mandibular movements (right and left lateral movement) and to analyze the differences between the ranges of these mandibular movements in asymptomatic subjects and patients in a young population.[1] At present, there are no quantitative data on this subject.

Screening history and clinical examination:

The purpose of the screening history and examination is to identify patients with subclinical signs and with symptoms that the patient may not describe but which are commonly associated with functional disturbances of the masticatory system. A screening history should consist of several short questions that will help alert the clinician, or they may be included in a general health and dental questionnaire that the patient completes prior to first being seen by a dentist. The screening examination also includes observations of jaw movement. Restrictions or irregular mandibular movements are indications of the necessity of a more thorough examination.[3]

According to D'Amico, the upper canine teeth, when in functional contact with lower canines, determine both lateral and protrusive movements of the mandible.[4]

The human masticatory system consists of a mandible that is able to move in relationship to the skull and which is guided by two temporomandibular joints through contractions of the masticatory muscles. To establish the contribution of each individual structure to jaw movements, one must explore the construction of the joints and the muscular system as well as the mechanical consequences of this construction.[2]

The direct influence of the teeth on jaw movements is reflected by the superior portion of the Posselt envelope of incisal point motion, but the dentition can also have an indirect influence on jaw movements. It has been demonstrated that subjects with malocclusion have a more irregular chewing pattern than normally found.[5, 6] It is not clear whether these aberrant patterns are due to the tooth contacts themselves or to external factors.[2] In summary, there are many factors that impede assessment of the mutual contributions of the relevant active and passive structures to jaw movements.[2]

Bruxism is a common and highly destructive parafunction affecting the masticatory motor system. It is usually diagnosed relatively late and at an advanced stage through abrasion of the hard tissues of the teeth. Psychoemotional factors are at the core of this disease, along with increased sensitivity of the muscle receptors and the stretch reflex, induced involuntarily by masseter muscle contractions. That results in changes in muscle coordination and the movement pattern of the whole system. Consequently, these processes lead to pain in the stomatognathic system.[7] The aim of this study was to find possible predictors of signsand symptoms of temporomandibular disorders (TMD). Hence, this study was planned to estimate the DMM, maximum intercuspation, and edge to edge position of the canines in canine-guided individuals.

MATERIAL AND METHODS

One hundred female subjects participated in the study. They were selected from a group of dental students attending the faculty of dentistry of Ataturk

University. All subjects had canine guidance on either side, had complete dentitions except for the third molars, and were without obvious occlusal abnormalities such as cross-bite and excessive overbite. The subjects ranged in age from 18 to 25 years. The left and right canine guidances of each subject were examined separately by placing a strip of articulating paper between the opposing canines and posterior teeth during an active ipsilateral excursion from the intercuspal position to the cusp-to-cusp position of the canines. A baseline questionnaire and clinical examinations focusing on the function and dysfunction of the masticatory system were performed. The one hundred subjects completed questionnaires similar to the baseline questionnaire and also attended a clinical examination. All participants were asked to fill in a questionnaire including questions on TMJ and mastication habits. The subjects were examined clinically for jaw mobility and TMJ pain.

The maxillary midline and a corresponding line on the mandible were marked at maximum intercuspation with a marker pen in the patient's mouth. Subjects were given a face mirror and were trained to make left and right lateral movements (working side).

Each patient was asked to move the mandible laterally until the canines were in an end-to-end relation. The range of left DMM on the edge to edge position of the canines was recorded. The same procedure was repeated on the right side, and the values were recorded during right lateral movement (working side).

The following screening questions were asked of the patient, in order to identify functional disturbances:

1. Do you have difficulty and/or pain when you are chewing, talking, or using your jaws?
2. Are you aware of noises in the jaw joints?
3. Do you have oral habits? (unilateral chewing, bruxism)

The *t*-test was used to compare the differences between different groups. The chi-square test was used to analyze the corresponding association of TMJ disorders and midline dislocation with canine guidance and laterotrusion. The aim of the study was to examine the influence of parafunctions on the occurrence of TMJ symptoms in students of Atatürk University.

RESULT

Reported TMJ clicking at the start was the only significant predictor (P<0.01) for TMD symptoms (pain in jaw), and bruxism was a marginally significant predictor for pain in the jaw (P=0.055). Another predictor from the baseline examinations (unilateral chewing) was insignificant. The results indicated that some signs and symptoms might predict TMD signs and symptoms. This study attempted to correlate these entities in 100 patients. Although specific conclusions are difficult to draw from this study, the findings suggest that the most important predictors of pain in the jaw are clicking and bruxism.

The mean value of the DMM for all subjects was found to be 3.61 mm on the right side and 3.64 mm on the left side. The values were subjected to Pearson correlation, and the *P* value was statistically significant (P<0.01).

The mean value of the DMM for subjects who had no pain in the jaw was found to be 3.60 mm on the right side and 3.74 mm on the left side. The values were subjected to a paired *t*-test, and the *P* value was statistically insignificant (P>0.05). The mean value of the DMM for subjects who had pain in the jaw was found to be 3.74 mm on the right side and 3.83 mm on the left side. The values were subjected to a paired *t*-test, and the *P* value was statistically insignificant (P>0.05).

Table 1. comparison of pain in jaw with tmj noise using chi - square test

			Tmj noise		
			no	yes	Total
Pain in jaw	no	Count	82	11	93
		% within pain in jaw	88,2%	11,8%	100,0%
		% within tmj noise	98,8%	64,7%	93,0%
	yes	Count	1	6	7
		% within pain in jaw	14,3%	85,7%	100,0%
		% within tmj noise	1,2%	35,3%	7,0%
Total		Count	83	17	100
		% within pain in jaw	83,0%	17,0%	100,0%
		% within tmj noise	100,0 %	100,0 %	100,0%

Table 2. comparison of pain in jaw with bruxsizm using chi - square test.

			bruxsizm		
			no	yes	Total
Pain in jaw	no	Count	82	11	93
		% within pain in jaw	88,2%	11,8%	100,0%
		% within bruxsizm	95,3%	78,6%	93,0%
	yes	Count	4	3	7
		% within pain in jaw	57,1%	42,9%	100,0%
		% within bruxsizm	4,7%	21,4%	7,0%
Total		Count	86	14	100
		% within pain in jaw	86,0%	14,0%	100,0%
		% within bruxsizm	100,0%	100,0%	100,0%

Figure 1. The figure of measurements.

DISCUSSION

Parafunctions play a crucial role in the formation of TMJ dysfunctions with disc displacement and mandibular dysfunctions that result in intra-articular disorders of the temporomandibular joint. This leads to both painful and painless symptoms, including those listed here and those related to the organs of vision and hearing.[7-9] Numerous studies have shown that symptoms of dysfunction occur in 40–70% of children and in 60–70% of adolescents and adults, depending on the assumptions made.[7, 8] The most common symptoms include abnormal condylar motions, pathological sounds (clicks and crackles), pain in pressured areas of the temporomandibular joint, and free mandibular movement.[7]

The jaw moves through contractions of the masticatory muscles. Each muscle contraction is associated with a force that is expressed by three independent variables: its magnitude, its point of application, and its orientation. The latter two are determined by the muscle’s line of action, defined by the geometry of the system.[2] The mandible itself, however, is deformable,[10] so it is possible that the transfer of impact loads of the teeth to the joints may be reduced by its elasticity.

The influence of the passive constraints appears to be more dominant as jaw movement deviates from the midline.

Dynamic biomechanical analysis has demonstrated that the masticatory muscles are capable of maintaining the integrity of the masticatory system, in most cases, without the need for an articular capsule with ligaments to maintain articular apposition.[11] In contrast, they appear to play a role in reducing the mediolateral movements of the mandibular condyle during laterodeviation.[12]

If the joints are loaded asymmetrically, the influence of their reaction forces on jaw movement has to be considered. When a muscle is activated unilaterally, the condylar reaction forces may produce a reverse movement compared with the one expected from the muscle’s line of action. In practice, however, the muscles contract as groups rather than in isolation. For both midline and nonmidline jaw movements, dynamic muscle properties should be taken into account, since they limit the force-producing capacities of the muscles, thereby restricting jaw movement possibilities.[2]

One of the possible causal factors suggests that temporomandibular disorders in children are a functional mandibular overload variable, mainly bruxism. Bruxism, defined as the habitual nonfunctional forceful contact between occlusal tooth surfaces, consists of involuntary, excessive grinding, clenching, or rubbing of teeth during nonfunctional movements of the masticatory system. Its etiology is still controversial, but it has been attributed to multifactorial causes, including pathophysiologic, psychological, and morphologic factors. In younger children, bruxism may be a consequence of immaturity of the masticatory neuromuscular system. Complications include dental attrition, headaches, temporomandibular disorders, and masticatory muscle soreness. Some studies have linked oral parafunctional habits to disturbances and diseases of the temporomandibular joint, mainly bruxism, suggesting its association with temporomandibular disorders in the primary and mixed dentition, whereas other authors have not observed this respective relationship in primary dentition. The unreliability of the clinical assessment of bruxism also reduces confidence in conclusions with respect to the relationship with TMD.[13] The frequency of TMD and whether there is a relation between malocclusion and bad mouth habits was evaluated by Yılmaz and Duymus[14],and no joint problem was found in 80% of the students under treatment. In the 20% who reflected problems, however, there was no statistical relation between the TMD and their gender or malocclusion.

CONCLUSION

Within the limitations of the study, clinically significant conclusions can be drawn from the fact that many individuals who had pain in the jaw exhibited TMJ noise and bruxism. But there was no relationship with DMM. Hence, it can be concluded from this study that these values of DMM cannot be used for predicting TMD.

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