The Relationship between Occlusal Interferences and Temporomandibular Disorders

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Summary

The significance of occlusal interferences in the aetiology of temporomandibular disorders (TMD) has been questioned in numerous past and recent articles of dental literature. The aim of this study was to analyze the relationship between clinical diagnoses of TMD and different types of occlusal intereferences (centric interferences (retruded contact position (RCP) - intercuspal position (ICP) slide greater than 1 mm), working interferences, and nonworking interferences during lateral and protrusive mandibular movements) in a young adult non-patient population. A questionnaire including data from history and clinical functional examination was used in the study. All subjects (a total of 230) were male (conscripts), from 19 to 28 years of age (mean 21.3 ± 2.1). The prevalence of occlusal interferences in percentage in 230 young adult non-patients, 65% had no occlusal interferences during examination of the functional state of occlusion, while 14% of subjects had centric interferences (RCP-ICP slide greater than 1 mm), 5% of subjects had working interferences and 16% of subjects had nonworking interferences during lateral and protrusive mandibular movements. Statistical analysis (Chi square test) did not show any significant differences in the distrubution of occlusal interferences between the group of subjects with the clinical diagnoses of TMD and the group of asymptomatic subjects. We concluded that clinical diagnoses of TMD (muscle and temporomandibular joint disorders) were not associated with different types of occlusal interferences. This study focused on a non-patient population of young adult males and the results may not be applicable for the general population.

Key words: *occlusal interferences, temporomandibular disorders.*

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Introduction

The aetiology of temporomandibular disorders (TMD) has been considered one of the most controversial issues in clinical dentistry. In the past, occlusion has been viewed as a major aetiological factor for TMD. Also, it has been suggested that occlusal interferences may be aetiological factors of functional disturbances in the masticatory system (1,2). Among the types of occlusal alterations that have been considered as contributing factors of TMD, centric interference is the one most often dis-

cussed (3), while the next is nonworking (mediotrusive, balancing) side interferences (4). Studies of non-patient populations have found significant correlations between TMD and occlusal interferences although the findings have not been consistent in all age groups (5-8). On the other hand, longitudinal studies failed to identify any association between occlusal interferences and TMD signs or symptoms (9,10). A review of selected literature on experimentally created occlusal interferences shows that the issue is complex and not fully understood. While some investigators have failed to demonstrate any effects of experimental occlusal prematurities, others have reported both inconsistent and consistent clinical, electromyographic and electrognathographic changes in response to the insertion of different types of interferences (11).

The aim of this study was to analyze the relationship between clinical diagnoses of TMD and different types of occlusal intereferences in a young adult non-patient population.

Subjects and methods

The study comprised 230 subjects of a specific group (conscripts) that needed conservative-endodontic treatment or a control within a prevention program. Subjects with an acute clinical condition were not included in the study. The examination was based on data from history and clinical functional examination (12, 13). All subjects were men in the age group from 19 to 28 years (mean 21.3 ± 2.1).

Occlusal interferences are undesirable occlusal contacts that may produce mandibular deviation during closure to maximum intercuspation or may hinder smooth passage to and from the intercuspal position. The functional occlusal relationships considered are working, nonworking (balancing, mediotrusive) occlusal interferences, and length and symmetry of retruded contact position - intercuspal position (RCP-ICP) slides (centric interferences). A working interference may occur when there is contact between the maxillary and mandibular posterior teeth on the same side of the arches as the direction in which the mandible has moved. If that contact is strong enough to disocclude anterior teeth, it is an interference. A nonworking interference is an occlusal contact between maxillary and mandibular teeth on the side of the arches opposite the direction in which the mandible has moved in a lateral and protrusive excursion. The centric interference is a premature contact that occurs between the retruded contact position (RCP) and intercuspal position (ICP) when the mandible closes. It will cause deflection of the mandible in a posterior, anterior and/or lateral direction (14).

In relation to the clinical signs and symptoms of TMD reported in the study, the subjects were categorized using the diagnostic classification of The American Academy for Orofacial Pain (13). According to the classification, the following groups were identified: a group of subjects with muscle disorder (myalgia), a group with temporomandibular joint disorder (disc displacement with reduction), and a group with muscle disorder and temporomandibular joint disorder, simultaneously. Pearson's chi square test was used when 2 x 2 cross tabulations were applicable. The value $P < 0.05$ was required to accept the differences as statistical by significant between clinical diagnoses of TMD and different types of occlusal intereferences in a young adult non-patient population. Statistical data processing was achieved by means of the program packages Statistica for Windows, Release 5.1 H (StatSoft), and SPSS for Windows, Release 7.5.

Results

Table 1 shows the prevalence of clinical diagnoses of TMD in the young adult non-patient population. Out of the total number of the population examined, 65.7% of the subjects were classified as asymptomatic subjects, 5.7% of the subjects had muscle disorder (myalgia), 9.1% had temporomandibular joint disorder (disc displacement with reduction), and 19.6% of the subjects had muscle disorder and temporomandibular joint disorder, simultaneously.

The prevalence of occlusal interferences in percentages in the 230 young adult non-patients, 65% had no occlusal interferences during examination of the functional state of occlusion, while 14% of subjects had centric interferences (RCP-ICP slide greater than 1 mm), 5% of subjects had working

interferences and 16% of subjects had nonworking interferences during lateral and protrusive mandibular movements.

Pearson's chi square test was used to test for difference in the various types of occlusal interferences between asymptomatic subjects and subjects with muscle (myalgia) and temporomandibular joint disorders (disc displacement with reduction). Statistical significance was set at level $p < 0.05$. The results of this analysis showed that the distributions of occlusal interferences were not statistically significant when compared between "cases", i.e. patients with a specific diagnosis, and "controls", i.e. subjects free from any signs and symptoms of TMD (Tables 2, 3 and 4).

Discussion

The controversy regarding the relationship between occlusion and TMD has not yet been resolved. Much of the conflicting opinions may be due to the fact that there is a lack of evidencebased on research in this field. Most so-called TMD experts pay little importance to occlusion in the aetiology of TMD, whereas the majority of practitioners still adhere to the concept of focusing on occlusal factors in diagnosis and treatment of TMD (15).

Of the 230 subjects included in the study, 79 (34.3%) were classified as having combined muscle and temporomandibular joint disorders. These clinical data can be compared with similar studies on non-patient populations that reported the overall prevalence of TMD to be 40 to 60% (16-19).

There is no universal agreement on the type of interference considered to be detrimental to function and causal in the aetiology of TMD. The classical types of occlusal interferences are common according to epidemiologic surveys even in non-patient populations (3, 20). The correlations found between such interferences and TMD in epidemiological and clinical studies, including longitudinal ones, have been too weak to provide any clinically relevant conclusions (21). In this study, statistical analysis (Pearson's Chi square test) did not show any significant differences in the distribution of occlusal interferences (centric, working and nonworking interferences) between the group of subjects ("cases") with a diagnosis of muscle disorder (myalgia), temporomandibular joint disorder (disc displacement with reduction), or a combination of these disorders and a group of asymptomatic subjects ("controls").

Among the types of occlusal alterations that are considered as contributing factors of TMD, centric and nonworking interferences are the most often discussed. There have been also few studies concerning the effect of working side interferences on the masticatory system (22). In his study, Westling (3) found that non-patient adolescents with centric interferences had no influence on the development of TMD, but may be considered as a predictive factor for temporomandibular joint disorder. Similar results were reported among non-patients, showing a significant relationship between the presence of nonworking interferences and TMD. Most of these studies have been cross-sectional and it is difficult to draw any conclusions regarding cause-effect relationship from them (4, 6-8, 23). These results contradict the findings of Egermark-Eriksson et al (24), Kirveskari & Alanen (25), Watanabe et al (26) who found only a weak, or no correlation between nonworking interferences and signs and symptoms of TMD in their longitudinal studies.

On the other hand, Minagi et al (27, 28) concluded on the basis of their studies, correlating nonworking interferences with joint sounds and vertical displacement of the condyles, that contacts on the nonworking side were in fact protective in nature, and not harmful. In studying masticatory forces generated during simulated clenching, Kikuchi, Korioth & Hannam (29) found that nonworking interferences decreased the nonworking condylar load, supporting the clinical concept of Minagi et al (27).

According to the findings of this study, it is difficult to suggest that working interferences (low prevalence of 5%) cause substantial change in the masticatory system. The results of previous studies (22, 30, 31) also demonstrated that working interferences are not an important factor which can be related to TMD.

The issue of whether occlusal interferences are good or bad for the function and health of the masticatory system has been the topic of numerous studies. However, no consensus has been reached. Confusion still exists regarding such a basic question

as the prevalence of these contacts at different ages and changes in contact patterns over time. One reason for the huge difference in prevalence between studies is probably related to variations in definitions of what has been classified as interferences and contacts, respectively. Another reason may be a lack of standardized measurements. Different techniques for identifying contact patterns are likely to produce divergent results (4). Furthermore, a well-structured causal TMD explanation could only be achieved with a longitudinal study design, rather than with a cross-sectional study design (9).

In spite of limitations, the findings of this study are in accordance with numerous studies suggesting no correlation between occlusal interferences and TMD. Most of the future progress in the TMD field will come from intensive studies of the pathophysiologic mechanisms underlying all kinds of muscle and joint pain, as well the phenomena of neuroplasticity leading to chronic pain. Such studies should provide the scientific basis for developing tissue-targeted therapies that will reverse the pathologic processes, rather than merely palliating the associated symptoms. However, we cannot forget that wellplanned and performed clinical studies continue to be necessary to test, apply, and control results of basic, i.e. laboratory research. Finally, the relationship between occlusion and TMD can only be settled by acceptance of evidence based on high-quality research (32, 33).