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Review Article

Causal Relationship between Occlusal Factors and Temporomandibular Disorders

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Abstract

This review evaluated the possible role of some occlusal factors in the etiology of temporomandibular disorders (TMDs). Only a few occlusal factors have been implicated in causing TMDs, among which occlusal interferences in the retruded contact position (RCP) and RCP-intercuspal position (ICP) did not appear to have causal roles. In contrast, the role of occlusal discrepancies between habitual occlusal position and bite plate-induced occlusal position on the etiology of TMDs was promising, and thus, the follow-up studies should be performed.

Keywords: Temporomandibular Disorder;Habitual Occlusal Position; Bite Plate-Induced Occlusal Position; Retruded Contact Position; Intercuspal position

The etiology of temporomadibular disorders (TMDs) is still unclear at present; There is a lack of evidence to support the causal role of occlusal factors and their use as a therapeutic modality in TMDs [1]. However, in 2005, it was reported that the discrepancy between bite plate-induced occlusal position (BPOP that is considered as muscular contact position) and habitual occlusal position (HOP) was related to temporomandibular joint (TMJ) sounds. This review aimed to compare the causal role of the occlusal factors that have been reported in the literatures [2-6].

Strength of association

A study by Kopp reported that unilateral or bilateral loss of molar support was significantly more frequent, whereas the number of occluding pairs of molars was significantly lower in the TMJ-crepitation group than in the mandibular dysfunction group (F: $p<0.05$), thereby demonstrating that the loss of molars plays a role in the etiology of TMJ osteoarthrosis [2]. In another study, Krough-Poulsen and Olsson recommended the use of occlusal adjustments to eliminate unilateral premature contacts in the retruded contact position (RCP) and interferences between RCP and intercuspal position (ICP) causing lateral displacement of the mandible[3].

Thereafter, Mohlin et al. demonstrated positive correlations between subjective symptoms of dysfunction and interference on non-working side as well as single tooth contact on the working side ($p<0.0001$, regression coefficient); moreover, muscle tenderness was positively correlated with interference in the retruded position (RP) of the mandible ($p<0.0001$-0.003, regression coefficient)[4]. Subsequently, Nilner reported correlations between RP interference and deviation in maximal mouth opening ($p<0.01$) and tenderness to TMJ palpation laterally ($p<0.05$); correlations were also observed between unilateral RP interferences and irregular movements and deviations in maximal opening ($p<0.01$) in the older age group (range 15-18 years) whencompared with the younger age group ($p<0.05$)[5]. Furthermore, the masseter muscle and the attachment of the temporal muscle were usually tender on palpation in adolescents with mediotrusion interferences (balancing side contacts) than in younger subjects without interferences ($p<0.05$)[5]. Torii and Chiwata compared HOP and BPOP in subjects wearing an anterior bite plate for five minutes, and they reported that the statistical differences between the two were significantly associated with subjects with TMJ sounds in subjects ($p=0.000007$, using Fisher's exact test)[6].

Consistency of association

De Laat et al. investigated the correlation between occlusal parameters and symptoms of TMJ dysfunction and reported that the occlusal relationship could not possibly have a causal role in TMJ dysfunction [7]. Furthermore, Egermark-Eriksson et al. reported that an attempt to analyze the longitudinal relationship between occlusal interference and the signs and symptoms of mandibular dysfunction did not reveal any strong correlations [8]. Although asymmetric RCP-ICP slides were more prevalent in women with reduced disk displacement and large RCP-ICP slides, it was not clear whether these associations were etiologic or because of other secondary causes [9]. Two recent studies by the same authors (Torii and Chiwata, 2007, 2010) reported the relationship between occlusal discrepancy (HOP and BOPO)and TMD symptoms [10,11].

Specificity of association

Specificity refers to the fact that a particular factor is responsible for a particular pathological change. The results of the pilot study, wherein arthrogenous and myogenous symptoms had disappeared following the elimination of the discrepancies,indicate that the occlusal discrepancy between HOP and BPOP may have been responsible for the arthrogenous and myogenous changes in the subjects[12]. A clinical evaluation of occlusal adjustments by a double-blind method revealed no significant differences between improvements in signs and symptoms obtained by real occlusal adjustments and those obtained by mock adjustments [13], thereby indicting the lack of specificity with respect to occlusal interferences in RCP or RCP-ICP.

Temporal relationship

A causal factor is responsible for the occurrence of symptoms. It is apparent that occlusal discrepancies did exist before the appearance of symptoms in the pilot study conducted by Torii and Chiwata [12]. However, it is unclear whether the interferences in RCP or RCP-ICP existed before or after the appearance of the symptoms [4,5].

Coherence of association

What does RCP mean physiologically? Why does the elimination of interferences in RCP or RCP-ICP relieve TMD symptoms? The answer to these questions have not yet been obtained. In infants, TMJ and jaw muscle function before tooth eruption, enabling the teeth to erupt and occlude in an optimal position [14]. Weak jaw muscles affect tooth eruption leading to malocclusion and occlusal discrepancies between HOP and BPOP. Changes in the structure of TMJ or jaw muscles may be attributed to disturbances in teeth eruption, leading malposition. Thus, the pathological changes observed in TMJ and the jaw muscles appear because of the additional task of having to adapt to the malposition of the teeth within the mandible[15].

Experiment of association

This is an interventional experiment; as previously mentioned, the elimination of occlusal interferences in RCP and RCP-ICP did not relieve TMD symptoms[13]. In the contrast, the elimination of occlusal discrepancies between HOP and BPOP ameliorated TMD symptoms [12].

Conclusion

The etiology of TMD is considered to be multifactorial, and occlusal factors are currently not included among the causal factors of this disorder. However, the occlusal discrepancy between HOP and BPOP appears to play a causal role , thereby warranting the requirement for further studies to explore this aspect.

Competing interests

The author declares that he has no competing interests.

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