

# Literature review correlating Malocclusion and TMD

*\*\*Mohlin, 2004:* Apart from crowding of teeth, no other significant differences were found between the groups with regard to separate malocclusions, tooth contact pattern, orthodontic treatment, or extractions. A greater proportion of subjects with low endurance were found in those with TMD.

*Tuerlings, 2004:* These results indicate that few relationships exist between individual parameters and TMD signs.

*Gesch, 2004:* Few associations were reported between malocclusion and parameters of functional occlusion and clinical as well as subjective TMD, and these associations were not uniform. No particular morphologic or functional occlusal factor became apparent.

*Fujita, 2004:* When comparing the primary symptoms to those at the time of examination, the patients with unilateral chewing and bruxism tended to have more complicated symptoms. In conclusion, the TMD symptoms of the patients with notable oral habits did not change or become worse during a period of about 5 years.

*\*Barker, (Pankey) 2004:* A randomly chosen group of 60 patients with occlusal interferences and signs and symptoms of TMD used a mandibular orthotic to balance their occlusions at centric relation (CR). When the occlusions of symptomatic patients were balanced in CR, there was a significant reduction or elimination of TMD complaints, suggesting a relationship between balancing occlusion in CR and optimum management of TMD. (No consistent time interval for treatment was provided.)

*Ali, 2003:* The differences between right and left lateral occlusal curvatures (OCs) in the mandibular second premolar and first and second molars, as well as the anteroposterior OCs in the mandibular first and second molars, showed significant correlations with mandibular deviation in the TMD group. On the other hand, in the no-TMD group, there was no significant correlation between OCs and mandibular deviation. The above results suggest that OCs *might try to compensate* for mandibular deviation in patients with TMD.

*Henrikson, 2003:* (i) Orthodontic treatment either with or without extractions did not increase the prevalence or worsen pre-treatment symptoms and signs of TMD. (ii) Individually, TMD fluctuated substantially over time with no predictable pattern. However, on a group basis, the type of occlusion may play a role as a contributing factor for the development of TMD. (iii) The large fluctuation of TMD over time leads us to suggest a conservative treatment approach when stomatognathic treatment in children and adolescents is considered.

*Egermark, 2003:* Subjects with malocclusion over a long period of time tended to report more symptoms of TMD and to show a higher dysfunction index, compared with subjects with no malocclusion at all. There were no statistically significant differences in the prevalence of TMD signs and symptoms between subjects with or without previous experience of orthodontic treatment. This 20-year follow-up supports the opinion that no single occlusal factor is of major importance for the development of TMD, but a lateral forced bite between retruded contact position (RCP) and intercuspal position (ICP), as well as unilateral crossbite, *may be a potential* risk factor in this respect. Furthermore, subjects with a history of orthodontic treatment do not run a higher risk of developing TMD later in life, compared with subjects with no such experience.

*Kusayama, 2003:* 44 adult Japanese Class III patients (mean age 21 years 11 months) were divided into 2 groups: a facial asymmetry group in which the mandibular transverse deviation exceeded +/- 1 SD from the norm, and a control group in which the mandibular transverse deviation was within +/- 1 SD of the norm. Statistical comparison with a control group showed characteristic dental anomalies in the facial asymmetry group, including asymmetry of the curve

of Spee, molar inclination, dental arch form, lateral overjet, and slanting of the occlusal plane. Stepwise linear regression analysis showed that transverse and vertical skeletal asymmetry variables including the mandible and the maxilla were effective parameters for characteristic dental anomaly variables, and a significant high correlation between dental anomalies and skeletal asymmetry was found. (But what about a correlation with TMD?)

*Mohlin, 2002:* The study confirmed earlier observations that TMD prevention is not a major motivating factor for orthodontic treatment.

*Carlsson, 2002:* it cannot be concluded from this study whether these symptoms recorded in childhood--oral parafunction, tooth wear, TMJ clicking, and deep bite--can be used for predicting manifest TMD in adult age.

*Marzooq, 1999:* Although occlusal relationships, such as overbite, non-working side interferences, and discrepancy between the intercuspal position and the retruded contact position, have often been considered as contributing factors of TMD, there is no consistency among even those studies that support such an occlusal factor.

\*\*\**Celic, 2002:* Out of the total number of subjects (230), 65.7% subjects were classified as asymptomatic, 5.7% subjects had muscle disorders (MD) (myalgia), 9.1% subjects had disc displacement with reduction (DDR), while 19.6% subjects had disc displacement with reduction associated with muscle disorder (DDR + MD) (myalgia). The overjet equal to or greater than 5 mm was significantly more prevalent in the symptomatic patients (MD, DDR, DDR + MD) than in the asymptomatic group ( $P < 0.001$ ). The overbite equal to or  $> 5$  mm also demonstrated statistically significant difference ( $P < 0.006$ ) between the symptomatic (suffering from DDR, and DDR + MD) and asymptomatic subjects. Conclusion of the study is that the overjet and overbite equal to or  $> 5$  mm was more present in the group of subjects with diagnosis of a TMD (DDR and MD), (and it is felt that this) distinguishes this group from the group of asymptomatic subjects.

\*\*\**Thilander, 2002:* A sample of 4724 children (2353 girls and 2371 boys) (5-17 years old) were grouped not only by chronological age but also by stage of dental development (deciduous, early mixed, late mixed, and permanent dentition). The prevalences increased during the developmental stages. Girls were in general more affected than boys. Significant associations were found between different signs, and TMD was associated with posterior crossbite, anterior open bite, Angle Class III malocclusion, and extreme maxillary overjet.

*John, 2002:* with 3033 subjects, writes that this study provides the strongest evidence to date that there is no association between overbite or overjet and self-reported TMD.

*Tullberg, 2001:* This study provides the strongest evidence to date that there is no association between overbite or overjet and self-reported TMD. The results of this study suggest that relapse of early orthodontic treatment and further need of treatment does not influence the later status of subjective symptoms or clinical signs of TMD in young adults. (44 subjects)

*Sonnesen, 2001:* no firm conclusion could be made regarding any particular craniofacial morphology in children with symptoms and signs of TMJ dysfunction.

*Gaudet, 2000:* Data presented here do not support the hypothesis that TMD patients improve spontaneously without treatment.

*Seligman, 2000:* The occlusal and attrition factors studied were only moderately useful in differentiating normals from TMD patients.

*Pullinger, 2000:* Occlusal factors may be cofactors in the identification of patients with TMD, but their role should not be overstated. Some occlusal variation may be a consequence of rather than a cause for TMD.

\*\*\**Liu, 1998:* A total of 508 orthodontic patients were enrolled. The frequencies of TMD were 44.2% in patients with retruded position (RP) interference and 38.1% in those without such interference ( $p > 0.05$ ). The frequency of TMD in patients with protrusive interference was greater than those without (32.2% vs. 18.4%;  $p < 0.005$ ). Patients with balancing interference had a significantly higher frequency of TMD than those without (49.2% vs. 23.9%;  $p < 0.0001$ ). We thus conclude that patients with functional malocclusion of balancing or protrusive interference type have an increased risk for developing TMD.

\*\*\**Fushima, 1999:* These results suggest that in TMD patients asymmetries in occlusal relationship of the midline of the mandibular teeth and molars were mainly due to a mandibular skeletal asymmetry and not merely due to a dental malposition on the alveolar basal bone. Midline discrepancy and right-left difference of the molar relationship seem to be important occlusal characteristics in patients with TMD.

*Kahn, 1999:* This study suggests there are no systematic dental occlusal differences that clearly separate symptomatic from asymptomatic patients. Results indicate that it is unclear as to the relationship of the 3 analyzed factors and of intraarticular TMDs.

\*\*\**Crawford, 1999:* Since condylar axis position is dictated upon closure of the dentition into maximum intercuspation and since condylar axis position was shown in this study to be strongly correlated with TMD symptomatology, it can be concluded that a statistically significant relationship exists between occlusion-dictated condylar position and symptoms of TMD.

\*\*\**Sonnesen, 1998:* Symptoms and signs of TMD were significantly associated with distal molar occlusion, extreme maxillary overjet, open bite, unilateral crossbite, midline displacement, and errors of tooth formation. The analysis suggests that there is a higher risk of children with severe malocclusions developing TMD. Errors of tooth formation in the form of agenesis or peg-shaped lateral teeth showed the largest number of associations with symptoms and signs of TMD; these associations have not previously been reported in the literature.

*Liu, 1997:* The frequencies of TMD signs were 44.0% for edge-to-edge bite, 31.2% for posterior crossbite, 27.6% for deep bite, 26.5% for excessive overjet, 26.5% for crowding, 23.7% for anterior crossbite and 23.6% for open bite. Although patients with edge-to-edge bite or posterior crossbite had TMD signs more often than the others in the whole group, the differences did not reach statistical significance. We did not find a significant relationship between morphologic malocclusion and TMD.

*Marrant, 1996:* No relationship was found between signs detected by clinical examination and symptoms reported by the patients.

\*\**Raustia, 1995:* Occlusal factors and condyle position asymmetry as deduced from computed tomography (CT) axial scans were correlated with signs and symptoms of TMD in 49 young adults (mean age 24 years, range 15-33 years). It seems that occlusal discrepancy can be a predisposing factor to TMD, especially when it is asymmetrically expressed.

*Pullinger, 1993:* Thus, occlusion cannot be considered the unique or dominant factor in defining TMD populations. Certain features such as anterior open bite in osteoarthritis patients were considered to be a consequence of rather than etiological factors for the disorder.