ARTICLES FROM CURRENT ORTHODONTIC LITERATURE, SELECTED AND REVIEWED BY:
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Prevalence of malocclusion in children with obstructive sleep apnea

Galeotti A, Festa P, Viarani V, et al. Prevalence of malocclusion in children with obstructive sleep apnoea. Orthod Craniofac Res 2018;21:242-7.

The objective of this study was to determine if there was an association between obstructive sleep apnea (OSA) and malocclusion in children. The sample sizes were adequate with 139 participants with OSA (aged 2-10 years) and a control group of 137 healthy participants. Diagnosis of OSA was based on nighttime at-home pulse oximetry scores of 2-4 based on the McGill Oximetry method of assessment. One expert orthodontist described the malocclusions. Data collected included age, sex, body mass index (BMI), canine relationship, posterior crossbite, overbite, and overjet. A Shapiro-Wilk test was used to assess normality of data. Chi-square (categoric variables) and Mann-Whitney (continuous variables) tests were used to determine statistical differences between the OSA and control groups. Analysis of variance was used to evaluate the differences in means between the OSA and control groups. The study found no association between BMI and OSA. Statistical analyses show associations between OSA and posterior crossbite, increased or decreased overbite, and increased overjet. However, it may not be conclusive to say that malocclusion is causative of OSA or vice versa. Children with OSA may have associated malocclusions, and therefore it is beneficial for orthodontists to incorporate an OSA-screening questionnaire in their medical history forms. If it is determined that a patient is at risk for OSA, the orthodontist should recommend that they follow up with their pediatrician for further testing. Polysomnographic sleep studies could have improved the accuracy of diagnosis of OSA. Having calibrated multiple examiners could have improved the characterization of the variety of malocclusions likely to be encountered. Regarding the variables, a continuous scale rather than categoric labeling of type of malocclusion may be more related to OSA scores.

Reviewed by Tylor Brekke

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Closed or open exposure of palatally displaced canines

Bjorksved M, Arnrup K, Lindsten R, et al. Closed vs open surgical exposure of palatally displace canines: a multicenter, randomized, controlled trial. Eur J Orthod 2018;40:626-35.

In this study, the researchers set out to investigate open versus closed techniques for exposing palatally displaced canines, because no consensus exists in the current literature elucidating a superior method. The authors tested for significant differences in surgery time, complications, and patients' perceptions between the 2 methods for exposing impacted canines. In this randomized controlled trial involving 3 clinics, 119 patients (75 girls, 44 boys, ages 9-16 years) were equally divided: 60 closed exposures, 59 open exposures. There were 89 unilateral cases and 30 bilateral. Surgery time was evaluated with the use of *t* test. Categoric variables were evaluated with the use of chi-square test, Fischer exact test, and Mann-Whitney *U* test. Patients were surveyed on the day of the procedure and 7 days afterward. There was no significant difference in mean surgery time: closed exposure 35.4 $\pm$ 16.4 minutes, open exposure 31.8 $\pm$ 15.8 minutes. Severe complications were similar between groups when comparing unilateral cases. There were significantly more severe complications in the open exposure group in bilateral cases ($n = 5$ vs $n = 0$). The closed group reported significantly more pain at anesthetic injection than the open group. Seven days after surgery, the open group reported significantly more pain (median 11.5) compared with the closed group (median 3), which correlated with postoperative pain on the day of the procedure. There were no significant differences in masticatory difficulty or whether patients would choose to undergo the procedure again. No multivariate analyses were performed for

factors that may influence pain, such as presurgical analgesics, type of anesthesia, sex, age, or unilateral versus bilateral impactions. There was no comparison done between any of the studied measures and location of the impacted tooth. Follow-up of patients was limited to 4 weeks.

Reviewed by Madeline Kelley

Magnetic resonance for disk diagnosis in adolescents

Kellenberger CJ, Bucheli J, Schroeder-Kohler S, et al. Temporomandibular joint magnetic resonance imaging findings in adolescents with anterior disk displacement compared to those with juvenile idiopathic arthritis. J Oral Rehabil 2019;46:14-22.

This study aimed to improve diagnostic differentiation between anterior disk displacement (ADD) and juvenile idiopathic arthritis (JIA) via comparative analysis of morphology and inflammation of temporomandibular joints (TMJs) on magnetic resonance images (MRIs). Intravenous administration of gadolinium contrast agent (0.1 mmol/kg of body weight) was followed by fat-saturated T1-weighted fast spin-echo images (MRI) in every patient. Three-dimensional gradient-echo acquisition analysis indicated that inflammatory signs between the conditions are similar and therefore not differentially diagnostic. It also indicated that although both diseases showed signs of condylar deformity, the shape of the glenoid fossa tended to more closely maintain its expected shape in ADD than in JIA, with less severe flattening in ADD. ADD condyles were smaller in the anteroposterior diameter. The Mann-Whitney test was used for qualitative grades of inflammation and joint deformity, and independent-sample *t* tests and the chi-square test was used to assess mandibular condyle and glenoid fossa size, shape, inclination, and frequency of each occurrence. Patients in the sample were identified by searching existing archived images taken in symptomatic patients, so the study was influenced by sampling bias. Sample size was small, with 18 ADD and 18 JIA patients. A self-proclaimed weakness of the study was the potential inclusion of JIA with TMJ involvement in the ADD group. The study could have benefited from a larger sample size and MRIs of patients who may not have been symptomatic (though that may be difficult to get ethical approval for). It also could have benefited from better-differentiated sample groups.

Reviewed by Shannon Schober

Mechanobehavior and ontogenesis of the temporomandibular joint

Nickel JC, Iwasaki LR, Gonzalez YM, Gallo LM, Yao H. Mechanobehavior and ontogenesis of the TMJ. J Dent Res 2018;97:1185-92.

This paper explores the influence of age-related behaviors on the mechanical environment of the TMJ tissues. Cells of the mandibular condyle, eminence, and TMJ disc respond to changes in loading conditions and dictate the morphologies of mature TMJ tissues. Premature failure of TMJ tissues compared with postcranial joints may be due to the denser cellular composition and higher nutrient consumption rates in TMJ tissues. Mechanical loading limits nutrient availability within the TMJ disc, resulting in cellular fatigue and, in turn, making the TMJ disc prone to degenerative changes. Computational modeling was used to measure physiochemical changes in cell signaling within the TMJ disc due to mechanobehavior. The difference in mechanobehavior of subjects with or without myofascial pain was suggested to be related to the level of low-magnitude jaw muscle activations. This is contrary to the traditional opinion that high-magnitude activations are associated with bruxing and clenching. Women with bilateral disc displacement had significantly higher ($P < 0.05$) mechanobehavior scores during day and night than those without disc displacement. A proposed theoretical model uses the relationship between dental age and compressive stress experienced on the TMJ ($R^2 = 0.89$) to suggest that dolichofacial children may reach the inhibitory threshold of chondrogenesis 3 years earlier than brachyfacial children. Further research to develop a model that measures differences in mandibular growth in dolichofacial versus brachyfacial subjects could facilitate more effective use of mandibular orthopedic appliances. Furthermore, more age-related data regarding mechanobehavior influence on TMJ growth, cartilage maintenance, and disc dysregulation in humans are needed to test the proposed model, because it currently uses in vitro thresholds of chondrogenesis inhibition (0.05 MPa) to analyze differences in mandibular growth pattern of 2 human phenotypes.

Reviewed by Puja Patel