Evaluation of a Novel Microencapsulated Orthodontic Cement to Prevent White Spot Lesions

Jonathan A. Yih, DMD, MS (2018)

Abstract: The esthetic result of orthodontic therapy can be compromised by white spot lesion (WSL) development. WSLs are associated with increased bacterial accumulation exacerbated by orthodontic appliances and poor patient oral hygiene. One strategy to reduce WSL formation is to utilize orthodontic cements capable of releasing ions to inhibit bacterial growth and remineralize enamel. The Premier Dental Supply Company's experimental cements incorporated with microcapsules containing a combination of Zn^{2+}, PO_4^{3-}, Ca^{2+}, and F^- were evaluated for their capability to minimize bacterial growth and the formation of WSLs and for their bond strength to enamel compared to a control. The experimental cements containing microencapsulated ions released significant levels of Zn^{2+}, PO_4^{3-}, Ca^{2+}, and F^- in an acidic aqueous solution (pH 5.15) over a 28-day period. The fluoride-containing formulation demonstrated a mild inhibition of bacterial growth. There were no significant differences in WSL formation on enamel for any of the cements. While there were no significant differences in the debonded adhesive remnants, the shear bond strengths were significantly lower for cements containing microcapsules, though they were still within the clinically-acceptable range. Future studies should focus on clinical capabilities of the cements and verify the adequacy of the bond strength.

Graduate orthodontic residents' perspectives on education: A follow-up study

Amelia Stoker, DMD, MS (2018)

Introduction/Objective: The purpose of this study was to conduct a follow-up survey at the Graduate Orthodontic Resident Program (GORP) in Ann Arbor, Michigan. It was based on two previous survey studies by Keith & Proffit in 1992 and Bruner et al in 2003. The survey identified current resident demographics, their perspectives about current training and future goals and compared the results with the 1992 and 2003 surveys to evaluate trends across a 26-year span.

Materials and Methods: An anonymous, electronic survey was distributed via SurveyMonkey at GORP in Ann Arbor, Michigan on August 2-3, 2018. It was a 39-42 question survey that used branching logic in three categories: Program Specific Questions, Future Goals and Demographics. The data was tested for statistically significant differences between groups using chi-square or analysis of variance.

Results: The total number of orthodontic residents attending GORP in 2018 was 489. The total respondent population was 369 (response rate 75.5%).

Conclusions: Orthodontic resident trends over 26 years show the number of female residents and educational debt has increased with less stipends given. The educational debt is associated with anxiety and influences residents' decisions on where to work.

DIFFERENCES IN TEMPOROMANDIBULAR JOINT LOADING FORCES BETWEEN DOLICHOFACIAL AND BRACHYFACIAL PHENOTYPES: A LONGITUDINAL CEPHALOMETRIC STUDY

Riddhi Desai, DMD, MS (2018)

Introduction:
Craniofacial growth is a complex process that is influenced by various different factors. Of particular interest, is the method by which extremes in facial growth patterns result. The purpose of this study was to determine whether or not dolichofacial (Frankfort horizontal mandibular plane angle (FHMPA) $\geq 30°$) versus brachyfacial (FHMPA $\leq 22°$) phenotypes differ in temporomandibular joint (TMJ) loads during growth and if these differences are gender specific, age specific, or correlate longitudinally with mandibular ramus height (Condylion-Gonion, Co-Go).

Setting and Sample Population:
Online database: AAOF Legacy collection (http://www.aaoflegacycollection/org/aaof_home.html). Lateral and posteroanterior cephalographs of 36 dolichofacial and 29 brachyfacial individuals at average ages of 6 (T1), 12 (T2), and 18 (T3) were used from the collection.

Materials and Methods:
Three-dimensional anatomical data geometries were derived from lateral and posteroanterior cephalographs. The geometries were used in a numerical model based on minimization of muscle effort. A numerical model predicted ipsilateral and contralateral TMJ loading forces associated with unilateral static biting on the mandibular incisor, canine, and first molar at various biting angles. A loading force of 100 units was applied and the direction varied within the occlusal plane from $0 - 350°$ (θ_{xz}) in $10°$ increments and perpendicular to the occlusal plane at $0°$ (θ_Y=vertical) up to $\theta_Y = 40°$, in $5°$ increments. Descriptive statistics were used to characterize all groups; and intergroup differences were compared using analysis of variance (ANOVA) for each vertical biting angle (θ_y) at times points T1, T2, and T3 for both males and females. ANOVA assessed for group differences in TMJ loading forces for ipsilateral and contralateral condyles. Unequal paired 2-tailed t-test compared gender, age, and ramus heights between phenotypes.

Results:
Female dolichofacial subjects produced significantly higher (p<0.05) TMJ loading forces than brachyfacial subjects while men generally had the opposite outcome. The significant loading forces were mainly at the lower vertical biting angles. An overall decrease in loading force was observed from incisor to canine to molar in TMJ loading force for both brachyfacial and dolichofacial subjects. In addition, the loading force from T1 to T3 at each vertical biting angle for each tooth decreased. At all timepoints dolichofacial subjects had a significantly higher FHMPA than brachyfacial subjects. And at higher ages, dolichofacial phenotypes had significantly lower ramus heights compared to brachyfacial phenotypes.

Conclusions:
TMJ loading forces may influence mandibular growth and therefore explain the differences between dolichofacial and brachyfacial phenotypes. Furthermore, variation in growth and mechanics of the TMJ could play a role in gender disparities.

Vertical changes in adult patients treated with the orthodontic clear aligner therapy: a retrospective study

Ji Sun Min, DMD, MS (2018)