A comparative analysis of aerodynamic and anatomic characteristics of upper airway before and after mini-implant–assisted rapid maxillary expansion

Hongyi Tang, Panpan Liu, Qiuping Xu, Yingyue Hou, and Jing Guo. Am J Orthod Dentofacial Orthop 2021;159:e301-e310

Introduction: The objective of this research was to observe changes in aerodynamics and anatomic characteristics of the upper airway after mini-implants assisted rapid maxillary expansion and to evaluate the correlation between the 2 changes of the upper airway in young adults. **Methods:** Thirty consecutive patients (mean age, 23.82 ± 3.90 years; median, 24.5 years; 9 males, 21 females) were involved. Cone-beam computed tomography was taken before activation and over 3 months. Three-dimensional models of the upper airway were reconstructed on the basis of cone-beam computed tomography. The anatomic characteristics of the upper airway, including volume, area, transverse, and sagittal diameter, were measured. The aerodynamic characteristics of the upper airway were calculated on the basis of 3-dimensional models using computational fluid dynamics. The correlation between the changes in aerodynamics and anatomic characteristics of the upper airway was explored. **Results:** The enlargements of the volume of the total pharynx, nasopharynx, and oropharynx were found (9.99%, 20.7%, and 8.84%, respectively). The minimum cross-sectional area increased significantly (13.6%). The airway resistance (R) and maximum velocity (V_{max}) decreased significantly in both the inspiration and expiration phase (inspiration: R, −26.8%, V_{max}, −15.7%; expiration: R, −24.7%, V_{max}, −16.5%). The minimum wall shear stress reduced significantly only in the inspiration phase (−26.3%). The correlations between decreased R and increased volume and minimum cross-sectional area were observed. **Conclusions:** Mini-implants assisted rapid maxillary expansion is an effective device for improving anatomic characteristics represented by the total volume of the upper airway and minimum cross-sectional area, which contributed to the respiratory function depending on the favorable changes of aerodynamic characteristics including resistance, velocity, and minimum wall shear stress.

Smile preferences of orthodontists, general dentists, patients, and the general public in three-quarter and lateral views

Parichart Pasukdee, Johnson Hsin-Chung Cheng and De-Shing Chen. Am J Orthod Dentofacial Orthop 2021;159:e311-e320

Introduction: This study aimed to analyze differences in esthetic smile preferences between Thai dentists and the general population and determine factors that affect smile perception. For the analysis, in addition to the frontal smile view, the three-quarter and lateral smile views were considered. **Methods:** A computer-based questionnaire was used that comprised a demographic survey and multiple photographs of smiles. In total, 61 orthodontists, 180 general dentists, 378 orthodontic patients, and 421 laypersons were asked to select the most preferred digitally altered smile for each variable in the frontal, three-quarter, and lateral views. Chi-square and Kruskal-Wallis tests with post-hoc tests were used for comparing groups. Multiple linear regression was used to analyze the influence of demographic factors on smile esthetics. Significance was set at $P < 0.05$. **Results:** Chi-square tests revealed significant differences in preference between men and women and between the professional and nonprofessional groups for almost all variables. Demographic factors influenced smile esthetics in the nonprofessional group. **Conclusions:** Both sex and dental knowledge background affected smile preference. The smile preferences of observers varied based on the view, and therefore, the lateral and three-quarter views should be routinely included in smile analyses. Demographics negligibly affected smile perception in the professional group, whereas they significantly affected perceptions in the nonprofessional group, especially age and education.

Influence of upper lip curvature on smile attractiveness in patients with different degrees of gingival smiles: A cross-sectional study with opinions from oral health providers and laypersons

Sergio Hernán Valverde-Montalva, Carlos Flores-Mir, Daniel Rinchuse, and Luis Ernesto Arriola-Guillén.
Am J Orthod Dentofacial Orthop 2021;159:e321-e329

Introduction: Although there is relative consensus about approaches to gingival smile management, there are still discrepancies as to whether a gingival smile is attractive or not. The purpose of this study was to quantify the influence of upper lip curvature shape and the amount of gingival display on the perception of smile attractiveness assessed by Peruvian orthodontists, dentists, and laypersons. **Methods:** A frontal photograph was digitally altered to generate 3 types of upper lip curvature shapes (upward, straight, and downward) with 5 different levels of gingival smile exposure (0 mm, 2 mm, 3 mm, 4 mm, and 5 mm). Fifteen images were generated. Three groups of evaluators (50 dentists, 50 orthodontists, and 50 laypersons) assessed the images using a visual analog scale. One-way analysis of variance with Bonferroni post-hoc tests and multiple linear regressions were applied. **Results:** The downward lip curvature shape had a negative effect on the esthetic evaluation of the smile with gingival exposures of 3 mm or more for all the evaluating groups (approximately 20-30 points less than upward or straight smile curvature shapes, $P < 0.05$). Laypeople gave higher scores of almost 10 points more than dentists and orthodontists when evaluating the upward lip curvature shape with 5 mm of gingival exposure during smile ($P = 0.029$). **Conclusions:** We found that upward or straight upper lip curvature shapes have a positive impact on perceived smile esthetics. In contrast, downward upper lip curvature shapes have a negative effect on perception when evaluating different degrees of gingival smiles.

Rehearsal's effect on recall and comprehension of orthodontic informed consent

Brennan N. Skulski, Henry W. Fields, William M. Johnston, Fonda G. Robinson, Allen Firestone, and David J. Heinlein.
Am J Orthod Dentofacial Orthop 2021;159:e331-e341

Introduction: Proper informed consent allows patients to take an active role in their own treatment decisions, and enhanced compliance might improve treatment outcomes. The objective of this research was to determine if handwritten rehearsal of core and custom consent items would increase short-term recall and comprehension. **Methods:** A total of 90 patient-parent pairs were randomly assigned to 2 groups. After case presentation, each subject was provided 10 minutes to read a modified informed consent document. Group A received visual printouts containing the 4 core elements (root resorption, decalcification, pain, and relapse/retention) likely to be encountered by all patients and up to 4 custom elements (eg, impacted teeth, orthognathic surgery, or other case-specific treatment issues). Subjects identified and wrote what the image depicted and how it could affect treatment. Group B viewed a slideshow presentation on all 18 consent elements arranged from general to specific. All participants were interviewed, and each provided their sociodemographic data, as well as completed literacy, health literacy, and state anxiety questionnaires. The groups were compared for recall and comprehension through an analysis of covariance. **Results:** The rehearsal intervention significantly improved recall and comprehension of the core elements ($P = 0.001$). Rehearsal also improved custom recall and comprehension, but not significantly. Group B performed significantly better on treatment questions ($P = 0.001$). Overall, as anxiety increased, correct responses decreased. **Conclusions:** The rehearsal group improved recall and comprehension of the core and custom elements of informed consent and proved a more efficient method than an audiovisual presentation to provide informed consent. It also improved meeting legal obligations.

The 50 most-cited articles on clear aligner treatment: A bibliometric and visualized analysis

Alessandro Bruni, Francesca Giulia Serra, Vittorio Gallo, Andrea Deregibus, and Tommaso Castroflorio. Am J Orthod Dentofacial Orthop 2021;159:e343-e362

Introduction: Research on clear aligner treatment (CAT) has increased in recent years. In this study, we aimed to perform a bibliometric and visualized analysis to identify and critically assess the 50 most highly cited articles on CAT. **Methods:** Web of Science was selected as a data source and consulted until March 2020 to identify all articles potentially relevant to the analysis. All the eligible articles were collected until 50 manuscripts were listed. Article-based parameters, journal-based parameters, and author-based parameters were registered to perform the bibliometric analysis. Keywords were automatically harvested from the selected articles to implement the visualized analysis. **Results:** The search identified a total of 378 articles; the total number of citations of the selected articles varied from 15 to 112. The average number of citations per year varied from 1.15 to 13.83. The predominant study design was clinical (31.7%). Over the 15 journals in which the most cited articles were published, the *American Journal of Orthodontics and Dentofacial Orthopedics* published the majority of those included in the list (14) and also received the greatest number of citations (671). A total of 195 authors contributed to the 50 most cited articles; a significant portion of them (26) were unaffiliated with academic institutions. A total of 184 keywords were gathered from the article list. **Conclusions:** The number of citations on CAT is expected to grow steadily in parallel with the rising number of research projects. The present work identifies the most influential articles on CAT and their characteristics, placing emphasis on the journals, the authors, and the topics addressed.

Skeletal and dental changes after maxillary expansion with a bone-borne appliance in young and late adolescent patients

Fabio Annarumma, Marco Posadino, Anna De Mari, Sara Drago, Hussein Aghazada, Giovanni Manes Gravina, Erda Qorri, Armando Silvestrini-Biavati, and Marco Migliorati. Am J Orthod Dentofacial Orthop 2021;159:e363-e375

Introduction: Rapid palatal expansion is a common therapy during orthodontic treatment and could be a preliminary step for correcting different malocclusions; furthermore, this treatment could be necessary at any age. Different anchorage approaches have been proposed to obtain an effective skeletal result, although every device produces both dental and skeletal effects. This study aimed to compare the dentoskeletal effects of a bone-borne palatal expander considering 2 groups of patients of different ages. **Methods:** Twenty-four patients consecutively treated were included in the study; patients were divided into 2 groups according to their age: group 1 with age $\leq$16 years and group 2 patients $>$16 years. All patients had a preexpansion cone-beam computed tomography scan; a second scan was required at the end of activations. All patients received a bone-borne appliance anchored on 4 miniscrews. **Results:** Significant intragroup differences were found for maxillary width and dental diameters. No significant differences were found between groups with regard to longitudinal changes, except for the maxillary right plane. **Conclusions:** The use of bone-borne maxillary expansion was effective in generating palatal widening both in growing and young adult patients. No significant skeletal or dental differences were found between groups.

A cross-sectional retrospective study of normal changes in the pharyngeal airway volume in white children with different skeletal patterns. Part 2: Cervical vertebral maturation method and hyoid bone

Lam Vuong and He-Kyong Kang. Am J Orthod Dentofacial Orthop 2021;159:e377-e388

Introduction: The purpose of this cross-sectional retrospective study was to evaluate the patterns of pharyngeal airway volume change determined by cervical vertebral maturation (CVM) stage and compare it with that which was characterized by chronological age. Correlations between hyoid bone positions and airway volumes were also examined. **Methods:** CVM staging was determined from cone-beam computed tomography scans of 420 white patients aged 9-15 years. Patients were stratified on the basis of sex and skeletal pattern to establish pharyngeal airway volume clusters for each CVM stage. The horizontal and vertical positions of hyoid bones were measured using Hyoidius and Sella. **Results:** Males had larger pharyngeal airway volumes compared with females. In males, the largest increases in pharyngeal airway volumes occurred at an earlier CVM stage than females. No statistically significant differences in pharyngeal airway volumes were noted in subjects with skeletal Class I, II, and III malocclusion. The hyoid bone in males was more anteriorly and inferiorly positioned compared with females. The Class III group had a further forward position of the hyoid bone than the Class I and II groups. **Conclusions:** The patterns of pharyngeal airway change obtained using CVM staging did not correlate well with traditional maturational models for skeletal growth. It implies that chronologic age could be a relatively reliable indicator for the assessment of pharyngeal airway volumes in adolescents, as outlined in part 1 of the present study. Subjects with anteriorly and superiorly positioned hyoid bones exhibited smaller pharyngeal airway volumes, which highlights the role of soft tissue and its influence on airway patency.