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ARTICLES FROM THE CURRENT ORTHODONTIC LITERATURE, SELECTED AND REVIEWED BY:

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Cone-beam computed tomography superimposition methods

Ghonewima A, Cho H, Farouk K, Kula K. Accuracy and reliability of landmark-based, surface-based and voxel-based 3D cone-beam computed tomography superimposition methods. Orthod Craniofac Res 2017; 20:227-36.

As new imaging techniques become widespread in orthodontics, understanding their applications and limitations is imperative. With cephalometric films having high importance for diagnostics in orthodontics, many orthodontists rely on these 2-dimensional images for diagnostics and superimpositions. As cone-beam computed tomography (CBCT) technology becomes increasingly popular, studies examining CBCT images should be increasing and sought after by many orthodontists who use this technology. There are many advantages to using CBCT scans for initial records of orthodontic patients, such as negating the need for additional images for impacted teeth, root resorption, atypical condylar morphology, and alveolar morphology for implant placement. Although the potential for a second image is decreased with CBCT technology, there are some drawbacks to using 3-dimensional scans, most notably increased radiation dosage depending on the machine and the settings, expense, patient willingness, technique sensitivity, and additional software programs.

With these advances in imaging, superimpositions of scans are important to examine because of their usefulness in orthodontic therapy. This study compared 3 superimposition techniques for CBCT images on 20 patients treated with the Herbst appliance. The reference structure used was the anterior cranial base. The techniques were landmark-based, surface-based, and voxel-based. Not surprisingly, landmark-based was significantly less accurate than surface-based and voxel-based for superimpositions. However, landmark-based superimposition was still considered to be a reliable method. With continuing software developments, it is important to stay up to date on new methods and techniques for superimpositions for 3-dimensional scans to accurately and reliably compare different time points in a patient's treatment history. It is likely that many more studies will flood the literature as this imaging technology becomes more common in orthodontic practice.

Reviewed by Alli Jacobs and Sana Naheed

Customized and noncustomized appliances

Penning EW, Peerlings RH, Govers JD, Rischen RJ, Zinad K, Bronkhorst EM, et al. Orthodontics with customized versus noncustomized appliances: a randomized controlled clinical trial. J Dent Res 2017; 96:1498-504.

This article may help if you are a practicing orthodontist planning your bracket inventory. In this well-designed study, 2 bracket systems made by Ormco—Insignia system computer-designed customized brackets, and Damon Q 0.22-in noncustomized self-ligating brackets—were compared. Two practicing orthodontists in the Netherlands were calibrated for treatment procedures. Each patient was randomly assigned to receive 1 system and treated by 1 orthodontist. All patients were seen on the same 8-week recall; then alignment was evaluated. The authors tried to test whether the quality of overall treatment was related to the bracket system. A power analysis was done strengthening the confidence in the conclusion. The null hypothesis was not rejected; as a result, customized appliance systems did not shorten treatment duration compared with noncustomized appliances. Interestingly, a greater impact on treatment duration was associated with the practicing orthodontist. Reasons that could have influenced this significant association were not discussed in the article (eg, staff, skills, clinic

settings, and so on). The results indicated that, in addition to the extra cost and more patient complaints, the use of customized brackets was associated with more loose brackets and longer planning time for the orthodontist. Analysis of cost effectiveness was not done in this study. This article proposed an answer to a simple yet clinically relevant question. It would be interesting in future studies to test cost effectiveness to help orthodontists make decisions based on each one's practice philosophy. Other factors could be considered such as the practitioner's skills, other customized systems, and other influences on the quality of treatment.

Reviewed by Carli Loss

Unilateral complete cleft lip and palate treatment

Alberconi,TF, Siqueira GL, Sathler R, Kelly KA, Garib DG. Assessment of orthodontic burden of care in patients with unilateral complete cleft lip and palate. Cleft Palate Craniofac J 2018; 55:74-8.

The orthodontic burden of care among patients with craniofacial anomalies including oral clefts refers to nasoalveolar molding, maxillary protraction, secondary alveolar grafting, and orthognathic surgical procedures. The authors of this retrospective and observational study evaluated the orthodontic burden of care among 100 patients with unilateral cleft lip and palate. Several parameters such as duration of orthodontic treatment, number of visits, appliances, surgical procedures, and distance traveled were assessed. To evaluate the effect of malocclusion on the orthodontic burden of care, the sample was divided into 2 subgroups: group 1, patients with a Goslon Yardstick score of 1, 2, or 3 (n = 62); and group 2, patients with a Goslon Yardstick score of 4 or 5 (n = 38). Overall, the results indicated that mean time of orthodontic treatment was 140.2 months, mean number of orthodontic appointments was 61.8, mean number of appliances was 10, mean number of surgical procedures was 6.2, and mean total distance traveled to attend the center for orthodontic appointments was 38,978.5 km. The group 2 patients had a longer time in orthodontic treatment (P <0.05), more surgical procedures (P <0.05), and longer distance (P <0.05) traveled than did the patients in group 1. The authors concluded that the orthodontic burden of care in patients with unilateral cleft lip and palate is relevant, especially among those with severe malocclusions. However, the results from this study should not be generalized to other countries because of differences in socioeconomic circumstances and health care services. The orthodontic burden of care can be improved by research efforts to minimize maxillary growth restriction related to primary surgery, simplify the orthodontic treatment protocol, minimize the number of interventions, and offer treatment interventions closer to the patient's residence.

Reviewed by George Jeryn Jacob

Vertical dimensions with extraction and nonextraction treatment

Beit P, Konstantonis D, Papagiannic A, Eliades T. Vertical skeletal changes after extraction and nonextraction treatment in matched class I patients identified by discriminant analysis: cephalometric appraisal and Procrustes superimposition. Prog Orthod 2017; 18:44.

Control of the vertical dimension is a challenge in clinical orthodontics, especially with crowding. To date, there are limited data on the effects of extraction treatment on the vertical dimension. The authors of this study examined the vertical skeletal changes that may occur with the extraction of 4 premolars with comprehensive orthodontic treatment. They attempted to eliminate bias by obtaining a sample of patients who were considered borderline. To identify borderline subjects, a discriminant analysis was performed on a sample of 542 patients with Class 1 malocclusion. This analysis selected 83 borderline patients with similar morphologic features: 42 were treated without extractions, and 41 were treated with extraction of 4 first premolars. Seven cephalometric measurements were used to analyze vertical skeletal changes from pretreatment to posttreatment. Significant differences between the groups included an increase in the lower facial third of the extraction group as measured by the N-ANS/ N-ME ratio (P = 0.01), and a decrease in the gonial angle of the extraction group (P = 0.02). Similar changes in other cephalometric values suggested an increase in the vertical dimension of the nonextraction group and the opposite effect in the extraction group, but none was statistically significant. Identifying patients with similar morphology via the discriminate analysis was an important step in attempting to match the control and experimental groups. The authors acknowledged that this sample included only Class 1