Authors’ response

Thank you very much for your interest in our article, “Effectiveness of incremental versus maximum bite advancement during Herbst appliance therapy in late adolescent and young adult patients” (Am J Orthod Dentofacial Orthop 2019;155:48-56).

Martin and Pancherz evaluated the amount of bite jumping and mandibular incisor positional changes and reported moderate correlation between the amount of activation and change of incisor position, meaning the greater the bite jumping, the larger the incisor protrusion. In their study, the subjects were not homogeneous regarding growth period. The group was generally (~70%) composed of patients who were in the prepeak and peak periods. The skeletal and dentoalveolar contributions to correction differ between adults and children after Herbst therapies. Because maturation has a vital importance to evaluate the skeletal and dentoalveolar effect of the Herbst appliance, we focused on the studies that included patients who are at the postpeak stage or at the end of growth.

Ruf and Pancherz evaluated the treatment effects of Herbst appliance therapy in patients who were 15.7-44.4 years of age. The overjet correction was 13% skeletal and 87% dentoalveolar. Sagittal position of the mandibular central incisor within the mandible (ii/oLp-pogoLp) changed 4.49 ± 1.71° after Herbst therapy. Purkayastha et al evaluated the treatment effects of Herbst appliance therapy in stepwise and maximum advancement. The mean age of their patients was ~22 years. Mandibular incisor positional changes (li/Olp-Pg/Olp) were 2.7 ± 1.9 mm in the maximum group and 3.8 ± 1.7 mm in the stepwise group, and the mean difference between groups was −1.1 ± 1.8 mm.

Statistically significant differences for lower incisor protrusion and proclination between groups were found only when these measurements were performed according to NB plane, but IMPA and Md1-MdOP measurements did not differ between groups. The mean differences between groups for L1-NB measurements were −3.09 ± 5.64° and −057 ± 1.16 mm, for IMPA −2.95 ± 5.85°, and for Md1-MdOP 2.33 ± 4.83°. The maximum pretreatment overjet for the maximum advancement group was 11.9 mm and the incisor proclination was 3.8°. These measurements were, respectively, 12.2 mm and 7.9° in incremental advancement group. Therefore, in the light of these findings, there was no significant relationship between the amount of mandibular protrusion and the amount of the incisor proclination for late adolescents and adults after Herbst appliance therapy.

Taking into account the threshold force level ~35-60 g for orthodontic tooth movement, even though the transmitted forces onto the mandibular incisors are assumed to be lower in stepwise activation than in the maximum bite jumping protocol, force production of 100 g as the result of 1 mm anterior advancement of the mandible is already higher than the required force magnitude for mandibular incisor protrusion in both activation types. In addition, the gradual force application by stepwise mandibular advancement may restart the orthodontic tooth movement process at every activation period and may thus increase the mandibular incisor protrusion.

Nasolabial angle consists of 2 lines belonging to the columellar nasal border and upper lip curvature. The individual variability in nasal structures in relation to age, sex, and ethnicity is a well known fact, and previous studies have reported that soft tissue analysis differs by population because nose and chin characteristics vary by heritage. Results from Hamamci et al indicated that girls exhibited more soft tissue profile changes from 9 to 14 years of age, whereas boys changed more from 14 to 18 years of age. This finding suggests that the velocity, amount, and completion time of soft tissue growth may exhibit interindividual variability. On the other hand, soft tissue does not always respond favorably to hard-tissue change. Growth and orthodontic treatment have been effective in the response of soft-tissue changes; however, Oliver suggested that the variance in soft-tissue structures due to thickness, strain, and posture is a factor affecting the correlation between hard and soft tissues. Oliver’s findings indicated that in patients with thin lips, the correlation between osseous and soft tissue changes was significant, whereas in subjects with thick lips, no significant correlation between osseous and soft tissue changes was observed. There was a significant correlation between maxillary incisor changes and vermilion border changes in patients with high lip strain, whereas in patients with low lip strain there was no significant correlation. In the light of this information, the variability in the response of the structures that constitute nasolabial angle, such as upper lip and the nasal columellar border, may create unpredictable and unexpected changes which may explain the decreased nasolabial angle in the incremental activation group despite backward movement of the upper lip.

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read the article “Are panoramic radiographs good enough to render correct angle and sector position in palatally displaced canines?” in the March issue (BJörkswed M, Magnuson A, Bazargani SM, Lindsten R, Bazargani F. Am J Orthod Dentofacial Orthop 2019;155:380–7). I appreciate and congratulate the authors for their profound and immense contribution in highlighting the sector analysis for palatally displaced canines (PDCs) in panoramic imaging and comparing that with cone-beam computed tomographic (CBCT) scans. However, the conclusions raised a few questions with me.

The authors mentioned that when it comes to early interceptive treatment of PDCs, it is enough to use panoramic radiographs. How easy was it to find the overlap in frontal view, the vertical distance to occlusal plane, angulation of canine to occlusal plane, dilacerations, and rotations? They have a significant relationship with the level of treatment difficulty. The lateral incisors near the PDC have shorter roots than the contralateral ones adjacent to the normally erupted canines, and the morphologic differences make it even more difficult for the clinician to diagnose further lesions. How accurate can the diagnostic information expected to be gained for good optimization of a treatment plan?

When I look at the statement of clinical relevance in imaging, it is important to know what additional information CBCT can provide. CBCT is definitely thought to have advantages over panoramic radiographs because its 3-dimensional nature obviously allows for navigation of volume in orthogonal axial, sagittal, and coronal planes as well as nonorthogonal multiplanar reformatted views. This gives unobstructed views of anatomic structures in the precise locations and offers a wider perspective on spatial relationships. In contrast, panoramic radiographs are limited by superimposition of structures, ghost images, air shadows, and, most importantly, the sensitivity to patient positioning errors, producing unequal magnification in horizontal and vertical dimensions. The other advantages of CBCT are absence of magnification and distortion and the ability to make precise measurements as a result of the isotropic nature of voxels that constitute the basic unit of each CBCT scan.

The risk-benefit ratio of CBCT is favorable. Owing to various overlapping carcinogenic factors in our life, it is next to impossible to evaluate long-term stochastic effects of radiographic examinations. Therefore the concept of ALARA, suggesting that radiation should be kept “as low as reasonably achievable,” has to be adhered to, when justifying CBCT acquisitions by comparing dose exposure to the background radiation.

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