ARTICLES FROM CURRENT ORTHODONTIC LITERATURE, SELECTED AND REVIEWED BY:
RESIDENTS FROM THE DEPARTMENT OF ORTHODONTICS, WEST VIRGINIA UNIVERSITY SCHOOL OF DENTISTRY, MORGANTOWN, WV

Peter Ngan, Chairman, Chris A. Martin, Clinic Director

Dan Grauer, Associate Editor for Residents' Journal Review
Santa Monica, Calif

Counterclockwise rotation with double-jaw orthognathic surgery

Acar YB, Erdem NF, Acar AH, Erverdi AN, Ugurlu K. Is counterclockwise rotation with double jaw orthognathic surgery stable in the long-term in hyperdivergent Class III patients? J Oral Maxillofac Surg 2018;76:1983-90.

Proper control of the occlusal plane (OP) is an important criteria for success in surgical treatment of patients with double-jaw surgery. Alteration of the OP or rotation of the maxillomandibular complex around a predetermined point is a surgical technique that involves intentional manipulation of the OP by clockwise (CWR) or counterclockwise (CCWR) rotation. The purpose of this study was to evaluate the stability of CCWR double-jaw orthognathic surgery of hyperdivergent Class III patients. Patients were evaluated by means of lateral cephalometric analysis, and counterclockwise rotation was assessed according to the change in the angle of the OP to the Frankfort horizontal plane. The functional OP is constructed by drawing a line 0.5 mm inferior to the mesiobuccal cusp of the maxillary premolars and bisecting the incisor overbite. OP changes of more than -2° were included in this study. Measurements were taken before treatment (T0), after surgery (T1), and at long-term follow-up (T2). The median retention period was 48 months. A total of 15 patients with a mean age of 23.5 years at the time of surgery had double-jaw counterclockwise surgery. A sliding genioplasty was performed in 4 patients. The OP-FH angle at T0 was 11.3°, at T1 7.9°, and at T2 8.0°. Ten patients showed very stable results with an OP-FH change $\leq 1^\circ$. Four patients showed unstable results with an OP-FH change of $2.25 \pm 0.5^\circ$ during the follow-up period. The changes between the anterior cranial base (SN) and mandibular plane (Go-Me) were statistically significant, with a -2° change from T0 to T2. During clinical examination, 2 patients reported paresthesia with the 2-point discrimination test: 1 reported that it was improving, and 1 reported that it was not recovering. All patients were satisfied with the esthetic and functional results of the surgery. The limitations of this study are the small amount of CCWR (3.4°), small sample size, lack of long-term follow-up records for all of the patients, and that the study did not include assessment of the occlusal interrelation outcome. The amount and direction of surgical movements have a major influence on the stability of orthognathic surgery, with most of the cases included in the sample involving smaller movements.

Reviewed by Carl Bernstein

Treatment of missing lateral incisors

Josefsson E, Lindsten R. Treatment of missing maxillary lateral incisors: a clinical and aesthetic evaluation. Eur J Orthod 2018, September 11 [epub].

The prevalence of maxillary incisor agenesis varies from 1.5% to 2%; this phenomenon has always engaged orthodontists and patients because it is an esthetic dilemma. The most common treatment options are space closure or tooth replacement with the use of an implant-supported crown. The aim of this study was to evaluate, functionally and aesthetically by patients and professionals, whether implant therapy or orthodontic space closure in the esthetic zone was the best long-term treatment modality. The study participants included 22 patients in the implant group who had one or both maxillary lateral incisors substituted by a single implant-supported crown and 22 patients in the space closure group. Examinations were performed by 1 orthodontist and the patient, who were instructed to assess 12 total variables (different or nonacceptable gingival color, nonacceptable crown color, abnormal crown length [long or short], buccal gingival retraction, bleeding when probing, papilla defect, midline deviation in the maxilla, spacing in the anterior maxilla, proclination of maxillary incisors, strained lip closure, nonacceptable appearance when smiling, and nonacceptable harmony of the study tooth with the other teeth) ≥ 5 years after the prosthetic therapy or orthodontic

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treatment was completed. Of the 12 variables assessed, only 1 was significantly improved in the implant group and 5 were significantly improved in the space closure group. There were no significant differences found between the treatment groups for the remaining 6 variables and no significant differences between the groups regarding the patient's and examiner's overall esthetic satisfaction. The authors were able to conclude that if both treatment options are available, space closure is preferable. Future research could include an assessment of the stability of the treatment outcome over the patient's lifetime.

Reviewed by Sarah LaRue

Airway in growing Class II patients

Isidora S, Carlob GD, Cornelisc MA, Isidord F, Cattaneoe PM. Three-dimensional evaluation of changes in upper airway volume in growing skeletal Class II patients following mandibular advancement treatment with functional orthopedic appliances. Angle Orthod 2018;88:552-9.

Several investigators have hypothesized that the functional appliance (FA) treatment of growing patients with deficient mandibles may lead to increased oropharyngeal airway dimensions. The purpose of this study was to assess, with the use of cone-beam computed tomography (CBCT), the changes in upper airway in children with Class II malocclusion after DA treatment. Pretreatment and posttreatment CBCT scans of 20 patients previously treated with functional appliances (age range 9-12 years) were reviewed. To eliminate the growth effect, the changes in the FA group were compared with an age-matched Class I group of 18 patients (age range 8-14). Total and partial volumes of the upper airway (lower nasopharynx, velopharynx, and oropharynx) were calculated with the use of a software program. The results showed that in the FA group, all of the partial and total volumes were larger at the end of treatment compared with the start of treatment. However, compared with the control group, a larger volume increment was seen only for the oropharynx and total volume in the FA group. The authors concluded that there was an increase in oropharyngeal volume after FA treatment in Class II patients, leading to an increase in total volume of the upper airway. This difference was mainly related to the changes at the oropharynx level, which differed significantly from what was observed in the Class I group. This study points to the importance of having a control group when evaluating the effects of orthopedic appliance on airway volumes. In addition, the effects produced by FAs were more than dentoalveolar. Further studies on the long-term effects of these changes are needed because no evidence exists that this increase can be maintained.

Reviewed by Ghaddy AlSaty

Expansion and bite-block therapy in open bite growing patients

Mucederoa M, Fusarolib D, Lorenzo Franchi L, Pavonia C, Cozza P, Lione R. Long-term evaluation of rapid maxillary expansion and bite-block therapy in open bite growing subjects: a controlled clinical study. Angle Orthod 2018;88:523-9.

Studies have reported on the effectiveness of early treatment of skeletal open bite with different appliances. Few have analyzed the effects of rapid maxillary expansion (RME) and bite block (BB) on early treatment of anterior skeletal open bite patients with no oral habits. The purpose of this study was to evaluate the long-term effects and stability of using these appliances in growing patients compared with a control group of patients with untreated open bite. The treatment group consisted of 16 patients with a mean age of 8.1 $\pm$ 1.1 years. Lateral cephalograms were taken before treatment (T1), at the end of active treatment (T2), and 4 years after the completion of treatment (T3). The BB appliance was constructed in the form of a Schwartz plate for the lower arch with posterior occlusal splints of 5 mm thickness. The RME was activated once a day until the palatal cusps of the maxillary posterior teeth approximated the buccal cusps of the mandibular posterior teeth; then it was left in place for at least 8 months as a passive retainer. Results showed significant increase in overbite of 1.8 mm and reduction in extrusion of maxillary and mandibular molars of 3.3 mm in the treatment compared with control group. A significant decrease in facial divergence (2.8°) was also noted. No significant differences were observed 4 years after active treatment. The authors concluded that the treatment protocol with RME and BB was effective in the correction of negative overbite in growing children, and the effects of early treatment with RME and BB were stable at long-term follow-up. However, further investigations with larger sample sizes are needed.

Reviewed by Mohamad Sarraj

Lingual orthodontics for space closure in patients with congenitally missing lower second premolars

Klang E, Beyling F, Knösel M, Wiechmann D. Quality of occlusal outcome following space closure in cases of lower second premolar aplasia using lingual orthodontic molar mesialization without maxillary counterbalancing extraction. Head Face Med 2018;14:17.

Orthodontists treating patients with isolated lower second premolar aplasia (ILSPA) have a difficult decision to make concerning how to achieve space closure as well as adequate final occlusion. Many providers opt to treat ILSPA with the use of maxillary counterbalancing premolar extractions to obtain an appropriate Angle Class I canine and molar relationship. Space closure achieved by means of complete protraction of the molars is difficult owing to problems with mandibular anterior anchorage loss and the subsequent compromised occlusion. This retrospective study examined 25 patients who were treated with the use of Herbst telescopes, double-cable pull mechanics, and WIN completely customized lingual appliances (CCLAs). Retrospective assessments were performed at 4 time points on cast models: (T0) immediate before bonding of the fixed lingual appliance; (T1) initiation of anchorage reinforcement by adding Herbst telescopes; (T2) completion of gap closure and removal of Herbst telescopes; and (T3) debonding of the fixed lingual appliance. Patients wore pretreatment removable functional appliances, which were followed by bonding of lingual braces for leveling and alignment. The Herbst appliance was placed at T1 for anchorage reinforcement. Space closure was achieved by placing 2 power chains as a double-cable mechanic device from the lingual side of the first premolar to the lingual side of the second molar and from the labial attachment of the Herbst arm to a buccal cleat bonded to the first molar. Herbst telescope activation was performed in a stepwise manner tailored to each individual patient. At T3, 100% of the second premolar aplasia spaces were closed and an average molar correction of 10.9 mm was achieved with root parallelism. An Angle Class I canine relationship was obtained in 29 of the 33 assessed canines after Herbst appliance removal. Both the mean overjet and mean overbite decreased from T0 to T3. The mean treatment duration time was 38.4 months; specifically, the Herbst treatment lasted a mean 13.8 months and active space closure 13.0 months. The mean speed of space closure was 0.57 mm/mo. The authors described retention by fixed lower 3-3 retainer, as well as fixed lower 4-6 and upper 6-7 retainers in combination with an activator worn at night for anterior-posterior retention. In conclusion, WIN CCLAs in combination with Herbst telescopes offer a solution to mesialize molars in these challenging cases of lower second premolar aplasia. This represents another clinically viable possibility for orthodontic providers to add to their toolbox.

Reviewed by Joanna Song

Initial stress distribution of maxillary protraction with different anchorage designs

Eom J, Bayome M, Park JH, Lim HJ, Kook YA, Han SH. Displacement and stress distribution of the maxillofacial complex during maxillary protraction using palatal plates: a three-dimensional finite element analysis. Korean J Orthod 2018;48:304-15.

Skeletal anchorage has been used as an auxiliary for maxillary protraction to increase the amount of maxillary protraction while reducing untoward side-effects such as molar extrusion and proclination of incisors. This study used a 3-dimensional finite element model to analyze 6 different anchorage designs of maxillary appliances protracted with facemasks: type A, tooth-borne anchorage with transpalatal bars; type B, tooth-borne and bone-borne hybrid anchorage; type C, palatal plate with 3 microimplants; type D, Class III palatal plate connected to fixed appliances for intraoral traction; type E, Class III palatal plate combined with rapid maxillary expansion (RME); and type F, Class III palatal plate intraoral traction with RME. Results showed that facemasks with types A, B, and C exhibited the most anterior dentoskeletal displacement in the sagittal plane. In addition, type C exhibited the least amount of counterclockwise rotation of the palate. This is possible due to the location of force application of type C, which was more inferiorly and anteriorly located than types A and B and farther away from the center of resistance of the maxillary complex. Less forward movement of anterior nasal spine was found with type D because skeletal anchorage was tied to the dentition for intraoral protraction, which may be better described as amaxillary dentitional protraction device. Finally, RME with protraction force had minimal influence on the forward movement of the maxilla. The design of the appliances used in conjunction with RME was asymmetric owing to the location of the screws. A more symmetric appliance design may produce more desirable treatment effects. Important to keep in mind is that this study was conducted within the limitations of a finite element model. Musculature, growth, and biologic differences among patients may play a factor in a clinical setting.

Reviewed by Nicolette R. Chahin