A parent with maxillary lateral incisor agenesis has a 15-times greater risk of having a child with the same anomaly.

**Background:** A common problem that requires orthodontic intervention is maxillary lateral incisor agenesis. A common treatment for this problem is to open space for a maxillary lateral incisor implant. However, that treatment is expensive. Often, parents with this problem wonder if their children will also have this anomaly.

**Objective:** To determine the relative risk of a parent with maxillary lateral incisor agenesis to have a child with the same problem.

**Design/Methods:** This was a compilation of 4 research projects that had been performed in the past on large populations to determine the heritability and relative risk of maxillary lateral incisor agenesis. Previous studies had been performed in Portugal, Sweden, Utah, and Israel. Several hundred individuals with maxillary lateral incisor agenesis were identified, and the pedigrees of their families were explored.

**Results:** The percentage of the population affected by maxillary lateral incisor agenesis was between 1% and 2%. The relative risk for maxillary lateral incisor agenesis in a child of a parent who had that anomaly was around 15 to 16 times greater. In addition, the authors determined that microdontia of the maxillary lateral incisor is a milder form of maxillary lateral incisor agenesis.

**Conclusions:** There is a significant familial aggregation of maxillary lateral incisor agenesis, and microdontia of maxillary lateral incisors is part of the same phenotype.

**Reviewer's Comments:** This study has good valuable information. I have treated many patients with maxillary lateral incisor agenesis. In looking back at these families that I have treated, I would agree that the risk certainly is higher in families where the problem has already occurred. I simply did not know what that increased relative risk was in the past. These authors have shown that the risk is relatively high at 15 times greater than in the general population. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Maxillary Lateral Incisor Agenesis

Print Tag: Refer to original journal article
Intrusive Lingual Torquing Forces Are Most Likely Cause of Orthodontic Root Resorption

Root Resorption Associated With Orthodontic Tooth Movement: A Systematic Review.

Weltman B, Vig KWL, et al:


Even extensive root resorption does not usually affect the functional capacity or greatly compromise the longevity of teeth.

Background: If you are a practicing orthodontist, I am confident that you are concerned about the occurrence of root resorption in your patients. Therefore, to help your patients, it is important to know what factors or variables are related to the occurrence of root resorption.

Objective: To report the results from a rigorous systematic review of scientific literature that relates to external apical root resorption in patients with fixed orthodontic appliances.

Design/Methods: In this literature review article, the authors initially retrieved 921 unique citations from which they identified 144 full articles, of which only 13 met inclusion criteria for this study. They evaluated these articles for evidence of the relationship of a number of different variables and root resorption.

Results: Based on this review, the authors found that comprehensive orthodontic treatment did cause an increased incidence and severity of root resorption. Root resorption was also related to heavy forces, intrusive movements, and lingual torquing of maxillary central incisors. Interestingly, they found no relationship between the incidence of root resorption and archwire sequence, trauma, unusual tooth morphology, self-ligating versus conventional orthodontic bracket systems, or 1- versus 2-phase Class II treatment. They also found that root resorption associated with orthodontic treatment ceases after active treatment, and even extensive root resorption does not usually affect the functional capacity or greatly compromise the longevity of teeth. They also found that orthodontically induced internal root resorption usually ceases after appliance removal.

Conclusions: Heavy intrusive forces on maxillary central incisors in combination with lingual root torque are most likely to cause root resorption.

Reviewer's Comments: The results from this study present an excellent example of the need for performing a thorough review of the literature or meta-analysis to develop an evidence-based approach to orthodontic treatment. I suspect that many orthodontists would be surprised to find out that there is no relationship between root resorption and a history of previous trauma or tooth morphology. The good news is that, although comprehensive orthodontic treatment is related to root resorption, the resorption usually ceases after active treatment is discontinued and even extensive root resorption does not greatly compromise the longevity of the teeth. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Root Resorption, Causes, Tooth Movement

Print Tag: Refer to original journal article
With Orthognathic Surgery, Is What We Plan What We Get?

The Accuracy of Two-Dimensional Planning for Routine Orthognathic Surgery.
Rustemeyer J, Groddeck A, et al:


This study demonstrates that most actual surgical outcomes are similar to the movements predicted with 2-dimensional cephalometric planning, but there may be some outcomes that differ significantly from the plan.

**Background:** Comprehensive treatment of severe skeletal discrepancies may require a combined orthodontic and orthognathic surgery approach. Due to the invasive nature of orthognathic surgery, accurately planning the surgical movement is critical.

**Objective:** To compare presurgical predictions with actual postsurgical lateral cephalometric measurements to determine the accuracy of predictions.

**Design:** Retrospective study.

**Participants:** 54 patients (mean age, 26 ± 8 years) who underwent a bilateral sagittal split ramus osteotomy (BSSRO) with or without a Le Fort I osteotomy (33 patients had a 2-jaw procedure). Twenty-eight patients presented with mandibular prognathia, while 26 had mandibular retrognathia.

**Methods:** Presurgical lateral cephalograms (taken within 14 days of surgery) were traced using Onxy Ceph (Version 2.7.19), and planned surgical movements were entered. Then postsurgical cephalograms, taken after removal of intermaxillary fixation 14 days following surgery, were also traced. Cephalometric angles to assess horizontal (SNB, SNA, ANB) and vertical (NL-NSL, ML-NSL, ArGoMe) dimensions were compared.

**Results:** No statistically significant differences were found between predicted cephalometric angles and actual postsurgical angles. However, mean differences were around 1.0° to 2.0°, and differences of up to 8.5° were discovered.

**Conclusions:** Predicting mandibular movement with 2-dimensional software remains a relatively accurate tool for orthognathic surgery planning, yet some significant variation can occur.

**Reviewer’s Comments:** This study was a bit different than most looking at software prediction tools. There was no examination of soft tissue outcomes, which have been the most difficult to model. The study looked at the ability to plan a certain movement and then execute that movement through the surgical procedure. So if a 2-mm maxillary impaction was planned, that was the movement entered into the prediction software. The bottom line is that 2-dimensional prediction techniques are valuable and useful, but actual surgical outcomes vary somewhat from predictions even with use of interocclusal splints and careful techniques to transfer 2-dimensional predictions into the surgical plan. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Orthognathic Surgery, Prediction, Accuracy

Print Tag: Refer to original journal article
Combination headgear during phase I treatment of Class II malocclusions slows the eruption of maxillary second molars by about 45% compared to that in untreated controls.

**Background:** Headgear is a common appliance used to correct a Class II malocclusion during the mixed dentition. When headgear is worn, it places a force on the maxillary first molars. What effect does this have on eruption of maxillary second molars?

**Objective:** To measure the linear displacement of maxillary second molars and the impedance of eruption in a sample of subjects who wore combination headgear during the mixed dentition.

**Design:** Prospective, randomized clinical trial.

**Methods:** The authors gathered records on 47 patients who wore a cervical headgear for about 15 months. A control group consisting of 50 patients was identified, who had records taken during a similar time but had no orthodontic treatment. Both groups started with Class II malocclusions. Cephalometric radiographs were available before treatment and after headgear therapy had been completed. The authors measured linear changes in the position of maxillary first and second molars between those 2 time intervals.

**Results:** In the headgear group, the maxillary first molar was displaced distally about 2.6 mm, and its eruption was 1.5 mm. The control group showed mesial movement of the maxillary first molar of 1.2 mm and eruption of 2.5 mm. The maxillary second molar erupted toward the occlusal plane in both groups, but in the headgear group, on average, the eruption was slowed down 46% compared to that of the control group. In the headgear group, average distal displacement of the maxillary second molar was 2.8 mm, while in the control group, there was no distal movement of the second molar. At the end of phase II, a visual review of records suggested that changes in second molar position were temporary, because all second molars had erupted in both groups.

**Conclusions:** Headgear therapy has a distalizing effect on the maxillary second molar, and it also impedes the molar's eruption during the time the headgear is being worn. However, after headgear is discontinued, maxillary second molars continue to erupt normally.

**Reviewer's Comments:** During my career, I have used a considerable amount of headgear to treat early Class II malocclusions. I have found similar results, with displacement of maxillary second molars during treatment. However, it has also been my experience that these changes were transient, and that eruption of second molars was not affected by headgear treatment long term. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Headgear, Eruption Pattern, Maxillary Second Molars

Print Tag: Refer to original journal article
Choose Appliance Design Based on Provider Preference, Patient Comfort

A Randomized Clinical Trial to Compare the Goshgarian and Nance Palatal Arch.

Stivaros N, Lowe C, et al:


During leveling and aligning, the Goshgarian and Nance palatal arches showed similar ability to control upper molar position and prevent rotation and tipping.

**Background:** Transpalatal arches (TPAs) are common adjuncts used with fixed orthodontic appliances. They have been advocated for molar derotation, anchorage control, minor molar expansion, and torquing molars. However, no previous randomized clinical trials have compared the effectiveness of various types of TPAs.

**Objective:** To compare the effectiveness of the Goshgarian palatal arch (standard TPA with adjustment loop) and the Nance appliance in prevention of mesial drift, distal tipping, and mesio-palatal rotation of the maxillary first molars.

**Design:** Randomized clinical trial.

**Participants:** 57 patients aged 10 to 17 years who required upper premolar extractions for comprehensive orthodontic treatment.

**Methods:** Patients were randomly allocated to the Goshgarian group (n=29) or the Nance group (n=28); 49 patients (86%) completed the trial, with no bias found in the dropouts. Pretreatment records were taken of each patient. A palatal arch was fit (Goshgarian or Nance), followed immediately by extraction of upper premolars and bonding of fixed appliances. Fixed appliances were a standard McLaughlin, Bennett, Trevisi prescription with a 0.022” slot size. Alignment and leveling were done by progression up to a 0.019” x 0.025” stainless steel wire. After 6 months, the palatal arch was removed. The tissue was allowed to heal for 1 week, then an alginate impression was taken. Models were scanned with a laser scanner to create digital models. Pretreatment and 6-month models were superimposed on the palatal rugae, and molar movements were measured.

**Results:** No significant differences were found between a Goshgarian arch or Nance appliance in the amount of mesial molar movement (0.98 ± 1.02 mm vs 0.72 ± 1.33 mm) or distal molar tipping. The Goshgarian arch rotated molars distally 4.5°, which was greater than the 2.0° of rotation by the Nance arch but likely not clinically significant. A 7-point Likert scale did find more discomfort in the Nance group.

**Conclusions:** Based on these results, no clinical advantage in prevention of mesial molar movement, distal tipping, or mesio-palatal rotation was found between a Nance and Goshgarian arch. The increased discomfort in the Nance group may be clinically relevant.

**Reviewer’s Comments:** It wasn’t surprising to me that these 2 appliances were found to perform much the same under these conditions. The molar position was studied only during leveling and aligning, not during space closure. In addition, the study was powered to detect a 2-mm difference in molar position, and molars changed <1 mm during this treatment phase. It appears the appliance design should be chosen based on provider preference and patient comfort rather than any difference in outcome. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Palatal Arch, Goshgarian, Nance, Clinical Trial

Print Tag: Refer to original journal article
During bimaxillary orthognathic surgery, the change in lip cant is about half that in occlusal cant when correcting maxillary asymmetry.

**Background:** A common treatment for patients with maxillary and mandibular facial asymmetry is to perform bimaxillary orthognathic surgery. These patients typically have a canted occlusal plane. Surgery involves impaction of the maxilla on one side to level the occlusal plane, followed by shortening of the ramus of the mandible to re-establish the mandibular occlusal plane. However, what happens to the lip cant when this surgery is performed?

**Objective:** To compare the change in lip cant compared to occlusal cant change following bimaxillary orthognathic surgery for facial asymmetry.

**Design/Methods:** Retrospective analysis of 25 adult subjects who had undergone bimaxillary surgery to correct facial asymmetry. Pretreatment and posttreatment photographs and anteroposterior radiographs were available. The authors measured angular and linear changes in occlusal cant and lip cant before and after surgery.

**Results:** From both linear and angular perspectives, the amount of change in lip cant after surgery was about half the amount of change in occlusal cant.

**Conclusions:** Orthognathic surgery to correct occlusal cant of the maxilla produces only about 50% improvement in lip cant following surgery.

**Reviewer's Comments:** I was particularly interested in this study. I have experienced this problem. I have treated several patients who had significant skeletal asymmetries and, at the end of treatment, occlusal planes and skeletal problems had been eliminated; however, these patients still had a slight deformity or cant to the lips. This study confirmed that, even though skeletal changes are totally corrected, the amount of lip change is about half that of skeletal change. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Lip Cant

Print Tag: Refer to original journal article
If you are going to have a coaching session with your staff members to help them improve performance, it is important to start on a positive note.

**Background:** The success of your practice depends to a great extent on the performance of your staff members. If you want to improve the performance of individual staff members, it is important to know how to coach them.

**Objective:** To present specific recommendations for coaching staff members to help improve their performance. **Discussion:** If you are going to have a successful orthodontic practice, you will need to have a staff that works together as a team and maximizes their individual performance capabilities. In this article, the author presents 5 recommendations to follow when you coach staff members to improve their performance: (1) Always set goals for your team members, which starts with having them be better informed. (2) In meeting with staff members, start on a positive note. It's hard to believe that any staff member is not doing something right, and by initially discussing one of their strengths rather than criticizing them, you increase the likelihood that they will respond positively to your suggestions. (3) It is also important to empower team members to solve challenges: instead of telling them what they’re doing wrong and how to fix it, you should discuss the problem with them and encourage them to find their own solution. If you can do this, your staff members will be solving problems on their own and will not require your individual input each time a problem arises. (4) Don’t be so quick to criticize your employees, which can lead to resentful feelings toward you and does not produce the desired result. Focus on and offer suggestions for solving any future challenges. (5) Be honest with your staff members. Most staff members would rather be told honestly about their performance and what needs to be done rather than have you sugarcoat your comments, thinking that this approach will maintain a harmonious environment.

**Conclusions:** Guiding staff members in a positive helpful manner is the best way to build a long-term highly satisfied office team.

**Reviewer’s Comments:** I found this article to be very practical. I think many orthodontists, myself included, have a tendency to avoid discussing difficult individual problems with staff members. If you follow the suggestions presented in this article, you should be able to address concerns with your staff members in a manner that makes them comfortable and that increases the likelihood of improving their performance, which is so important for your practice. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Coaching Staff Members, Improved Performance

Print Tag: Refer to original journal article
This article describes a systematic method for reviewing cone-beam CT images in orthodontics and presents a template for displaying select images to patients and referring dentists.

**Background:** Cone-beam CT (CBCT) has become increasingly used since its introduction to dentistry in 1998. The ability to create undistorted 3-dimensional images can improve diagnostic information, yet no standardized methods for displaying and reviewing these images in orthodontics have been adopted.

**Objective:** To propose a system for reviewing CBCT volumes and a simple template that can be printed for referring doctors and patients.

**Methods:** Typical CBCT scans take between 4.8 seconds and 26.9 seconds, depending on the specific machine and field of view. Including time to position the patient, about 1 minute is needed to acquire an image. Next, a technician can create standard template images in Dolphin 3D, taking about 6 minutes. This template includes a panoramic view, lateral cephalometric view, frontal cephalometric view, airway view, sagittal slice, coronal slice, axial slice, and temporomandibular joint views. Finally, the orthodontist reviews the images, requiring only about 2 minutes for a routine case. The CBCT panoramic image typically has some vertical incisor overlap, but this allows imaging of the condyles in maximum intercuspation. Cephalometric views can be traced to compare with 2-dimensional norms. Slices in 3 planes of space can be used to evaluate tip, torque, amount of available alveolar bone, and any pathology. For new patients, all sagittal, coronal, and axial slices are quickly reviewed for pathology, which is reportedly present in 21% of cases. Having an oral and maxillofacial radiologist examine complex cases may be cost-effective.

**Conclusions:** The authors present a standard system of viewing CBCT images as well as a standard template to print a diagnostic summary. Although they admit future research still needs to examine exactly which diagnostic images are required, these techniques can provide a good initial system for viewing CBCTs at a typical orthodontic office.

**Reviewer's Comments:** While there is no solid research on an optimal method for reviewing CBCT images for orthodontic purposes, this technique appears to be a good place to start. For further information on what each image typically includes, reference the full article. A printed, systematic template may be good for distributions to other doctors and for case presentations, but images will likely be too small for much diagnostic value, since the authors print the entire template on a letter-size sheet of paper. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: CBCT, treatment planning, imaging

Print Tag: Refer to original journal article
Conventional orthodontic brackets produce more rapid canine retraction than do self-ligating brackets in first premolar extraction cases.

**Background:** In recent years, self-ligating brackets have become more popular. Advertisers claim that tooth movement occurs more rapidly with self-ligating brackets due to reduced friction. What effect do self-ligating brackets have on closure of extraction spaces, specifically with retraction of maxillary canines?

**Objective:** To compare clinically, using a split-mouth design, self-ligating brackets and conventional brackets during canine retraction to close maxillary first premolar extraction spaces.

**Design/Methods:** Prospective clinical trial comparing 2 self-ligating brackets (Damon3 and SmartClip) with conventional brackets. The total sample consisted of 43 patients. Maxillary first premolars were extracted. On one side, either the SmartClip or Damon3 bracket was placed. On the opposite side in each subject, a conventional bracket was used. Canines were retracted using a nickel-titanium spring that delivered 150 g of force. Average rate of tooth movement was measured and calibrated at 20-day intervals during the entire space closure.

**Results:** The rate of canine retraction for a 28-day period was 1.17 mm for the conventional bracket, 0.9 mm for the Damon3 bracket, and 1.10 mm for the SmartClip bracket. The authors analyzed the data and found that the differences were statistically significant; however, the differences are probably not clinically significant.

**Conclusions:** Self-ligating brackets do not increase the rate of canine retraction compared to conventional brackets.

**Reviewer’s Comments:** I appreciated the last paragraph of the discussion of this paper. The authors stated that, even though there was a statistically significant difference with the conventional bracket producing more rapid canine retraction, these differences were probably not clinically significant since they were only two- and three-tenths of a millimeter. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Self-Ligating vs Conventional Brackets

Print Tag: Refer to original journal article
Sutural Density Appears Similar Pre-, Post-RME

*Modifications of Midpalatal Sutural Density Induced by Rapid Maxillary Expansion: A Low-Dose Computed-Tomography Evaluation.*

Franchi L, Baccetti T, et al:


The density of the bone in the mid-palatal suture decreases as the suture extends posteriorly, which could help to explain the greater anterior expansion achieved with rapid maxillary expansion.

**Background:** What happens to the density of the mid-palatal suture as the result of rapid maxillary expansion (RME)? At 6 months post-active retention after RME, is the bone density of the mid-palatal bone suture back to normal? These are questions you should be able to answer if you are routinely using RME for patients with constricted maxillas.

**Objective:** To evaluate treatment and posttreatment changes produced by RME in the density of the mid-palatal suture.

**Participants:** 17 prepubertal patients who underwent RME.

**Methods:** Multi-slice low-dose CT scans were taken on each patient prior to initiation of RME, at the end of active expansion, and 6 months post-expansion. Expanders were activated 2 times a day for 14 days, for a total expansion of 7 mm.

**Results:** The density of the mid-palatal suture was less than that of the maxillary bone. The density of the anterior part of the mid-palatal suture was less than the posterior part, which could help to explain the greater opening that occurred anteriorly during active expansion. The density of the mid-palatal suture was greatly decreased after active expansion but returned to normal at 6 months post-retention.

**Conclusions:** The density of the mid-palatal suture significantly decreases after active expansion but returns to normal at 6 months post-retention.

**Reviewer’s Comments:** Low-dose CT scans have previously been used to evaluate bone density for placement of implants. I believe we will be seeing an increasing number of studies similar to this one that expand on use of low-dose CT to measure other areas of bone density. While this study confirmed that 6 months of retention following active expansion was enough time to let the mid-palatal suture return to normal, due to the protocol of this study, it was not possible to know if a shorter period of post-retention would have been sufficient. Until future studies indicate otherwise, it's probably best to play safe and leave the expander passive for 6 months. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Mid-Palatal Sutural Density, Rapid Maxillary Expansion

Print Tag: Refer to original journal article
**Background:** Many different retention protocols are advocated by orthodontists. Typically, clinicians will follow their patients for at least 1 year after treatment, since research has shown gingival fiber remodeling to take 4 to 6 months and periodontal fiber remodeling to last at least 262 days. Few prospective trials have compared full-time retainer wear with immediate part-time wear.

**Objective:** To compare the stability of immediate nighttime retainer use for 12 months with full-time retainer use for 6 months followed by 6 months of nighttime wear.

**Design:** Randomized clinical trial.

**Participants:** 67 consecutive patients finished by 1 clinician in Manchester, U.K. were evaluated. Patients were aged 10 to 16 years, began with anterior crowding, and finished with clinically acceptable alignment.

**Methods:** Subjects were randomly allocated to 1 of 2 retention groups. Both groups received the same type of Hawley retainers. Maxillary retainers had Adams' clasps on the first molars with a soldered labial bow, including labial acrylic on the incisors. Mandibular retainers were similar, except the labial bows just went from canine to canine. The full-time wear group was instructed to wear their retainers full-time for 6 months, followed by 6 months of nighttime wear. Meanwhile, the part-time group began immediately with nighttime wear for the 12-month period. Models were available prior to orthodontic treatment, following completion of treatment, and after 12 months of retention. A blinded examiner measured the irregularity index and incisor crowding in the maxillary and mandibular anterior region for all casts. Intra-examiner reliability was confirmed by re-measuring 20 casts.

**Results:** The irregularity index and incisor crowding significantly decreased during treatment, but showed a trend to increase during retention. Using t-tests, no significant differences were found in irregularity or crowding between the 2 different retention groups. The immediate nighttime wear group had more extraction cases, more males, and 1 mm less initial crowding prior to orthodontic treatment. Therefore, ideal statistical equivalence was not present at baseline, but the cases were clinically equivalent prior to the start of retention.

**Conclusions:** Immediate nighttime wear with Hawley retainers may be as effective in maintaining alignment as a period of full-time wear followed by nighttime wear.

**Reviewer's Comments:** This is the second study I have reviewed in the last several months that showed no difference with immediate part-time retainer wear -- the other study used vacuum-formed retainers. One important characteristic of the retainers that should be emphasized is the placement of acrylic over the labial bow to engage the incisors. This is not the typical Hawley retainer I see and this difference could improve the effectiveness of part-time wear. I am advising caution in applying this result to your practice if you use a different design of Hawley retainer. (Reviewer-Brent E. Larson, DDS, MS).

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**Keywords:** Retention, Hawley, Retainer Wear, Effectiveness, Clinical Trial

**Print Tag:** Refer to original journal article
Orthodontists can better treat children with genetic syndromes if they understand the quality of life issues that are involved in living with these conditions, and also understand the individual strengths these children may exhibit.

**Background:** Velocardiofacial syndrome (VCFS), also known as DiGeorge syndrome, is a genetic disorder with associated craniofacial findings including cleft palate and velopharyngeal insufficiency. VCFS has a prevalence of approximately 1 in 4000 live births, and is caused by a microdeletion of chromosome 22q11.2. In addition to the palatal clefting, this syndrome is also associated with congenital heart defects, hypocalcemia, immune deficiency, and characteristic facial features. While physical and cognitive effects of this disease have been well researched, the impact on quality of life (QoL) has not been studied.

**Objective:** To determine the effect VCFS has on QoL and to compare these patients with healthy and chronically ill children.

**Design:** Cross-sectional survey.

**Participants:** Parents of 45 children with VCFS who were recruited by mailing, brochures or an online website were included. The children were aged 2 to 18 years, with an equal gender distribution (51% male); 91% of children were Caucasian.

**Methods:** A single compiled survey was sent to each household to assess function, fatigue, and strengths. The PedsQL™ 4.0 Generic Core Scales, a reliable 23-item measure with a 5-point Likert-type scale, was used to determine QoL related to function. The PedsQL Multidimensional Fatigue Scale, an 18-item measure, was used to assess fatigue. Finally, a list of 18 character strengths was given to the parent to describe positive attributes possessed by the child. Results were compared with published norms for healthy and chronically ill children.

**Results:** QoL scores for children with VCFS were low, especially for school functioning and cognitive fatigue. Boys scored significantly lower for both functioning and fatigue, especially for 'paying attention in class' and 'keeping up with schoolwork.' Compared to published norms, the QoL in children with VCFS was significantly lower in all areas compared to healthy children. Compared to chronically ill children, emotional, social, and school functioning scores were lower, but not physical health scores. The most commonly listed strengths were humor (80%), caring (78%), kindness (76%), persistence (62%), and enthusiasm (58%).

**Conclusions:** Children with VCFS have significantly lower quality of life scores when compared to normal children, but do possess strengths to cope with these challenges.

**Reviewer’s Comments:** Due to cognitive challenges, especially limitation in attention and remembering details, orthodontic treatment for children with VCFS should attempt to minimize the need for patient compliance. Understanding potential strengths, such as humor, can improve interaction during procedures and make orthodontic treatment more positive. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Velocardiofacial Syndrome, Quality of Life, Cleft Palate

Print Tag: Refer to original journal article
Better Superimposition Method for 2D, 3D Images?

Novel Information Theory Based Method for Superimposition of Lateral Head Radiographs and Cone Beam Computed Tomography Images.

Jacquet W, Nyssen E, et al:

Dentomaxillofac Radiol 2010; 39 (May): 191-198

A semi-automated method of superimposition is described that may help orthodontists better understand growth and treatment effects when using digital images.

**Background:** Tracing lateral cephalometric radiographs for comparison with normal values or for superimposition is currently labor intensive. Additionally, there is variability in landmark identification by a single practitioner and especially between practitioners. Methods to automate landmark identification are still too variable for clinical use, but methods to directly superimpose images based on gray-scale values (either pixel- or voxel-based) have been attempted. However, they have a couple of problems. First, artifacts or distortion can alter the gray-scale distribution within an image, making a direct correlation difficult. Mutual information (MI)-based superimposition, a mathematical technique borrowed from communication technology, is more robust dealing with variations in gray-scale distribution. Secondly, these techniques superimpose the whole image, so previous superimpositions with MI have needed to define a region of interest (ROI), superimpose the ROI, and then apply it back to the whole image. However, focal mutual information (FMI) alignment criterion allows identifying focal points of interest and superimposing more efficiently.

**Objective:** To introduce FMI as a method for lateral cephalometric and cone beam computed tomography (CBCT) superimposition.

**Methods:** A series of periapical radiographs were taken on a human mandible phantom at different angles (-4.0° to 4.0° in 0.5° steps) both before and after the second premolar was displaced mesially. Superimposition was done with both a ROI approach and an FMI approach. Additionally, 2 consecutive lateral cephalograms (before and after treatment with a twin block appliance) were superimposed with FMI. Four focal points were chosen in the cranial base, maxilla, and mandible so that 3 separate superimpositions could be performed. Finally, 2 consecutive CBCT images (before and after mandibular surgery) were superimposed with an FMI approach using 3 focal points in the mandible.

**Results:** FMI outperformed the ROI approach in 15 of 17 periapical superimpositions, with FMI showing better overall alignment. Accurate superimpositions were generated for the lateral cephalograms and CBCT images, showing treatment effects clearly.

**Conclusions:** While still in its early application, FMI may eventually provide an easy, quick method of superimposing cephalograms or CBCT images. Several points of interest for defining the region of superimposition may need to be manually located, but still allow for a dramatic reduction in time to superimpose images.

**Reviewer's Comments:** This is an interesting approach to superimposition that looks very promising for the future. A semi-automated approach would not only save time but also reduce potential practitioner bias in superimposition, revealing more objective growth and treatment changes. Some sort of new development is needed to improve the use of superimpositions in the digital age. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Cephalometrics, Superimposition, Cone Beam CT

Print Tag: Refer to original journal article
Effectiveness of Orthodontic Intervention in Providing Acceptable Occlusion


Pietilä I, Pietilä T, et al:

Eur J Orthod 2010; 32 (April): 186-192

In Finland, a study of adolescents showed that acceptable occlusion occurred more frequently in those that did not have a history of orthodontic treatment.

Background: Despite many debates, controversies still exist in orthodontics regarding the benefits of early treatment versus late treatment. While some good studies exist on the effectiveness of early and late treatment, few studies have evaluated the effectiveness and efficiency of these methods in publicly funded programs. Evaluation of publicly funded orthodontic care, such as in Finland, require cohorts of untreated and treated individuals to evaluate not only the effectiveness of treatment, but the proper identification and treatment of those that can benefit most from limited resources.

Objective: To determine the acceptability of occlusion in 8 Finnish municipal health centers and to compare treated and untreated individuals in early and late treatment centers.

Design: Cross-sectional study.

Participants: 1109 of Finnish adolescents aged 16 and 18 years (n=2325) participated in the study.

Methods: Letters were mailed to invited participants with a scheduled exam time, with a number to call to reschedule or cancel. Two blinded, calibrated orthodontists used the Occlusal Morphology and Function Index to determine the acceptability of the occlusion, both in terms of morphology and function. The centers were separated into an early timing group (3 centers, average treatment age of 8.0 years) and a late timing group (5 centers, average treatment age of 10.7 years).

Results: The proportion of acceptable occlusions was slightly higher in the early treatment group compared to the late treatment group. Between 42% and 72% of subjects at each health center had acceptable morphology, with unfavorable canine relation and excessive overbite being the most common problems. In terms of function, between 46% and 72% was acceptable, with disturbances in protrusion and lateral excursion being most common. A history of orthodontic treatment decreased the odds of acceptable occlusion, likely because more significant malocclusions received treatment. Interestingly, centers that treated early had a higher proportion of acceptable occlusions, but they also had resources to accept 65% to 74% of cases compared to 23% to 50% for those centers that treated later.

Conclusions: Only minor differences were found between Finnish municipal health centers that treated early compared to those that treated late, with a slightly higher proportion of acceptable occlusions found in the early treatment group.

Reviewer’s Comments: It is difficult to draw any conclusions from this report since those patients that received treatment were very different from those that did not. Presumably those who did not receive treatment were those who did not have significant malocclusions, so it is not surprising that the untreated group would have better occlusal outcomes. Also, occlusion is only one outcome measure among many that may be important for orthodontics. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Occlusion, Treatment Outcome, Early Treatment

Print Tag: Refer to original journal article
Alveolar cleft grafting prior to permanent incisor eruption takes less time with fewer complications compared to grafting when the maxillary canine root is half developed.

**Background:** The most common timing for alveolar cleft grafting is recommended to be between the ages of 9 and 11 years. At this time, the maxillary canine root is one half to two thirds developed, and will predictably erupt into the grafted bone to help establish and maintain the alveolus. However, some researchers recommend earlier grafting prior to eruption of the permanent maxillary central incisors. Are there any advantages to grafting earlier?

**Objective:** To compare early versus late grafting of the alveolar cleft in children.

**Design:** This was a retrospective evaluation of 2 groups of individuals. In 1 group, grafting of the alveolar cleft was performed at age 6 to 8 years, prior to eruption of the maxillary permanent central incisors. There were 61 subjects in this group. In the second group, 38 subjects had their alveolar cleft graft performed at age ≥9 years.

The authors compared the operative time, length of hospitalization, follow-up time, and complications between these 2 groups.

**Results:** The results of this study showed that the average operative time for group 1 was 86 minutes, and for group 2 was 103 minutes. When the postoperative complications of the 2 groups were compared, only minor complications were associated with the procedure in either group. In both groups, about 10% of the subjects developed minor postoperative complications. In addition, no statistically significant differences were found between groups 1 and 2 relative to hospital stay, length of follow-up, or complication rate.

**Conclusions:** It may be more advantageous to perform alveolar cleft grafting at a younger age in order to take advantage of eruption of both incisors and canines in helping to develop and maintain the alveolus and close the cleft.

**Reviewer's Comments:** I have served on a cleft palate review team for many years. I was surprised by this study. In the past, I have typically recommended grafting between 9 and 11 years based on maxillary canine root development. The authors of this study make some good points. It could be more advantageous to the patient to perform this surgery a bit earlier; however, these authors did not follow these patients long-term. I wonder if there will be any differences in the quality and amount of bone and soft tissue around the maxillary teeth once they have monitored these patients for a significant length of time. I am not changing my timing of doing grafting until I see the impact of the esthetics and periodontal implications between early and late grafting. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Alveolar Cleft Grafting, Timing

Print Tag: Refer to original journal article
About a third of the orthodontic patients in this study had impacted third molars, but few had any pathologic changes associated with the impaction.

**Background:** A common decision that must be made after orthodontic treatment of adolescents is the future disposition of the maxillary and mandibular third molars. Should they be extracted? Should they remain? Will they erupt?

**Objective:** To investigate the frequency of agenesis, impaction, angular position, and related pathologic changes of third molars in a group of orthodontic patients.

**Design/Methods:** This was a retrospective evaluation of the panoramic radiographs of 351 orthodontic patients aged 20 to 26 years. The descriptive characteristics of agenesis, impaction, angular position, and pathologic changes of the third molars were recorded.

**Results:** The results of this study showed that the frequency of maxillary third molar impaction was 43.2%, and the frequency of mandibular third molar impaction was 56.8%. About 17% of the samples showed third molar agenesis. The frequency of mesioangular inclination of the third molars was about 50%. Only 10% of the impacted third molars showed any pathologic changes.

**Conclusions:** About a third of the orthodontic patients had impacted third molars, but few had any pathologic changes associated with the impaction.

**Reviewer’s Comments:** The findings from this study seem reasonable. After practicing for many years, I still ponder over whether or not to recommend extraction of third molars at the end of orthodontic treatment in adolescents. This study suggests that about a third of the third molars will be impacted. I recommend extraction of third molars in about a third of my patients, so perhaps this is reasonable. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Third Molars, Pathologic Changes, Impaction

Print Tag: Refer to original journal article
The long-term stability of orthopedic maxillary expansion and surgically assisted maxillary expansion is similar, with both experiencing about 50% skeletal and 30% dental relapse.

**Background:** Maxillary expansion is a common treatment for palatal constriction. At young ages, orthopedic expansion of the maxilla is possible. In adults, surgically assisted maxillary expansion is preferred. What is the long-term stability of these types of expansion?

**Objective:** To compare the stability of surgically assisted versus orthopedic expansion of the maxilla 3 years after retainers have been discontinued.

**Design/Methods:** This was a retrospective evaluation of maxillary expansion compared to control groups. One group consisted of 10 patients with an average age of 15 years who had been treated with orthopedic maxillary expansion. The second group consisted of 10 subjects who were aged 19 years and had been treated with surgically assisted maxillary expansion. The third group of 10 subjects had an average age of 15 years and was untreated, but had records taken over the time intervals of this study. Posteroanterior cephalometric radiographs and maxillary and mandibular dental casts were measured before expansion, immediately after expansion, and then 3 years later.

**Results:** The results of this study showed that in both surgically assisted and orthopedic expansion groups, there was a 50% decrease in skeletal maxillary transverse dimension after 3 years. When the dental casts were measured, both the surgical and orthopedic expansion groups showed a 30% decrease in transverse molar width after the follow-up period. The authors found that the skeletal relapse and dental relapse were similar between both the surgical and orthopedic expansion groups.

**Conclusions:** Neither surgical nor orthopedic expansion is absolutely stable long-term. Both skeletal and dental relapse occurs; however, a significant amount of the expansion is still maintained.

**Reviewer's Comments:** I appreciate the authors' candidness in illustrating that relapse is common in both surgically assisted and orthopedic maxillary expansion. However, I believe that the authors perhaps did not follow the subjects long enough. What happens after 5 years, or 10 years, to the transverse width? I believe that these patients should be followed even longer. Most other studies of expansion show that it is not a completely stable orthodontic or orthopedic change. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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**Keywords:** Palatal Expansion, Stability, Surgically Assisted vs Orthopedic Expansion
The positions of the incisors do not appear to be influenced by muscle activity in the upper lip at rest or during clenching, chewing, or swallowing.

**Background:** Some reports have suggested that the force exerted by the upper lip may influence the inclination of the upper incisors. Is this true?

**Objective:** To determine whether muscle activity in the upper lip, specifically the orbicularis oris muscle, is associated with the inclination of the upper and lower incisors, overjet, and overbite.

**Participants:** The sample for this study consisted of 45 subjects randomly selected from those with crowding, increased or decreased overjet or overbite, spacing, or flared or intruded incisors -- all of whom had applied for orthodontic treatment.

**Methods:** Cephalometric radiographs were used to measure overjet, overbite, and inclinations of the upper and lower incisors. Electromyographic (EMG) recordings were used to measure the muscle activity in the upper lip with the lips at rest, during maximal clenching, chewing of 2 hazel nuts, and swallowing of the 2 nuts. Statistical correlations were used to evaluate the relationship between upper lip muscle activity and incisor inclination, overbite, and overjet.

**Results:** There were no statistically significant associations between the EMG activities of the upper lip and the inclinations of the incisors, overjet, and overbite.

**Conclusions:** The positions of the incisors do not appear to be influenced by muscle activity in the upper lip at rest or during clenching, chewing, or swallowing.

**Reviewer's Comments:** I was somewhat surprised by the results of this study. I have seen a number of patients in the mixed dentition who had protrusive upper incisors due to a finger or thumb sucking habit. When the habit is removed the incisors usually move lingually due to pressure from the upper lip. I would have expected a different result here, possibly because this was an adult sample that had a large number of Class I malocclusions. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Incisors, Maxillary Lip Pressure

Print Tag: Refer to original journal article
Background: "Gray-market" or counterfeit dental products are being sold in the United States. How do you know that you are not using these products in your office?

Objective: To discuss the presence of "gray-market" or counterfeit dental products being sold in the United States. Discussion: "Gray-market" products include branded goods intended by the brand owner for one national market that instead are diverted and resold by unauthorized distributors to another market. These can include outdated products no longer registered in the United States with the FDA that are acquired in developing markets. Counterfeit products are simply fake materials being sold under the guise of a well-known product. These products do not ever originate from the brand owner. Using "gray-market" or counterfeit products can be harmful to your practice in a number of ways. First, they may not perform well, resulting in less satisfaction for your patients. Second, there is a legal liability associated with using a dental material that is not approved for sale in the United States or cannot be tracked back to its origin of sale. How can you keep these products from getting into your office? The first thing to do is schedule regular meetings with the staff person in your office who is in charge of purchasing and make this person aware that these products exist. There are a number of signs that may indicate that products are "gray-market" or counterfeit and include the following: an exceptionally low price, an unknown distributor name, suspicious packaging, and an expired expiration date. It is a good policy to purchase products only from authorized distributors and you can get a list of authorized distributors by calling the manufacturer or looking them up on the Internet. Authorized dealerships sometimes run sales promotions, but if a product you are planning to purchase is well below a fair market price, there's a good chance that it is either "gray-market" or counterfeit.

Conclusions: Potential problems for patients from inferior products can be far more costly than any discounted savings when purchasing them.

Reviewer's Comments: I was not aware that "gray-market" and counterfeit problems were being distributed and sold in the U.S. dental market. In addition to possible problems for your patients by using inferior products, there is also the problem of not having manufacturer or distributor support if something goes wrong with them. I thought this article presented some excellent suggestions on how to identify and avoid purchasing "gray-market" or counterfeit products and the bottom line is that if the cost savings seems too good to be true, beware. (Reviewer- John S. Casko, DDS, MS, PhD).

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Keywords: Gray-Market, Counterfeit Dental Products

Print Tag: Refer to original journal article
Maxillary Constriction Could Be Related to Changes in Cervical Vertebrae Morphology

Does a Transverse Maxillary Deficit Affect the Cervical Vertebrae? A Pilot Study.

Di Vece L, Faleri G, et al M:


Correcting maxillary transverse deficiencies may provide more widespread benefits than just achieving a good occlusion.

Background: Correcting transverse maxillary constriction is one of the more common things that orthodontists do. Is it possible that maxillary transverse deficiency can actually have an abnormal affect on the cervical vertebrae?

Objective: To analyze the morphology of the cervical vertebrae in subjects with transverse maxillary constriction.

Participants: 40 subjects undergoing palatal expansion to correct transverse maxillary constriction composed the study group, which was compared with a control group of 40 subjects without transverse maxillary constriction.

Methods: Lateral cephalometric radiographs were used to assess the cervical morphology for each of the subjects in the 2 groups. Round angles and concave vertebral body edges were classified as vertebral anomalies that could not be associated with physiologic vertebral growth. The anomalies in the 2 groups were compared statistically.

Results: The subjects in the study group who had maxillary constriction had a statistically higher percentage of vertebral defects than the control group. The most common defect found in the study group was rounding of the anterosuperior angle of the vertebral body. In the study group, most of the defects were found in C4 or C5.

Conclusions: There is a possible correlation between transverse maxillary constriction and morphologic anomalies of the cervical vertebrae.

Reviewer’s Comments: I must admit that I was surprised by the results of this study. It seemed a long stretch to me to have transverse maxillary constriction in any way related to anomalies of the cervical vertebrae. However, after realizing that changes in head posture and mouth breathing have previously been shown to have an effect on craniocervical angles, I felt that maybe the relationship of transverse maxillary constriction to anomalies of the cervical vertebrae was not that big a stretch. However, I should emphasize that this was a pilot study and consisted of only 40 patients in the study group. It would be interesting to see if these results hold up in a larger study and also to see what further changes occur in the long-term for the study group. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Transverse Maxillary Deficit, Cervical Vertebrae Changes

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