This study indicated that two-thirds of the surgically assisted rapid maxillary expansion cases examined did not have full palatal separation from the anterior nasal spine to the posterior nasal spine, but that expansion stopped or was reduced at the transverse palatine suture.

Background: Surgically assisted rapid maxillary expansion (SARME) is used for expansion in non-growing patients. CT examination provides an excellent tool to examine changes with SARME, yet few data have been published.

Objective: To classify types of openings in the midpalatal suture with SARME.

Design: Retrospective clinical study.

Participants: 70 adult patients (40 females, 30 males; age, 18 to 53 years) treated with SARME at the Federal University of São Paulo. All patients had >7 mm of maxillary transverse discrepancy, no history of trauma, and no craniofacial deformity.

Methods: Each patient received a helicoidal CT scan preoperatively and again immediately after orthopedic expansion. Patients received either a Hyrax appliance (n=41) or a Haas appliance (n=29) 1 week before surgery. The surgical procedure was a subtotal Le Fort I osteotomy with pterygomaxillary disjunction, and the expander was activated 1.6 mm at the time of surgery. Starting on the fourth postoperative day, patients were instructed to activate the expander twice daily (0.4 mm/day). Using the postoperative CT scan, midpalatal sutures were classified into 2 types: type I, complete opening from the anterior nasal spine to the posterior nasal spine; or type II, full opening from the anterior nasal spine to the transverse palatine suture, with partial or no opening posteriorly.

Results: All cases showed full correction of the maxillary transverse deficiency. A type I opening was found in 22 patients (31.5%), and a type II opening was found in 48 patients (68.5%). Five cases showed paramedian opening posterior to the transverse palatine suture. No statistical difference in classification was found between the Hyrax and Haas appliances.

Conclusions: SARME is an effective method for correction of maxillary transverse deficiencies in adult patients, but the midpalatal suture will often open only to the transverse palatine suture.

Reviewer’s Comments: From a clinician’s view, this study would indicate that the type of expander used for SARME is not a critical component of the outcome. The authors suggest that the variable expression of the expansion was likely due to the surgeon’s success at complete separation of the pterygoid plates. The possible clinical ramification would be if further research shows a difference in long-term stability with a type I versus type II sutural expansion. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Expansion, SARME, SARPE, Surgical

Print Tag: Refer to original journal article
Orofacial myofacial therapy can improve the long-term stability of anterior open bite closure.

**Background:** Anterior open bites are commonly accepted as one of the more difficult orthodontic problems to correct. Can orofacial myofunctional therapy improve the long-term stability of anterior open bite closure? This is important to know if you are going to help your patients.

**Objective:** To evaluate whether completion of an orofacial myofunctional therapy program before removal of orthodontic appliances decreases the risk of relapse of closed anterior open bites.

**Participants:** The sample for this study consisted of a control group of 49 patients who were referred for an orofacial myofunctional therapy examination after orthodontic relapse. The experimental group consisted of 27 subjects who had been referred for orofacial myofunctional therapy either before or during orthodontic treatment.

**Methods:** The 27 subjects in the experimental group were treated by orofacial myologists in one practice, which used a standardized approach to therapy. Four subjects in this group had relapsed after orthodontic treatment and been referred for myofunctional therapy. The other 23 subjects had no previous history of fixed orthodontic treatment. The amount and stability of open bite closure was re-evaluated an average of 6 years after orthodontic treatment. Ninety-six percent of the patients were measured a minimum of 2 years after their last orofacial myofunctional treatment visit.

**Results:** In the experimental group, 17 of the 27 subjects had no measurable relapse, 9 subjects had a 1-mm relapse, and 1 patient had a 4-mm relapse. Sixty-three percent of subjects in the experimental group had a 100% reduction in open bite. The control group had a 3.4 mm average amount of overbite relapse. The experimental group experienced clinically and statistically less open bite relapse.

**Conclusions:** Orofacial myofunctional therapy is effective in closing and maintaining closure of anterior dental open bites.

**Reviewer's Comments:** The results of this study were very impressive. Based on my experience, I have not had much confidence in orofacial myofunctional therapy for the treatment of open bites; however, based on the results of this study, I will have to re-evaluate my position. I was particularly impressed with the fact that 23 of the 27 subjects in the experimental group had no history of fixed orthodontic treatment and yet had significant and stable open bite closure. I would like to have seen the data on how many subjects had dental versus skeletal open bite as evidenced by the presence of relaxed lip contact in occlusion. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Myofunctional Therapy, Open Bite Closure, Effectiveness

Print Tag: Refer to original journal article
The best treatment for ceramic surfaces before bonding is hydrofluoric acid followed by a silane coupling agent.

**Background:** Orthodontists who treat adults encounter problems when bonding brackets to porcelain crowns. These surfaces must be prepared in a different way compared to enamel surfaces. There are several options for treating the surface before bonding. Which type of preparation provides the best shear bond strength?

**Objective:** To compare the shear bond strength of orthodontic composite resin bonded to porcelain disks prepared by 6 different surface treatments.

**Design:** This was a laboratory study.

**Methods:** A total of 36 circular specimens of feldspathic porcelain were prepared and divided into 6 groups. In group 1, no preparation of the porcelain disk was made (control group). In group 2, specimens were treated with a mixture of acidic primer and a silane coupling agent. In group 3, specimens were treated with 9.5% hydrofluoric acid for 60 seconds. In group 4, the surface was treated with hydrofluoric acid followed by a silane coupling agent. In group 5, the surface was treated with air-particle abrasion. In group 6, the surface was treated with air-particle abrasion followed by acid primer and a silane coupling agent. After these treatments, brackets were bonded to the teeth using a light-cured composite. After storage for 24 hours, the brackets were removed, and the shear bond strength was recorded.

**Results:** The greatest shear bond strength was achieved using hydrofluoric acid followed by a silane coupling agent. The lowest shear bond strength occurred in the control group, in which no surface preparation was performed.

**Conclusions:** The hydrofluoric acid and silane-treated group had the greatest shear bond strength and should be considered the gold standard in bonding brackets to porcelain.

**Reviewer's Comments:** It has been my experience that the use of hydrofluoric acid and a silane coupling agent provides excellent bonding to porcelain crowns. I treat many adult patients and have always had favorable results with this technique. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Ceramic Surface, Treatment

Print Tag: Refer to original journal article
The final lower arch dimensions and lower incisor inclination are very similar when using self-ligating or conventional brackets for the correction of crowding.

**Background:** Controversy remains regarding the use of self-ligating brackets and their mechanism of resolving crowding. Some experts have proposed that passive self-ligation allows for increased arch expansion while minimizing incisor proclination.

**Objective:** To examine lower arch differences between self-ligating and conventional brackets when used for the treatment of crowding.

**Design:** Prospective clinical trial.

**Participants:** 56 patients who had non-extraction treatment to resolve mandibular crowding. All patients were treated by a single clinician.

**Methods:** Patients were treated either with self-ligating brackets or conventional edgewise brackets. No significant differences in demographics or clinical characteristics were found between the 2 groups initially. Full records were taken before treatment and immediately after treatment. Intercanine and intermolar widths were measured on the casts to assess arch expansion, while incisor proclination was measured on the lateral cephalogram.

**Interventions:** The self-ligating group was treated with a version of Damon2, 0.022 inch brackets. The arch wire sequence was a 0.014 inch CuNiTi Damon wire, 0.014 x 0.025 inch CuNiTi Damon wire, and a 0.016 x 0.025 inch stainless steel wire adapted to the arch form created by the CuNiTi wires. The conventional group was treated with a 0.022 inch slot, Roth prescription bracket. The arch wire sequence was a 0.016 inch CuNiTi, a 0.020 inch medium Sentalloy, a 0.020 inch stainless steel, and a 0.018 x 0.025 inch stainless steel wire. All patients had first and second molars (when present) bonded.

**Results:** Both bracket systems showed an increase in intercanine width and incisor proclination, with no statistically significant differences. Both groups also showed an increase in intermolar width, with the self-ligating group increasing 1.4 mm more than the conventional group.

**Conclusions:** Self-ligating brackets did not show a reduction in incisor proclination after resolution of mandibular incisor crowding compared to conventional brackets. Intercanine width increase was similar between brackets, but slightly increased molar expansion was found with self-ligating brackets.

**Reviewer's Comments:** It was difficult to determine how treatment allocation was determined in this study. There was no mention of randomization, and it made me wonder if it was done, at least partially, after the fact. When comparing arch dimensions, it is hard to know whether the difference in molar width was related in any way to the self-ligating bracket or to the different arch wire progression and bracket prescription. The bottom line is that it is difficult to demonstrate any significant outcome differences between conventional and self-ligating brackets. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Self-Ligating, Arch Form, Crowding

Print Tag: Refer to original journal article
Depth and angulation of miniscrews have a significant effect on failure during force application.

**Background:** Today, miniscrews are a popular device for enhancing anchorage during orthodontic treatment. Many orthodontists place their own miniscrews. When a miniscrew is being placed, decisions must be made about depth of placement and angulation. Do these potential variables have any effect on stability or failure of the miniscrew?

**Objective:** To investigate insertion variables and their effect on temporary anchorage device stability. These variables included penetration depth, angle of insertion, and attachment head distance from the cortical plate.

**Design:** This was a laboratory study.

**Methods:** Synthetic bone was used in this research project; 330 implants from 3 companies (Ormco, Synthes, and Dentaurum) were used. Three variables were tested: penetration depth, angle of insertion, and attachment head distance from the cortical plate. A testing machine was used to determine the force required to create initial failure of the miniscrew.

**Results:** Insertion depth is a critical variable in implant stability. The greater the insertion depth, the greater the stability. The minimum insertion depth should be 8 mm. The angle of the implant is important in stability. Implants placed perpendicular to the cortical plate had lower failure rates than those placed at 45° angles. The distance from the head of the mini-implant to the cortical plate was critical in implant stability. The closer the head of the implant to the cortical plate, the lower the failure rate.

**Conclusions:** Penetration depth, angle of insertion, and attachment head distance from the cortical plate are important variables in the stability of implant placement.

**Reviewer's Comments:** I like this study. The authors have clearly shown that these 3 variables are important in implant stability. Unfortunately, this study was performed in a laboratory. The bone substitute that was used was constant. In the oral cavity, this type of constant is not possible. It would be interesting to know whether this study, if duplicated in cadaver material, would produce the same results. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Temporary Anchorage Devices, Miniscrews

Print Tag: Refer to original journal article
Does an Emboss Filter Aid in Digital Cephalometric Landmark ID?

Leonardi RM, Giordano D, et al:
Eur J Orthod 2010; 32 (June): 242-247

In this study, the use of an emboss filter when identifying cephalometric landmarks did not improve accuracy and, in most instances, increased landmark location error.

**Background:** Currently, cephalometric landmarks are often identified on monitor-displayed digital images, allowing the use of image enhancement tools such as gamma correction, contrast manipulation, window and level selection, and embossing. In particular, an embossing tool creates shadows and highlights that correspond to the rate of color change on the original image, giving the appearance of 3D metal embossing. Despite the fact that the image has sharpened edges, little research has been done to examine the effectiveness of using the image emboss enhancement.

**Objective:** To compare the accuracy of cephalometric landmark identification on digital images with and without image emboss enhancement.

**Design:** 40 randomly selected cephalograms from the Department of Orthodontics at Catania University Hospital were randomly selected. Radiographs with obvious positioning errors or severe dentofacial deformities were excluded.

**Methods:** The radiographs were scanned at 300 dpi with 256 gray levels using an Epson scanner. Five orthodontic faculty members identified 22 landmarks on each radiograph in 2 different modes: an original image with no enhancements and an enhanced image using an embossing filter. Examiners were given one image at a time to trace and traced no more than 10 images in one session. A "best estimate" for each landmark was calculated from the mean x and y coordinates defined by the examiners. The mean error and standard deviation were then calculated.

**Results:** Mean errors were higher on the embossed images for all points except porion (although this increase was not statistically significant for 16 landmarks). When breaking down the x and y coordinates, the embossed image had no statistically significant increases in accuracy, and the majority of points showed increases in standard error. Although not significant, there was a slight increase in the accuracy of identifying orbitale on the x-axis and porion, protuberance menti, condylion, and anterior occlusal point on the y-axis.

**Conclusions:** Until more controlled methods of embossing are available, this enhancement feature shows no advantages for clinical or research applications.

**Reviewer's Comments:** This study did not include soft-tissue landmarks, which involves a specific time when the emboss filter is seen to be useful. The important point is that these various filters may appear to make landmarks more easily visible; however, in doing so, they may also systematically distort the landmark location. As always, it is best to capture and analyze an excellent image so that the use of image manipulation and filters can be minimized. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Cephalometrics, Digital, Accuracy

Print Tag: Refer to original journal article
Posterior vertical elastics can be used to close an open bite, if the etiology is dental versus skeletal.

**Background:** I have found the treatment of posterior open bites to be one of the most difficult orthodontic problems to treat. What is your philosophy for treating posterior open bites?

**Objective:** To discuss the treatment of patient with a posterior open bite. **Case Report:** An 18-year-old male patient had a posterior open bite. The patient had contact only in the incisor area and at the distal of the first molars, with a football-shaped opening in between. There was also a crossbite in the left posterior area. The patient was treated with orthodontics alone using cross bite and vertical elastics on the left side. The vertical elastics were placed after initial alignment of the arches and effectively closed the open bite. After the open bite was closed, rectangular arch wires were placed, and the vertical elastics were continued for an additional 5 months. At the end of active treatment, the patient received myofunctional therapy. Two-year records indicated that excellent results were achieved at the end of active treatment and that the cross bite correction and complete vertical closure were maintained.

**Conclusions:** Dental posterior open bites can effectively be closed with orthodontic treatment alone.

**Reviewer's Comments:** The long-term results achieved in this case were very impressive. Posterior open bites are one of the most difficult problems I treat and are especially difficult to maintain long term. The authors suggested that the etiology of the open bite was a tongue thrust; however, I believe the research clearly shows that tongue thrusts do not cause open bites and that the etiology was more likely a posterior resting tongue habit. If this were the case, maintaining the patient on vertical elastics for 5 months after correction of the open bite may have been a significant contribution to the long-term stability that was achieved. The myofunctional therapy after treatment may also have contributed. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Lateral Open Bite, Correction

Print Tag: Refer to original journal article
Panoramic radiographs can be used to determine the position of impacted maxillary canines with reasonable reliability.

**Background:** The most common radiograph taken before orthodontic treatment for most patients is a panoramic radiograph. Impacted maxillary canines are a common problem treated by orthodontists. The standard technique for determining the positioning of impacted maxillary canines requires the use of 2 periapical radiographs taken adjacent to one another. However, is it possible to diagnose the position of an impacted maxillary canine using a panoramic radiograph?

**Objective:** To evaluate the position of impacted maxillary canines in the alveolus using panoramic radiographs.

**Design/Participants:** This was a retrospective evaluation of the records of 102 patients with 130 impacted maxillary canines.

**Methods:** Initially, the authors evaluated the panoramic radiographs for each of these subjects. A horizontal line was drawn on the radiograph between the cusps of the maxillary first molars. Next, a line was drawn through the long axis of the impacted maxillary canine. The angle created by the intersection of these lines was measured in degrees. In the sample, there were 59 canines impacted labially and 71 impacted palatally. The authors compared the angulations of these 2 groups to determine the average angulation for palatal and labial impactions.

**Results:** In general, labially impacted canines were positioned more vertically, and palatally impacted canines were positioned more horizontally. The average angulation of labially impacted maxillary canines was 75.1°, and the average angulation of palatally impacted canines was 51.3 degrees. When the authors performed a logistic regression analysis, they found that impactions >65° were 26.6 times more likely to be positioned labially.

**Conclusions:** Panoramic radiographs are useful for predicting the location of impacted maxillary canines, and angulations >65° are usually associated with labially positioned maxillary canines.

**Reviewer’s Comments:** I liked this study. I have always utilized periapical radiographs to confirm my diagnosis of the position of maxillary canines. Today, cone beam radiography is becoming more popular, and obviously these scans can quickly diagnose the position of an impacted maxillary canine. However, the cost and increased radiation associated with cone beam radiographs is still an issue. This study has shown that, with reasonable accuracy, the angulation of an impacted canine can be used on a panoramic radiograph to identify the labiollngual location of the tooth. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Impacted Canines, Panoramic X-Rays

Print Tag: Refer to original journal article
Are RMGICs Strong Enough for Bonding Lingual Retainers?

Resin-Modified Glass Ionomer Cements for Bonding Orthodontic Retainers.

Baysal A, Uysal T:

Eur J Orthod 2010; 32 (June): 254-258

Although resin-modified glass ionomer cements may release fluoride and be moisture resistant, their strength is significantly less than conventional resins, making them questionable for use as lingual retainer bonding adhesives.

**Background:** Resin-modified glass ionomer cements (RMGICs) may have some advantages for bonding lingual retainers since they release fluoride and are more tolerant to moisture when bonding. To be useful, however, these cements must have adequate mechanical properties.

**Objective:** To evaluate the shear bond strength, fracture mode, and wire pull-out resistance for a traditional orthodontic composite and an RMGIC.

**Design:** In vitro laboratory study.

**Methods:** 40 freshly extracted human mandibular incisors were assigned to 2 groups for bonding with either Transbond-LR or Fuji Ortho-LC. Teeth were etched with 37% phosphoric acid gel for 15 seconds and rinsed for 30 seconds. The adhesive was formed in a cylindrical matrix and cured. For the composite samples, Transbond XT Primer was applied, and the Transbond-LR composite was placed and cured for 20 seconds. For the RMGIC samples, the enamel was moistened with cotton pellets, and Fuji Ortho-LC was applied and cured for 40 seconds. Samples were loaded in shear in a universal testing machine until failure, and fracture analysis was done at 20x magnification under an optical stereomicroscope. Failures were classified by the amount of resin remaining on the tooth surface. In a second part of the study, a 0.0215-inch multistranded PentaOne® wire was bonded into 40 acrylic blocks, 20 with each adhesive. The free ends of the wire were bent up and subjected to a tensile test on a universal testing machine.

**Results:** Shear bond strengths were 24.6 ± 9.2 MPa for the conventional composite and 10.2 ± 5.5 MPa for the RMGIC. Wire pull-out strengths were 19.8 ± 4.6 N for the conventional composite and 11.1 ± 5.7 N for the RMGIC. These differences were statistically significant. No differences were found in failure mechanism, which was typically either an adhesive failure or mixed failure.

**Conclusions:** RMGICs show inferior mechanical properties compared to conventional composites. However, RMGICs do offer other advantages (such as fluoride release and less moisture sensitivity), and the shear bond strength and wire pull-out strengths still may be sufficient for clinical use.

**Reviewer's Comments:** The advantages of using RMGICs for bonding lingual retainers (moisture tolerant and fluoride releasing) would be a plus if the strength of the materials were sufficient. This study indicates that there is too much sacrifice in strength when using an RMGIC to be comfortable with its regular clinical use. It may be useful to try an RMGIC in specific cases in which moisture control is nearly impossible or in individuals with low salivary output who may be more susceptible to demineralization. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Bonded Retainers, Adhesives, Resin-Modified Glass Ionomer

Print Tag: Refer to original journal article
When bonding teeth that are particularly susceptible to saliva contamination, the use of Transbond Plus self-etching primer can provide effective bond strengths.

**Background:** When attempting to bond teeth such as mandibular second molars, it is often very difficult to avoid saliva contamination of the bonding surfaces. Does using a self-etching primer reduce the likelihood that saliva contamination will have a negative effect on bond strength? This is something you should know.

**Objective:** To evaluate, in vivo, the effect of saliva contamination at different stages of the bonding procedure on the bond failure rate and the adhesive remaining on teeth after debonding brackets bonded with a hydrophilic self-etching primer (Transbond Plus self-etching primer [TSEP]).

**Participants:** The sample for this study consisted of 46 patients who required orthodontic treatment with fixed orthodontic appliances.

**Design/Methods:** This was an in vivo, prospective, controlled clinical trial in which a split-mouth design was used to assign patients to 1 of 2 experimental groups. One group had saliva contamination applied before placement of the TSEP. The second group had saliva contamination applied after placement of the self-etching primer before bonding metal brackets. The third group consisted of a control group that had brackets bonded to an uncontaminated surface. The number of first-time bond failures was recorded for each group during a minimum observation period of 6 months. The adhesive remnant index was also evaluated for each of the 3 groups.

**Results:** No significant difference was found in the number of bracket failures between the 3 groups. There was also no significant difference when the results of the adhesive remnant index were evaluated.

**Conclusions:** Saliva contamination either before or after application of a self-etching primer does not cause a significant increase in bond failures.

**Reviewer's Comments:** I believe most orthodontists will find these results very encouraging, particularly because this was an in vivo study as opposed to most trials in the past, which have been laboratory studies—many of which produced contradictory results. I believe that most orthodontists have been so deeply ingrained with the need to maintain an absolutely dry surface before bonding that the results of this study are almost hard to accept. The addition of hydrophilic monomers in self-etching primers is the primary reason that the negative effect of saliva contamination is reduced. It was also impressive that there was no difference in the pattern of bond failure among the 3 groups. (Reviewer- John S. Casko, DDS, MS, PhD).
Satisfaction with orthodontic results is related to the patient's perception of responsibility for retention and perceived stability of tooth position.

**Background:** As orthodontists, we want our patients to be happy after wearing orthodontic appliances. After all, patients can refer other individuals to our practices if they are pleased. Is satisfaction related to the stability of the result? Obviously, the stability of the result is related to retention. Who is primarily responsible for ensuring stability, the orthodontist or the patient?

**Objective:** To determine patients' opinions regarding responsibility for orthodontic retention, and to determine associations between patient attitudes toward retention and perceptions of treatment success.

**Design/Participants:** Retrospective survey of individuals who had had previous orthodontic therapy.

**Methods:** Surveys containing questions about satisfaction, retention, and perceived responsibility for retention were given to 555 participants. A total of 428 surveys were returned. The authors calculated the results of the survey based upon the questions that were asked.

**Results:** The results of this study showed that most respondents indicated that they were either satisfied or very satisfied with the alignment and fit of their teeth at the end of treatment and currently. Approximately 40% of the respondents reported a decrease in satisfaction since the end of treatment. Regarding responsibility for orthodontic retention, most individuals perceived that they themselves were responsible for maintaining the alignment of their teeth. Patients with invisible retainers were more likely to report that they were very satisfied compared to those with Hawley or permanently bonded retainers. Discontinuation of retainer use was significantly related to the type of retainer, with only 45% of those with Hawley retainers claiming to still wear them compared to 65% of those with invisible retainers and 68% of those with bonded retainers.

**Conclusions:** The authors conclude that there is a strong relationship between perception of stability of tooth position after treatment and current satisfaction.

**Reviewer's Comments:** This was a very large study, and the information was good. I was pleased to note that the satisfaction with treatment long-term was still perceived at a high level. I was even more pleased that patients regarded themselves as the responsible person for maintaining the alignment of teeth during retention. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Retention, Treatment Success, Patient Perception

Print Tag: Refer to original journal article
Expansion of Maxilla in Early Mixed Dentition Has Favorable Effect

Changes in Occlusal Relationships in Mixed Dentition Patients Treated With Rapid Maxillary Expansion: A Prospective Clinical Study.

McNamara JA Jr, Sigler LM, et al:

Angle Orthod 2010; 80 (March): 230-238

Rapid maxillary expansion has a significantly favorable effect on the sagittal occlusal relationship of teeth in the mixed dentition.

Background: It has been hypothesized that palatal expansion will produce alterations in the occlusal relationship of posterior teeth. However, to date, that hypothesis has not been tested.

Objective: To evaluate the hypothesis that expansion of the maxilla in the early mixed dentition followed by stabilization of the maxilla leads to improvement in sagittal molar relationships.

Design/Participants: Retrospective analysis of 500 patients who had been treated with palatal expansion.

Methods: The sample was divided into 3 groups: Class I (n=204); end-to-end (n=166); and Class II (n=130). All subjects were treated with a rapid palatal expansion device that was bonded to the teeth. After expansion, the teeth were stabilized with a transpalatal arch. Dental casts were made before treatment and after expansion. The relationship between maxillary and mandibular arches was compared before and after expansion in all 3 groups.

Results: A positive occlusal change was observed in 81% of the Class II patients, 69% of the end-to-end patients, and 58% of the Class I subjects. Forty-nine percent of the Class II patients, 29% of the end-to-end patients, and 23% of the Class I patients demonstrated an improvement in sagittal molar relationship of ≥2 mm. Less than 5% of corresponding control groups had a positive change ≥2 mm.

Conclusions: The authors conclude that expansion of the maxilla in the early mixed dentition has a favorable effect on the sagittal occlusal relationship of teeth.

Reviewer’s Comments: This is a very large sample that was followed quite closely by the authors. Although early treatment using palatal expansion is often debated, it is difficult to dispute the results in this study, which show that 1 positive effect of palatal expansion, besides widening the maxilla, is to produce an improved sagittal relationship of the teeth in both Class I and Class II subjects. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Palatal Expansion, Mixed Dentition, Occlusal Relationship

Print Tag: Refer to original journal article
Protraction Headgear -- When to Use It

Skeletal Changes of Maxillary Protraction Without Rapid Maxillary Expansion: A Comparison of the Primary and Mixed Dentition.

Lee D-Y, Kim E-S, et al:

Angle Orthod 2010; 80 (July): 692-698

Although the amount of skeletal change during protraction in the primary dentition is greater than in the mixed dentition, the amount of relapse is also greater, so that the overall change is equivalent in both groups.

Background: Although early treatment is de-emphasized today in orthodontics, a common problem that benefits from early treatment is maxillary hypoplasia. To treat this type of problem, a patient must wear a face mask to protract the maxilla. These appliances are difficult to wear as children get older. Therefore, it is ideal to use this appliance in the primary or mixed dentition. At which time frame would it be best to use the protraction device?

Objective: To determine the differences in treatment efficiency when using face mask therapy in the primary dentition compared to the mixed dentition.

Design/Participants: This retrospective analysis included 49 individuals who had Class III malocclusions due to maxillary hypoplasia.

Methods: All subjects were treated with protraction headgear using a face mask. The children were divided into 2 groups based upon their age and stage of dentition at the start of treatment. The primary dentition group had an average age of 6 years and consisted of 26 subjects. The mixed dentition group consisted of 23 subjects, with an average age of 8.4 years. Cephalometric radiographs were taken before treatment, at the end of treatment, and 1 year after the end of treatment. These were traced, analyzed, and compared.

Results: There was more significant change that occurred when a protraction face mask was used during the primary dentition. However, when the authors evaluated the subjects 1 year after discontinuing the protraction, the relapse tendency was greater in the primary dentition group compared to the mixed dentition group. As a result, when these 2 groups were compared at a later time, there were no differences in the end result.

Conclusions: The authors conclude that, although the amount of protraction in the primary dentition is greater, the relapse is also greater, so that it may be better to utilize a protraction headgear during the mixed dentition rather than the primary dentition.

Reviewer's Comments: This was an interesting study. I have used protraction face masks to correct maxillary hypoplasia in younger patients. I agree that it is much easier and patients are more cooperative; however, I have experienced the same problem. There is significant relapse if performed early on. My other concern is that perhaps there would be relapse in the mixed dentition group as well, if the sample were followed long enough. I look forward to further studies from this group that will perhaps follow these samples a bit longer. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Maxillary Protraction, Rapid Maxillary Expansion, Primary/Mixed Dentition

Print Tag: Refer to original journal article
Laser Radiation May Reduce Pain Associated With Tooth Movement

*Effects of CO2 Laser Irradiation of the Gingiva During Tooth Movement.*

Seiryu M, Deguchi T, et al:

J Dent Res 2010; 89 (May): 537-542

Laser radiation in animals reduces the response to tooth pain seen in the brain.

**Background:** A common consequence of orthodontic tooth movement is the pain that is perceived by the patient during the first few days after arch wire activation. Although in most patients this pain is minimal and does not require analgesics, in other patients, it can be more significant. Is it possible to reduce the pain by using a laser to irradiate the tissue in the area of the tooth movement?

**Objective:** To determine the early responses to nociceptive stimuli during tooth movement following laser irradiation. **Design/Subjects:** This animal experiment used 40 Wistar rats in this study.

**Methods:** The animals were divided into several groups. Besides a control group, 1 group had their mouth opened and kept open with a mouth prop. In another group, the mouth of the animal was opened, kept open, and an orthodontic elastic module was inserted between the first and second molars to simulate tooth movement. In subsequent groups, some of the animals had laser irradiation applied to the gingiva adjacent to the teeth where the orthodontic elastic modules were placed. Histology was then performed on the brain tissue to determine the presence of neurons that would indicate a painful or less than painful response.

**Results:** In the control group, low numbers of neurons indicating pain were observed. However, in the group where the tooth movement was performed, the number of neurons indicating a painful response increased significantly. In the group where laser irradiation was performed along with the tooth movement, the neurons indicating a painful response were reduced significantly.

**Conclusions:** The authors conclude that in their study, laser irradiation significantly reduced the number of neurons that produced a painful response 2 hours after tooth movement. In addition, the laser irradiation did not have an adverse effect on the periodontal tissue.

**Reviewer's Comments:** I have heard comments from those individuals who promote the use of lasers in dentistry, that there is a positive nociceptive effect when using a laser during tooth movement. Apparently, this study shows histologic evidence that, in fact, there is a reduction in the number of neurons that produce this painful response in animals. I look forward to further studies in this area to more clearly elucidate and confirm these effects in other samples. (Reviewer-Vincent G. Kokich, Sr, DDS, MSD).

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Keywords: Tooth Movement, Tooth Pain, Laser Radiation

Print Tag: Refer to original journal article
Lingual Appliances Reduce Risk of Caries and Decalcification

Caries Outcomes After Orthodontic Treatment With Fixed Appliances: Do Lingual Brackets Make a Difference?

van der Veen MH, Attin R, et al:

Eur J Oral Sci 2010; 118 (June): 298-303

A split-mouth study investigating the development of white spot lesions in subjects with labial and lingual appliances shows a much greater degree of decalcification associated with the labial appliances.

Background: Orthodontic appliances increase plaque retention and therefore place patients at increased risk for white spot lesions (WSLs). Due to surface morphology, salivary flow, and mechanical cleaning of the tongue, orthodontic appliances on lingual surfaces may be less prone to WSLs.

Objective: To examine differences in caries rate and WSLs between labial and lingual appliances.

Design: Randomized, split-mouth clinical trial.

Participants: 28 subjects from an orthodontic practice in Germany consented to participate. No cavitated lesions or smooth surface WSLs were visible at baseline.

Methods: Patients were randomly assigned to receive upper labial and lower lingual appliances or the reverse. Baseline examinations, including photographs and quantitative light-induced fluorescence (QLF) images, were done to assess for WSLs. Following treatment, photographs and QLF images were acquired again.

Results: The number of WSLs that developed was 4.8 times higher on labial surfaces. Using QLF, the integrated fluorescence loss was 10.6 times higher on labial surfaces. Although all patients appeared free of WSLs by clinical inspection at baseline, 8 of the 28 patients had white spots present, according to QLF. These 8 patients accounted for 65% of new lesions, while only 5 of the remaining 20 patients developed any WSLs.

Conclusions: Lingual braces offer an advantage in prevention of WSLs when compared to labial appliances. The use of QLF may identify patients at increased risk of developing visual WSLs during treatment.

Reviewer's Comments: This study demonstrates that lingual appliances can reduce the problem of WSLs during orthodontic treatment by reducing the development of lesions, as well as having lesions that do occur be less visible. An interesting finding was that QLF assessment before treatment was able to identify those subjects that developed the most WSLs during treatment. Perhaps pretreatment QLF assessment will become a standard part of our orthodontic work-up in the future. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Decalcification, White-Spot Lesions, Lingual Appliances

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In a study of temporomandibular disorder patients with osteoarthritis, a quantitative shape assessment of condylar surfaces using 3D imaging techniques was able to correlate patient's pain intensity with shape changes on specific condylar surfaces.

**Background:** Disorders involving the temporomandibular joint (TMJ) affect approximately 10% of the population and may lead to pain and functional impairment. Diagnosis of these disorders can be difficult, but advances in analysis of computerized tomography (CT) images may prove helpful.

**Objective:** To examine the variation in condylar morphology between osteoarthritic and asymptomatic joints and to correlate this variation with TMJ pain intensity and duration.

**Design:** Retrospective, cross-sectional clinical study.

**Participants:** 29 female patients with symptomatic TMJ osteoarthritis; 36 asymptomatic female patients were used as controls.

**Methods:** Cone-beam CT (CBCT) images were taken on all patients. A 3D surface-mapping technique known as shape correspondence was used to localize and quantify condylar morphology. Surface models of the condyles were also inspected for morphological changes, such as erosions, osteophytes, and flattening. Patients reported their overall pain duration since onset of symptoms and their average pain intensity over the last month on a scale of 0 to 10.

**Results:** Condylar morphology of patients with TMJ osteoarthritis was significantly different than asymptomatic condyles, as measured by shape correspondence. In addition, all osteoarthritis patients showed either flattening or surface irregularities of the condyles, but only 15% of asymptomatic patients showed flattening. Using a global morphologic score for the entire condyle, there was not a significant correlation with pain intensity, but a significant correlation was found with specific condylar surfaces.

**Conclusions:** Shape correspondence may become an important tool for objectively measuring morphological changes in the TMJ. Using this technique, significant differences can be found between osteoarthritic and asymptomatic joints.

**Reviewer's Comments:** Tools to improve the management of TMJ disorders are important, especially if they can help the diagnosis and treatment of patients with temporomandibular disorder (TMD) or help predict which patients will be susceptible to severe condylar resorption. Further automation of the segmentation process may make shape quantification a routine measurement for initial assessment of all orthodontic patients and for disease monitoring in those with TMD. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: CBCT, Condyle, TMJ

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This case report demonstrates a technique to maximize distal segment rotation in a Class II skeletal patient undergoing mandibular advancement and does not need additional chin projection.

**Background:** Correction of severe Class II skeletal malocclusions can be difficult, especially in adults. If the problem is severe enough or esthetics are a concern, a combined orthodontic and orthognathic surgery approach may be indicated. When an anterior deep bite and prominent chin are also present, presurgical orthodontics often involves maintaining the curve of Spee. This allows for a greater increase in face height during mandibular advancement, and the clockwise rotation required to bring the molars into occlusion decreases the chin prominence. Maximizing this rotation may avoid the need for a genial reduction, which can be unaesthetic.

**Objective:** To describe a method of maximizing clockwise rotation of the mandible during a bilateral sagittal split osteotomy (BSSO).

**Methods:** The authors suggest that during presurgical orthodontics, molar teeth that will occlude immediately postoperatively are bonded with composite (bite blocks). They recommend a full etch, a light-cured bonding agent, and a composite resin. Mandibular molars are typically the first choice, although maxillary molars may be used. Additional composite may be added as necessary. These composite onlays are removed during surgery by a boney rongeur and finished with a green stone bur, if needed.

**Results:** One case report is presented showing good correction of the dental malocclusion while also decreasing the chin prominence.

**Conclusions:** Posterior composite onlays, along with presurgical maintenance of the curve of Spee, may help avoid bimaxillary surgery or a genial reduction in patients with a skeletal Class II deep bite malocclusion and a prominent chin.

**Reviewer’s Comments:** It is common procedure to avoid leveling the curve of Spee in Class II deep bite subjects prior to surgery so that the distal segment rotation expresses the mandibular advancement as a face height increase rather than additional chin projection. This article takes the process 1 step further by attempting to intrude posterior teeth to further enhance the rotation. There are currently no data to suggest that this addition helps with the outcome, but minimizing posterior dental height could potentially be of some benefit. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Orthognathic Surgery, Deep Bite, Class II, Mandible, Chin

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Modified RME Appliances Effective for Maxillary Expansion in Early Mixed Dentition

Comparison of a Modified RME Appliance With Other Appliances for Transverse Maxillary Expansion.

Weyrich C, Noss M, Lisson JA:

J Orofac Orthop 2010; 71 (July): 265-272

Because different types of appliances can be equally effective in expanding the maxillary dentition, the choice of appliance can be based on the patient's specific needs or the orthodontist's preference.

**Background:** For patients in the early mixed dentition with a unilateral posterior crossbite and a functional shift, bilateral expansion of the maxillary dentition is usually indicated. Does it make any difference what type of appliance you use to achieve this expansion?

**Objective:** To compare the effectiveness of 2 different types of fixed appliances and 1 removable appliance for expanding the maxillary dentition in the early mixed dentition stage.

**Participants:** 40 patients in the early mixed dentition.

**Methods:** 20 patients were treated with a modified rapid maxillary expansion (RME) appliance, 10 patients were treated with a removable split-plate appliance, and 10 patients were treated with a Hyrax-type rapid palatal expander fixed to the first permanent molars. Dental casts were used to evaluate the changes produced by each appliance at the end of activation. Differences were statistically analyzed.

**Results:** There were no significant differences between the modified RME appliance and the RME appliance with shortened arms. Compared to the split-plate appliance, the modified RME achieved significantly greater anterior arch width expansion. At the end of the retention phase, the 3 appliances achieved essentially similar results, although the split-plate expansion appliance required significantly greater time to achieve the expansion, when compared with the other 2 appliances.

**Conclusions:** Different types of expansion appliances can be equally effective in expanding the maxillary arch in the early mixed dentition stage.

**Reviewer's Comments:** Because of the lack of eruption of the maxillary first premolars in the early mixed dentition, it is not possible to place a traditional RME appliance anchored by both the first premolars and the first molars. In this situation, I believe most orthodontists would use either a modified RME appliance banded to first molars, with arms extending anteriorly on the lingual surfaces of the primary dentition, or a removable split-plate type of appliance. It was interesting to note that there was no significant difference in the overall results achieved by each of these appliances. A split-plate appliance can be more easily fabricated and requires less chair time to place; however, the trade-off is that it will take a longer time to achieve expansion with the split-plate appliance. Individual patient circumstances or an orthodontist's preference can be used to choose the specific type of appliance. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: RME Appliance, Transverse Maxillary Expansion, Dental Arch Width

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There will be a shortage of orthodontic residents pursuing academic careers because most plan to enter private practice, with little time dedicated to research.

**Background:** The future of orthodontics in the United States will be greatly influenced by the motivation and goals of current orthodontic residents. What are these motivations and goals? Understanding them could give you a better idea of what future orthodontic practice may be like.

**Objective:** To investigate factors influencing career choice and identify future life plans of orthodontic residents in the United States.

**Participants:** 136 orthodontic residents in the U.S. who completed an online survey.

**Methods:** An online program was used to send an email with a personalized online link to 335 residents from 37 orthodontic programs; 136 responded. The residents completed a 57-item survey containing multiple choice and 1-line answers in May of 2007. As an incentive to complete the survey, they were informed that those who completed the survey would be entered into a random drawing to win a new orthodontic curing light. The survey was divided into the following segments: demographics; reasons for choosing orthodontics; evaluation of their orthodontic program; and future directions. The answers to the questions were then statistically analyzed.

**Results:** A passion for orthodontics was the most important reason that U.S. orthodontic residents gave for choosing orthodontics. Intellectual stimulation or challenge was also an important factor. For many of the orthodontic residents, the decision to become an orthodontist was made before entering dental school. The average debt of the orthodontic residents was $165,226 at the end of their program, and only 2 of the residents surveyed intend to pursue an academic career.

**Conclusions:** Because a very small number of orthodontic residents plan to pursue an academic career, the current crisis in orthodontic education is not likely to be solved in the near future.

**Reviewer’s Comments:** The authors suggested that a possible solution to the crisis in orthodontic education would be to recruit primarily researchers and teachers to the specialty. It has been my experience that almost every resident who applies to our program intends to pursue some form of an academic career. However, after graduation, very few do. Former federal grant programs that were intended to motivate orthodontic residents to pursue academic careers were very unsuccessful. Most orthodontic residents stayed in some form of teaching to fulfill the requirements of the grant, and as soon as these requirements expired, most went into private practice. It is my strong feeling that the primary reason that there is a shortage of orthodontic educators is a combination of the tremendous debt that residents are in when they finish their residency and the huge difference in financial renumeration between an academic career and private practice. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Orthodontic Residents, Motivation, Life Plans, US

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If you have a question about the exact position of an impacted maxillary canine and are using 2D radiology, it would be helpful to get an additional 3D cone-beam computed tomography image.

**Background:** Identifying the exact position of impacted maxillary canines is an important first step in deciding how to treat them. Could 3D cone-beam computed tomography (CBCT) produce information that would lead to a different diagnosis versus 2D radiography?

**Design/Objective:** This prospective study compares the differences in diagnosis and treatment planning of impacted maxillary canines based on 2 different imaging modalities.

**Participants:** 18 consecutive patients with a total of 25 impacted maxillary canines.

**Methods:** 2D traditional radiographs, including a panoramic radiograph to evaluate the vertical position, an occlusal radiograph to evaluate the proximity to adjacent teeth, and 2 periapical radiographs to determine the labial palatal position, were taken on each patient. Volumetric images of the maxillary dentition were also obtained from a CBCT scan. Seven faculty members, 4 orthodontists and 3 oral surgeons, were asked to diagnose and make up a treatment plan for the patients based on each of the radiographic modalities individually.

**Results:** There were differences in the identified location of the impacted cusp tip depending on the radiographic modality. There was 21% disagreement in the perceived mesiodistal cusp tip position and 16% in the perceived labiopalatal position. When root resorption of adjacent teeth was evaluated, there was a 36% lack of agreement.

**Conclusions:** The use of 2D and 3D images of impacted maxillary canines can produce different diagnoses and treatment plans for the same patient.

**Reviewer's Comments:** The results of this study do not surprise me. I have often found it difficult to accurately identify the position of impacted maxillary canines, particularly those that could not be clearly palpated. Based on more specific data provided by 3D imaging, I have made the decision to extract maxillary canines that had a very poor prognosis for orthodontic attachment, which was not obvious on 2D radiographs. I am not sure 3D CBCT volumetric images are needed for all impacted maxillary canines, but I feel that they are an appropriate adjunct to treatment when the exact location of the impacted maxillary canine is not obvious from 2D radiography. There is no question in my mind that we will be seeing greater use of 3D CBCT imaging in the near future. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Impacted Maxillary Canines, Radiology, Diagnosis, Treatment

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