Malformed or congenitally missing teeth are a problem often faced by both orthodontists and restorative dentists. Between 1% and 2% of the population will exhibit a shape modification of the maxillary lateral incisor commonly referred to as a peg lateral. The inheritance of the peg-shaped lateral incisors has been associated with the genotype that causes missing lateral incisors, and the shape modification is a modified manifestation of the hypodontia genotype. Peg lateral incisors may be unilateral or bilateral and may be associated with an opposite missing lateral. Classically, the peg lateral is characterized by a conical narrowing of the tooth in an incisal direction, resulting in a reduced mesiodistal width. The cervical dimensions of the affected tooth may range from normal to very narrow. The dimensions of the clinical crown in an incisal direction can be affected similarly, and often may result in a pointed appearance at the incisal edge. A peg lateral incisor can present an aesthetic challenge to the orthodontist when he/she is planning treatment for a case. It is important that the restorative dentist be a part of the team in this planning. Guidelines are presented to aid in the decision to extract or retain the tooth, and various options for the final restorative treatment of the case are discussed. Proper space creation and correct positioning of the retained tooth are crucial to the aesthetic success of the treatment. 

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Keywords: Peg Lateral Incisors

Print Tag: Refer to original journal article
In groups, not individuals, growth prediction procedures produce a good approximation of the growth of untreated Class II patients and, as such, may be one way of separating treatment effects from growth effects in clinical studies.

**Background:** Because of secular growth trends, untreated samples from historic growth studies may be less applicable as controls for contemporary clinical studies.

**Objective:** To determine whether growth prediction could produce results similar to observing untreated individuals, and to use this method to determine the treatment effects of a specific Class II treatment strategy.

**Design:** Retrospective clinical study using existing patient records.

**Participants:** 30 untreated Swedish Class II patients were used to test the growth prediction procedure, and 29 treated Class II subjects were used to test the use of growth prediction for determination of treatment effects.

**Methods:** The 30 untreated subjects had 2 cephalograms taken approximately 2 years apart. The first cephalogram was used to produce a 2-year growth forecast. This forecast was then compared to actual growth apparent on the second cephalogram. The comparison was done using a modified Ricketts' cephalometric analysis. The method was then applied to a second group of subjects treated with the variable anchorage straightwire technique protocol, which is a type of combination Begg/straightwire technique. The initial cephalogram of the treated subjects was used for the growth prediction that simulated what the patients would have looked like without treatment. The actual posttreatment cephalogram was then compared to this prediction, with the differences assumed to be attributable to treatment.

**Results:** The growth prediction method produced a reasonable simulation, on average, of the untreated control group, with the notable exception of the lower incisor position. The treated group showed primarily dental changes once the prediction was used to control for expected growth.

**Conclusions:** For this group of subjects, the growth prediction method provided a reasonable simulation of untreated controls and may be a method worth considering for retrospective studies.

**Reviewer's Comments:** It is important to understand that this study found the growth prediction to be relatively accurate, on average, for a group of 30 untreated individuals. This does not mean that it was accurate for growth prediction of any one individual. The authors are trying to provide an alternative strategy for producing a reasonable control group to study treatment effects in retrospective studies with the acknowledgment that a prospective study would be preferable. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Ricketts' Growth Prediction

Print Tag: Refer to original journal article
Background: The treatment of patients with mutilated dentitions presents one of the most difficult treatment challenges. However, well-coordinated interdisciplinary treatment can provide excellent occlusal and facial improvements for these patients. Case Report: A 37-year-old black woman had multiple missing teeth, severe dental overbite, bimaxillary dental protrusion, and procumbent lips. The patient was missing both maxillary lateral incisors and the maxillary left canine and premolars. In the mandibular arch, she was missing the right first molar. She was treated by extracting the mandibular left second premolar and using a high-pull hook on headgear to provide anchorage to retract the severely protruded mandibular anterior teeth. In the maxillary arch, the protruded central incisors were retracted the entire maxillary lateral space, which resulted in canine substitution for the maxillary right canine. The remaining maxillary left missing teeth were restored with implants. The final records for this patient indicate excellent occlusal and facial improvement.

Conclusions: Adults with severely mutilated dentition can achieve excellent occlusal and facial results with combined orthodontic prosthetic treatment.

Reviewer's Comments: When I first looked at the initial records for this case, I assumed that the treatment for this patient involved the placement of a temporary anchorage device (TAD), orthognathic surgery, or a combination of both. I was very impressed that excellent results were achieved without using either TADs or orthognathic surgery. Anchorage for retraction of the severely protruded mandibular incisors was provided by a high-pull hook on headgear. It is easy to assume that adult patients will not wear headgears. However, adults with very unattractive teeth combined with a poor facial appearance are often motivated enough to wear headgears. In addition to the patient's cooperation, one of the reasons this case was successfully treated was because a significant part of the patient's problem consisted of dental protrusion versus a skeletal discrepancy. This case report is a good example of the excellent results that can be achieved when orthodontists and prosthodontists work as a coordinated team. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Mutilated Dentition

Print Tag: Refer to original journal article
Maxillary protraction produces an increase in both nasopharyngeal and oropharyngeal airway dimensions.

**Background:** A common treatment for a developing Class III malocclusion in young patients is to use a reverse-pull headgear that produces maxillary protraction. When the maxilla is moved forward, what is the effect on the pharyngeal airway space?

**Objective:** To investigate the long-term effects of treatment with reverse headgear in patients with anterior crossbite and a skeletal Class III malocclusion, and to determine the eventual impact on the pharyngeal airway.

**Design/Participants:** This was a retrospective evaluation of 25 patients with Class III malocclusions. The average age of the patients was 11 years. All subjects had anterior crossbites. In all subjects, a reverse-pull headgear was used to move the maxilla forward. A cephalometric radiograph was taken before treatment, a second head film was taken as soon as a positive overjet was achieved, and a third head film was taken approximately 4 years later. In all subjects, after the initial crossbite correction, a second phase of orthodontic treatment with fixed appliances was used to maintain a normal occlusion. The mean treatment time for the reverse headgear was 6.9 months. The authors compared and evaluated the upper airway area by measuring the nasopharyngeal area and the oropharyngeal area.

**Results:** Forward movement of the maxilla produced a significant change in the nasopharyngeal airway during the maxillary protraction. The oropharyngeal airway also increased, but the change was not significant. The authors also found that after 4 years, these changes were maintained.

**Conclusions:** These authors have shown that treatment of maxillary deficiency with reverse headgear improved both nasopharyngeal and oropharyngeal airway dimensions initially, and that these changes were maintained at long-term follow-up.

**Reviewer’s Comments:** Although this study showed significant improvement in airway, this was only a 2-dimensional evaluation. Today, and in the future, I believe these studies will probably be performed using cone-beam technology so that a true 3-dimensional interpretation of airway changes can be evaluated after these types of treatment. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Maxillary Protraction

Print Tag: Refer to original journal article
Collecting and analyzing simple data collected at the initial appointment can lead to better understanding of referral patterns and staff effectiveness.

**Background:** Most orthodontic practices do not understand how conversion rates vary among different treatment coordinators or from different referral sources.

**Objective:** To demonstrate a simple method of data collection and analysis to better understand staff performance and referral sources.

**Design:** Expert opinion.

**Methods:** This whole process depends on collecting important data at the first patient visit. The first piece of data involves having the patient/parents complete a simple form to indicate how they heard about your office. The second set of data is collected by the staff and entered into an Excel spreadsheet for easy analysis. This information includes patient name and age, dentist, examination date, treatment coordinator, child or adult, details about the suggested treatment, and the patient's status upon leaving the office.

**Results:** These data can then be analyzed to answer several questions. How do the various staff or treatment coordinators compare regarding the acceptance of treatment? Are there changes in patient acceptance of treatment versus last month or last year? Are some treatment coordinators better with adult patients or child patients? What are my sources of new patients? Do referrals from some dentists always come earlier so patients go into observation rather than right into treatment?

**Conclusions:** Monitoring these simple parameters on an ongoing basis allows identification of areas for improved staff training, focused education of referring dentists, and proper use of marketing resources in areas that are most effective.

**Reviewer's Comments:** It would be important for staff to understand that data collection, especially if used to compare one treatment coordinator with another, is going to be used to focus training and not for disciplinary action. This rather simple data set can provide insight into many important parameters of your practice and can help the staff and the orthodontist learn best practices from each other. Dr. Haeger even reported on how he used this information to identify the most effective dentists at preparing patients for treatment, discovered the approach used, and then communicated this approach to a new dentist in the area who was not as experienced. You need to determine how you are comfortable using this information, but the many examples shown in this article seem to have applicability for almost every practice. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Practice Management

Print Tag: Refer to original journal article
Self-ligating brackets produce less friction with small, round arch wires, but friction increases as archwire size increases.

Background: Self-ligating brackets have become popular in recent years. One of the advertised benefits of self-ligating brackets is that they reduce the friction between the arch wire and bracket, thus permitting more rapid tooth movement. However, is this claim really true?

Objective: To perform a systematic review to compare, in an in vitro setting, the amount of expressed frictional resistance that orthodontic self-ligating brackets produce compared with conventional brackets.

Design/Methods: This was a systematic review of several electronic databases to find articles comparing frictional resistance between self-ligating and conventional brackets. A total of 70 articles were produced with this search. After applying the strict selection criteria for this study, the authors eliminated all but 19 of these articles. The authors then compared and evaluated the findings of these 19 articles to determine their results.

Results: A consistent agreement was found among the reviewed studies that self-ligating brackets produce lower friction than conventional brackets when coupled with small, round wires. However, these studies also agreed that frictional resistance increases as wire dimension increases, and that frictional force is generally greater with rectangular wires than with round wires. Steel self-ligating brackets were consistently reported to show lower friction than ceramic and polycarbonate conventional brackets. The authors cautioned clinicians that, although in vitro findings are a useful guide to anticipated clinical behavior, the observed clinical performance might be quite different than the in vitro findings.

Conclusions: Compared with conventional brackets, self-ligating brackets maintain lower friction when coupled with small, round arch wires, but as arch wire size increases, friction also increases.

Reviewer's Comments: Although this was an excellent systematic review, as with any in vitro study, none of the papers included can actually simulate what really happens in clinical situations because of variables such as mastication, oral function, degree of malocclusion, width and compressibility of the periodontal ligament, bracket and arch wire angulation, and temperature and moisture. Therefore, these results must be evaluated with caution. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Brackets

Print Tag: Refer to original journal article
In this study of women undergoing orthognathic surgery, no differences were found in underlying personality traits that would indicate a tendency to have unrealistic expectations about appearance.

**Background:** There is a question of whether some women seeking orthognathic surgery may have unrealistic expectations regarding the aesthetic outcome.

**Objective:** To use a variety of test instruments to assess the personality characteristics of women undergoing orthognathic surgery.

**Design:** Prospective study with controls using a variety of personality measurement instruments.

**Participants:** 30 women undergoing orthognathic surgery made up the study group and 30 volunteer women served as controls.

**Methods:** All study and control subjects were assessed for personality traits using a variety of questionnaires administered by the same investigator. The instruments were designed to measure satisfaction with facial appearance, satisfaction with overall body appearance, internalization and awareness of sociocultural appearance ideals, self-concept, self-esteem, and anxiety and depression.

**Results:** The average age of patients in the study group was approximately 25 years of age, and the control group was approximately 5 years older. No difference was found between groups for the majority of measurements, including depression and anxiety, self-esteem, self-concept, and overall body image. Differences were seen (as expected) in the 2 measures of satisfaction with facial appearance.

**Conclusions:** Women undergoing orthognathic surgery seem to be no different than those not undergoing surgery except for measures of satisfaction with facial appearance.

**Reviewer's Comments:** These results reinforce those of other studies suggesting that, in general, patients seeking orthognathic surgery do not have distorted views of ideal body image or personality types that could lead to unrealistic expectations of surgical outcome. Some patients seek a surgical change for the wrong reasons, but this situation is the exception rather than the rule. Be aware that this study was conducted in the United Kingdom and, therefore, may not be completely representative of other populations, but it is comforting that the results generally support the conclusions of trials from other countries. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Orthognathic Surgery

Print Tag: Refer to original journal article
Periodically scheduling a training day for your staff can significantly improve their efficiency and value to your practice.

**Background:** A well-functioning, competent, and highly motivated staff can result in improved quality of care in an orthodontic practice and less stress for the orthodontist. How do you train new and current members of your staff to improve their performance?

**Objective:** The purpose of this guest presentation article was to discuss the importance of a systematized training program for your practice.

**Results:** In this article, Dr. Levin suggests 5 specific steps that can be taken to improve staff training. First, document policies and procedures, which allows you to bring new team members into your practice and train them faster and more efficiently. Second, designate a training day. On-the-job training is not a very effective way to train new employees, and designating a specific training day with a set agenda can improve staff performance. Third, use scripting to improve verbal skills. Almost everything you do in your office can be scripted. The value of scripting is that it reduces the chance that patients will hear conflicting answers to the same question, which decreases the credibility of your practice. Fourth, institute regular performance reviews. These reviews should be done outside the practice and held in an environment that allows the majority of talking to occur in an open, nondefensive manner. Performance reviews done properly not only help your individual staff member, but also supply valuable feedback to you. Last is the need to schedule outside-the-office training. If you are keeping up professionally, you are probably attending a number of outside continuing education courses. If you want your staff to keep up with changes in orthodontic practice management, they will also require outside continuing education.

**Conclusions:** Systematized training helps turn a group of individual players into a highly functioning team.

**Reviewer's Comments:** I found the suggestions made by Dr. Levin to be very informative and practical. Because a well-trained staff can be a huge asset to your practice, training is something that cannot be left to chance. If you are interested in improving the performance of your staff, I strongly suggest you read this article in its entirety. (Reviewer—John S. Casko, DDS, MS, PhD).

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Keywords: Training

Print Tag: Refer to original journal article
Asymmetric setback of the mandible with sagittal split osteotomy does not significantly change disk position in the fossa.

**Background:** When patients have asymmetric mandibular prognathism, surgical correction requires asymmetric correction by repositioning one side of the mandible more than the other, which could potentially have an effect on the relationship between the condyle and the disk within the fossa. Is there a greater susceptibility for disk displacement during asymmetric mandibular setback?

**Objective:** To evaluate the effects of asymmetric setback of the mandible on articular disk position using MRI of the TMJ.

**Design/Participants:** Retrospective analysis of 22 subjects who had asymmetric mandibular prognathism. The average age of the sample was 24 years and 1 month.

**Methods:** All subjects had a sagittal split ramus osteotomy to correct the asymmetric mandibular prognathism. In addition, all had bicortical semi-rigid fixation with 2 screws on each side after manual intraoperative positioning of the condyles. Approximately 1 month prior to the surgery and >1 year after the surgery, MRIs were made of the temporomandibular joints. The position of the disk in the fossa was assessed.

**Results:** The results show that there was no change in disk position on either side, despite the asymmetric setback of the mandible. The authors also found that the posterior and anterior joint spaces were not affected by the asymmetric setback.

**Conclusions:** There was no significant change in disk position after differential setback of the mandible using sagittal split ramus osteotomy.

**Reviewer's Comments:** When mandibular setback surgery is performed asymmetrically, there are different manual forces placed on the 2 condyles during the fixation and positioning during surgery. Presumably, this could cause alteration in the relationship between the condyle and the disk during the surgical procedure; however, this study has shown that in spite of the asymmetric setback, no alteration in condyle-to-disk relationship occurred in any of the patients who were examined. This is good news for both surgeon and orthodontist. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Mandibular Surgery

Print Tag: Refer to original journal article
The cost per increment improvement in the ICON is measurable and varies widely across 7 European countries.

**Background:** The cost-effectiveness of orthodontic treatment has not been studied and is of interest to patients, practitioners, and third-party payers.

**Objective:** To measure the cost-effectiveness of orthodontic treatment across a variety of European countries.

**Design:** Retrospective study of treatment rendered in 10 orthodontic offices in 7 different countries.

**Participants:** 429 patients (average age, 13 years) consecutively treated in the 10 participating offices.

**Methods:** One researcher, calibrated in the use of the Index of Complexity, Outcome and Need (ICON), visited the 10 offices. Consecutively finished cases were selected that met specific criteria, which included adequate records. This same investigator scored the pre- and post-treatment study models using the ICON and collected information about the cost of treatment. The treatment fee was converted into Euros and adjusted for purchasing power. The average cost per point improvement in ICON was then calculated for each office.

**Results:** The average improvement in ICON was approximately 50 points, ranging from approximately 40 to 60. The cost for treatment also varied widely after adjustment for purchasing power. The median cost per point reduction in ICON ranged from 22 to 116 Euros.

**Conclusions:** This study demonstrated that it was quite possible to measure the cost-effectiveness of orthodontic practices using the cost per ICON point reduction, and that by using a purchasing power adjustment, the cost-effectiveness could be compared among different countries.

**Reviewer’s Comments:** Converted to U.S. dollars, the cost per point reduction in ICON was about $77. If I calculate my cost (assuming that I treat cases at least to the level of the median in this study), my cost is more like $120.00. This is not out of line with some of the countries in this pilot study, but certainly more than the mean. It is hoped that data like these will be used to identify appliances and treatment approaches that have the most value and not used by third-party payers to restrict patient options for treatment. (Reviewer-Brent E. Larson, DDS, MS).
Patients with severe bimaxillary dental protrusion can undergo significant retraction of their anterior teeth that does not result in apical root resorption.

**Background:** If an adult patient presented to you with severe bimaxillary dental protrusion and missing mandibular first molars, I suspect you would have a couple of questions about treatment. First, can you significantly retract the maxillary incisors without incurring root resorption, and second, is it possible to move the mandibular second and third molars mesially through the atrophied ridge caused by the missing mandibular first molars? It is important to know the answers to these questions.

**Objective:** This case report article documents the treatment of a 17-year-old black girl who presented with a Class I occlusion with severe maxillary and mandibular dental protrusion, very protrusive lips, and missing mandibular first molars. The patient was treated with the extraction of 4 first premolars, and the mandibular second and third molars were moved mesially through the narrow atrophied ridge in the mandibular first molar area. Treatment resulted in a large amount of retraction of the incisors, which caused a significant reduction in the patient's lip protrusion and resulted in an excellent profile. The mandibular second and third molars were moved mesially through the atrophied ridge in the first molar area. Thirty-two-year post-treatment records were obtained that indicated excellent stability of the occlusal and profile improvements and the presence of normal alveolar bone in both the vertical and labiolingual dimensions. The patient's treatment was supported by cervical and high-pull anterior headgears and Class II and Class III elastics. No temporary anchorage devices nor orthognathic surgery were part of this patient's treatment.

**Conclusions:** Severely dentally protrusive maxillary and mandibular incisors can be retracted a large amount resulting in excellent profile improvement and no root resorption.

**Reviewer's Comments:** The profile improvement in this patient is very impressive. I believe this was possible because the patient had a Class I occlusion and normal anteroposterior skeletal relationships, with her main problem being severe bimaxillary dental protrusion. This case demonstrates that teeth can be retracted a significant amount without root resorption if they are dentally protruded initially, and that mandibular molars can be moved mesially through an atrophied alveolar ridge that was the result of earlier mandibular first molar extraction. I commend the authors for having obtained the 32-year long-term post-treatment records. (Reviewer-John S. Casko, DDS, MS, PhD).

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**Keywords:** Bimaxillary Dental Protrusion

**Print Tag:** Refer to original journal article
Computer programs are accurate for predicting the outcome of soft tissue orthognathic surgery, except in the area of the lower lip.

**Background:** In recent years, computer programs have been developed to aid the surgeon and orthodontist in predicting the soft tissue response after orthognathic surgery. There is always a concern with predictions as to whether or not they are accurate. And, if they are not accurate, where are the inaccuracies, so patients are not misled with these prediction tracings? **Objective:** To perform a systematic review to investigate the accuracy of computer programs in predicting soft tissue response subsequent to skeletal changes after orthognathic surgery.

**Design/Methods:** This systematic review searched various electronic databases to produce studies that discussed or evaluated computer programs that predicted soft tissue response to surgery. The search produced 40 articles, but only 7 fulfilled the final selection criteria. The other articles were eliminated because they were either not a clinical trial, had no statistical inference, or their postoperative measurements were <6 months. All of the 7 selected articles provided horizontal and vertical measurements of various soft tissue points comparing computer-generated predictive change with actual postoperative measurements on the cephalometric radiographs of the patient.

**Results:** Results showed that generally, there were no statistically significant differences between the prediction and the actual outcome of the surgery, except for the area of the lower lip and chin. Although the individual errors in these prediction programs were always minimal (<2 mm), the authors found that the composite addition of these minimal errors could have clinical implications.

**Conclusions:** Computer programs that predict soft tissue response following orthognathic surgery are generally reliable, except for the area of the lower lip.

**Reviewer's Comments:** I liked this study. Most clinicians know that computer programs that predict soft tissue response to orthognathic surgery do have limitations. I really liked this systematic review, because it evaluated the 7 best articles on this subject, and found that, in general, these programs are fairly reliable, except for the prediction of the position of the lower lip. This is useful information for orthodontists as well as oral and maxillofacial surgeons. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Orthognathic Surgery

Print Tag: Refer to original journal article
Patients who present for orthognathic surgery have significantly more signs of temporomandibular disorders than a group of matched controls.

**Background:** Orthodontists frequently encounter adult patients who require jaw surgery to correct their malocclusions. Because of significant jaw discrepancies in some of these adult subjects, underlying TMJ symptoms may also be present. Is there a difference in the frequency of temporomandibular disorders (TMD) between a population of subjects who will receive orthognathic surgery compared to a group of age-matched controls?

**Objective:** To investigate whether TMD was more common in a group of individuals referred for orthognathic surgery than in a control group.

**Design/Participants:** This retrospective evaluation included a sample of 121 consecutive patients (mean age, 22.5 years) who had orthognathic surgery performed in combination with orthodontic treatment. A control group of 56 individuals (mean age, 23 years and 4 months) were recruited to match the patients in the treatment group in regard to age and gender. All individuals in the patient group and the control group were assessed for signs and symptoms of TMD by means of a questionnaire and a clinical examination. Then, the 2 groups were compared to determine if there were any differences.

**Results:** The patient group that received orthognathic surgery reported more subjective TMD discomfort on a verbal scale than did the control group. When these 2 groups were evaluated clinically, there were statistically significant differences between the patient group and the control group with regard to pain on palpation of the TMJs and related muscles, deviation during opening and/or closing of the mandible, and TMJ clicking.

**Conclusions:** Patients who were to be treated with orthognathic surgery had more signs and symptoms of TMD and a higher frequency of diagnosed TMD compared with a matched control group in this study.

**Reviewer's Comments:** I liked this study. My personal experience in having treated many adults who required orthognathic surgery is similar to the results of this study. Over the years, I have found that patients with more significant malocclusions, especially adults requiring jaw surgery, often have symptoms of TMD, including those listed in this study. This is good information for orthodontists. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: TMD

Print Tag: Refer to original journal article
The various base designs of metal and ceramic brackets influence bond strength when bonded to feldspathic porcelain.

**Background:** The number of adult orthodontic patients is increasing every year. Many adults prefer ceramic brackets instead of stainless-steel brackets, especially in the maxillary anterior region. However, many adults have pre-existing porcelain crowns on their anterior teeth. Since there are different bracket base designs, a study to determine which base design provides better bonding to porcelain crowns would be valuable.

**Objective:** To evaluate the shear bond strength of different ceramic bracket base designs to glazed feldspathic porcelain.

**Design:** Experimental study performed in the laboratory.

**Materials/Methods:** 40 samples of glazed feldspathic porcelain disks were produced according to the manufacturer's instructions. These disks were embedded in autopolymerizing clear acrylic resin. These blocks were then divided into 4 groups of 10 each for bonding 3 groups of ceramic brackets that had various base designs and 1 group of stainless steel brackets that served as the control group. The porcelain surfaces were etched with 37% phosphoric acid solution for 60 seconds, and a thin coat of porcelain primer was applied twice with a brush. The brackets were then bonded with light-cured composite. The bracket bases were divided into 4 types. The base designs included a beaded type, one with large round pits, one with an irregular design, and one with a mesh design that was on the metal bracket. The brackets were stored for 24 hours; a testing machine was then used to de-bond the teeth and the shear bond strengths were recorded.

**Results:** Results showed that the control group with the stainless steel brackets yielded the lowest mean shear bond strength. The brackets with the beaded base produced the greatest shear bond strength, and no significant differences were noted between the bracket base with the large round pits or the irregular base design. According to the authors, the shear bond strengths of all of the brackets were well within the acceptable clinical range.

**Conclusions:** Bond strength values between the beaded base ceramic brackets and the feldspathic porcelains were the statistically highest values among all groups.

**Reviewer's Comments:** I am not certain I would be excited to use a ceramic bracket that created very high shear bond strength between the bracket and a porcelain surface in the patient's mouth. With the high shear bond strength, when the bracket is removed, this could produce damage to the porcelain surface, which could require a new porcelain crown or veneer. So, although the beaded surface produced the greatest shear bond strength, perhaps those bracket base designs that produced slightly lower shear bond strength would perhaps be more clinically acceptable and produce less potential damage to the porcelain surface upon bracket removal. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Bracket Base Design

Print Tag: Refer to original journal article
When a pilot hole is drilled to place a mini-implant, a healing period of 4 weeks is necessary to provide implant stability.

**Background:** Mini-implants are now very popular as adjuncts to enhancing orthodontic anchorage; however, there are several different types of mini-implant designs and several different methods for placement. With some techniques, a pilot hole must be drilled initially. This creates heat and subsequent necrosis of the bone. How long should one wait before placing a force on the implant if a pilot hole has been drilled?

**Objective:** To examine the effects of different healing times on biomechanical stability and histomorphometric characteristics during integration of mini-screws and bones. **Design/Subjects:** Animal study performed on 15 rabbits.

**Methods:** The rabbits were divided into 5 groups with different healing times: 0 (immediate) and 1, 2, 4, and 8 weeks. Ninety titanium mini-screws, 6 mm long and 1.9 mm in diameter, were used in this study. The implants were placed in the tibiae of the rabbits. A guide drill was used to first place a pilot hole so that the implant sites could be placed 10 mm apart, with 3 implants in each tibia. After 0, 1, 2, 4, and 8 weeks of healing, several mechanical tests were performed. In addition, histologic examination of the implants at each of the time periods was performed to determine the healing.

**Results:** Results showed that the longer the healing time, the larger the torque or pullout load required to remove the implants. Only after 4 weeks of healing did maximum torque and maximum pullout load increase significantly. The authors believe that 4 weeks is an important time point for implant bone to gain biomechanical strength and integrate. The histologic analysis showed that in 4 weeks of healing, new bone, particularly woven bone, was observed on the implant bone interfaces.

**Conclusions:** A waiting period of 2 weeks is insufficient to allow healing around implants placed in this manner; 4 weeks healing time is preferable before loading the implant.

**Reviewer's Comments:** The conclusions from this study apply to the particular type of implant placement. In this study, a pilot hole was drilled in the bone prior to placing the implant. Although water spray was used, this still causes bone necrosis, which then requires a certain healing time before bone is deposited against the implant. This study showed that time period to be 4 weeks. With some mini-screw systems, no pilot hole is drilled, and the implants are self-tapping. This does not produce heat, and, therefore, it does not cause bone necrosis. In self-tapping mini-screws, the implants can be loaded earlier. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Mini-Implants

Print Tag: Refer to original journal article
Muscle Function and Chewing Pattern Altered With Unilateral Posterior Crossbite

Muscular Activation During Reverse and Non-Reverse Chewing Cycles in Unilateral Posterior Crossbite.

Piancino MG, Farina D, et al:


Children with a unilateral posterior crossbite in the mixed dentition have a reverse chewing cycle on the crossbite side 60% to 70% of the time and also demonstrate asymmetrical masseter muscle activity.

Background: More information is needed about how a unilateral posterior crossbite affects muscle activity and chewing patterns in developing children.

Objective: To observe the chewing pattern and electromyography (EMG) activity of children with unilateral posterior crossbite.

Design: Prospective study with controls.

Participants: 82 children (average age, 8.5 years) with a unilateral posterior crossbite and 12 age-matched controls with normal occlusion were included.

Methods: All children had jaw tracking done while chewing hard and soft boluses to monitor the chewing stroke. At the same time, the muscle activity of the masseter muscles was monitored with surface EMG. The chewing patterns and muscle activity of the children with crossbite were compared to the controls.

Results: The children with a posterior crossbite exhibited a reverse chewing pattern 60% to 70% of the time compared to <5% for the controls. The muscle activity on the crossbite side was consistently lower than on the non-crossbite side, while the muscle activity on the non-crossbite side was equal to or greater than controls. This represents a distinct asymmetry in muscle function in the crossbite group.

Conclusions: Children in the mixed dentition with unilateral posterior crossbite typically have a high degree of reverse chewing on the crossbite side and asymmetric masseter muscle activity.

Reviewer's Comments: We tend to think of a posterior crossbite as a structural problem, and assume that when we correct the structural relationships, the functional problems are corrected. The functional changes in these children are quite significant, and there is some indication that correction of the structural problem does not necessarily correct the functional asymmetry. Further information about the effect of the functional asymmetry on growth, and how we can best treat to correct function as well as structure, would help us to make better treatment timing decisions. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Posterior Crossbite

Print Tag: Refer to original journal article
A retrospective review of bony cysts in children indicates that the majority of the cysts are developmental in origin, with the most frequent being the dentigerous cyst.

**Background:** Orthodontists are used to dealing with young healthy patients, and we sometimes forget that pathology can occur in this group of individuals.

**Objective:** To characterize the cystic lesions seen in children from 2000 to 2007 at a single clinic in Greece.

**Design:** Retrospective study.

**Participants:** 43 children (age range, 2 to 14 years) with a total of 47 bony cystic lesions referred for treatment.

**Methods:** All children seen during the defined years with a cystic bony lesion were included in the review. Cysts were classified based on histological examination. The location of the cyst and gender of the patients were noted as well. The surgical approach and follow-up was recorded from the patient charts.

**Interventions:** All cysts were treated surgically.

**Results:** The average age of these children with cysts was approximately 10 years. Cysts were more common in boys than in girls (60% vs 40%). The most common cysts were dentigerous cysts (43%) followed by eruption cysts, odontogenic keratocysts, radicular cysts, and buccal bifurcation cysts at approximately 10% each. The dentigerous cysts were most frequently seen in the posterior region of the jaws. Treatment was by enucleation in 75% of the cases and marsupialization or another approach the remainder of the time. No bone grafting was required in this group of young patients with good evidence of bone fill after healing.

**Conclusions:** The most commonly seen cysts in children are developmental in origin, with the dentigerous cyst being the most common.

**Reviewer's Comments:** Reviewing radiographs for evidence of cysts is important in orthodontic patients. We get so focused on looking at root position and eruption progress on our panoramic films that we sometimes neglect to see radiolucencies in their early stages. Although these cysts are generally not malignant and typically respond well to treatment, early recognition simplifies treatment and can help save the teeth involved with the cyst. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Intraosseous Cystic Lesions

Print Tag: Refer to original journal article
Comparing Manual Toothbrushes for Teeth Cleaning Efficiency


Schätzle M, Imfeld T, et al:

Eur J Orthod 2009; 31 (February): 103-107

In this controlled laboratory study of cleaning around brackets, although no particular brush proved best, brushes with a v-shaped or staggered bristle length tended to clean better than a planar brush where all bristles were the same length.

**Background:** Since most orthodontic patients still use a manual brushing technique, information about which brush design is most effective around orthodontic brackets would be helpful.

**Objective:** To compare the cleaning efficiency of 9 manual toothbrushes when used around orthodontic brackets in a controlled environment.

**Design:** Laboratory study using a tooth model and mechanical straight-line brushing. **Materials:** 9 manual toothbrushes available in Europe were utilized for this study.

**Methods:** A tooth model was used that allowed placement of brackets on the 4 maxillary incisor teeth. Each toothbrush was mounted in a mechanism that moved the brush in a horizontal scrubbing motion across the teeth and brackets. Titanium oxide was placed on all teeth and the amount of tooth surface cleaned in 60 seconds was measured by optical scanning. The brushes were categorized as planar (all bristles the same length), v-shaped (inner bristles shorter), and staged (different height bristles).

**Results:** No single toothbrush performed significantly better in this test than the others. The staged and v-shaped brushes were more effective than the planar.

**Conclusions:** In this laboratory environment, a manual toothbrush with varying length bristles (either v-shaped or staged) cleaned better than the brush with all bristles the same length (planar).

**Reviewer's Comments:** The horizontal brushing motion used in this study is not what most dentists or orthodontists teach, but it is what many children use. Although these results may not reflect actual clinical use, they do suggest that it may be worth trying toothbrushes with a staged or v-shaped bristle pattern. Unfortunately, all brushes had a difficult time cleaning the critical area within 2 mm of the bracket base. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Toothbrushing

Print Tag: Refer to original journal article
Systemic Release of Metallic Ions From Orthodontic Mini-Implants

Systemic Levels of Metallic Ions Released From Orthodontic Mini-Implants.

de Morais LS, Serra GG, et al:


The systemic levels of metallic ions released from orthodontic mini-implants are below the average intake of these elements through food and drink.

**Background:** The use of metallic arch wires and orthodontic appliances can result in the release of metallic ions into the body. Do titanium mini-implants release ions into the body?

**Objective:** To gauge the concentration of titanium, aluminum, and vanadium over time in the kidneys, livers, and lungs of rabbits that had titanium alloy orthodontic mini-implants placed in their tibia. **Subjects:** The sample for this study consisted of 23 New Zealand rabbits.

**Methods:** The rabbits were randomly divided into 4 groups based on time periods following surgical implantation of the orthodontic mini-implants: (1) controls; (2) 1 week; (3) 4 weeks; and (4) 12 weeks. Four mini-titanium screws were placed in the left proximal tibia of 18 rabbits. Five rabbits had no screws placed and served as controls. After the different time intervals, the rabbits were sacrificed, and graphite furnace atomic resorption spectrophotometry was used to evaluate the release of titanium, aluminium, and vanadium to the kidneys, livers, and lungs of the 18 rabbits.

**Results:** Various amounts of titanium, aluminum, and vanadium were observed in the 1-week, 4-week, and 12-week groups, indicating that there was diffusion of these metals to the kidneys, livers, and lungs of the animals. However, the amount these ions released was significantly below the average dietary intake of these elements through food and drink.

**Conclusions:** Titanium alloy mini-screws do release metal ions, but the release of these elements is less than would occur through food and drink.

**Reviewer's Comments:** This was a very well-conducted and interesting study. It is important to understand that many of the arch wires and appliances that we use contain metals that can be absorbed into the body. Significant research has been done on resorption from arch wires, but this is the first study I am aware of that has evaluated absorption from titanium mini-implants. The good news is that apparently, the amount of resorption is not at a level that should be of concern to the patient or parent(s). (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Orthodontic Mini-Implants

Print Tag: Refer to original journal article
Ibuprofen and acetaminophen appear to be no more effective than a placebo for controlling pain after initial orthodontic appliance placement.

**Background:** It is not unusual for some orthodontic patients to be in pain after initial arch wire placement, and many orthodontists prescribe either ibuprofen or acetaminophen to help control the pain. Are these 2 drugs any better than a placebo?

**Objective:** To test the effectiveness of ibuprofen and acetaminophen in controlling discomfort after initial orthodontic appliance and arch wire placement.

**Participants:** The sample consisted of 60 patients undergoing comprehensive fixed orthodontic treatment.

**Methods:** Patients were randomly assigned to 1 of 3 experimental groups undergoing fixed comprehensive orthodontic treatment. One group received 600 mg of acetaminophen, a second group received 400 mg of ibuprofen, and a third group received a placebo. Each patient's level of discomfort was assessed with a 100-mm visual analog scale immediately after appliance placement, at different periods ranging from 3 to 48 hours, and at 3, 4, and 7 days.

**Results:** There was no significant difference in pain between the 3 groups, and there was no difference between males and females. Pain after initial arch wire placement peaked at 19 hours and then gradually decreased to pre-appliance placement values by day 7. There were large variations in pain perception.

**Conclusions:** Ibuprofen and acetaminophen appear to be no more effective than a placebo for controlling pain after initial orthodontic appliance placement.

**Reviewer's Comments:** I was surprised at the findings in this study. I was not sure whether acetaminophen or ibuprofen would be more effective in controlling pain after initial appliance placement, but I assumed either or both would be more effective than a placebo. In trying to guess why there were no significant differences between the 3 groups, it seems to me that the sample may have been too small to accommodate the large amount of individual patient variation that occurred. Also, it could be that there was a true placebo effect that would further confound the problem, because we obviously cannot be giving out sugar pills to our patients. Hopefully, a large study will help clarify the results of this study. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Orthodontic Pain Control

Print Tag: Refer to original journal article
Teeth with fully or partially lost sealants are not at a higher risk of developing caries than teeth that have never been sealed.

**Background:** If a patient has sealants placed to prevent caries and these sealants are lost or fractured, does the patient incur a greater risk of future caries? This is an important question, because if fractured sealants increase the risk for caries, it may not be appropriate to place sealants in patients who are not likely to have regular follow-up dental visits.

**Design/Objectives:** The purpose of this literature review study was to determine the effectiveness of resin-based sealants with no reapplication of partially or lost sealants.

**Methods:** The authors reviewed the literature for studies that evaluated the risk of caries in teeth that were formerly sealed versus nonsealed teeth. The reason for this literature review was to address concerns that partially lost sealants might trap food and therefore increase the risk of caries. The reason this question is important is that many public school children who have sealants placed in school clinics may not be able to afford regular follow-up dental visits. Therefore, it is important to know if these children are at higher risk for caries than children who had no sealants placed.

**Results:** Teeth with fully or partially lost sealants were not at a higher risk for developing caries than teeth that had never been sealed.

**Conclusions:** Fully or partially lost sealants do not create a higher risk for caries than teeth that do not have sealants placed.

**Reviewer's Comments:** The question addressed in this review is a very important one. Many public health programs provide free application of sealants to school children. Placement of these sealants may be the only dental treatment that many of these students receive. If the sealants were fully or partially lost and created a higher incidence of caries for children that are not likely to have follow-up dental care, it would have been better to have not placed them at all. Fortunately, this is not the case. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Formerly Sealed Teeth

Print Tag: Refer to original journal article