Sagittal split osteotomy and closing rotation of the mandible is a relatively stable procedure for correcting anterior open bite.

**Background:** An open bite is a common malocclusion treated by orthodontists. If this problem is significant and is due to a skeletal deformity in an adult, a common procedure for correcting this malrelationship is maxillary surgery to intrude the maxilla and allow the mandible to autorotate. However, in some patients, the maxilla could be in a good position, or maxillary surgery might be contraindicated. Can the surgery be performed in the mandible with mandibular counterclockwise rotation to correct an open bite? Will this type of surgery be stable?

**Objective:** To determine the stability of skeletal open bite correction with isolated mandibular osteotomies using rigid internal fixation and counterclockwise rotation of the mandible.

**Design:** This was a retrospective analysis of the records of 28 adult patients who had completed orthodontic therapy and had isolated mandibular surgery performed to close an anterior open bite.

**Methods:** All subjects had cephalometric radiographs taken immediately preoperatively, immediately postoperatively, and at least 1 year postoperatively. Cephalometric measurements were made and compared to determine the stability.

**Results:** The results showed that the closure of an anterior open bite with mandibular surgery is relatively stable. Of the 28 patients, 16 demonstrated a continued closing rotation of the mandible. In 12 patients (43%), the mandible demonstrated an opening rotation during the first year. The amount of relapse ranged from 0.1° to 1.9°, or a mean relapse of approximately 16%. However, in none of the patients in the sample was there an open bite after 1 year, even though skeletal relapse occurred. Dentoalveolar eruption also occurred, which produced a positive overlap of the teeth at the end of 1 year.

**Conclusions:** Mandibular osteotomy with counterclockwise rotation of the mandible is a relatively stable procedure for correcting anterior open bite in appropriate situations.

**Reviewer's Comments:** Although this was not an extensive sample, the authors did report a positive outcome with the use of mandibular surgery and counterclockwise rotation to correct anterior open bites. This is helpful to know because, in some patients, maxillary surgery is not appropriate or contraindicated. It was also gratifying to know that, in this sample with mandibular surgery to close the anterior open bite, the outcome after 1 year showed relative stability. (Reviewer-Vincent G. Kokich, DDS, MSD).

Keywords: Open Bite Correction

Print Tag: Refer to original journal article
Is Condylar Resorption in Women Related to Birth Control?

Oral Contraceptive Pill Use and Abnormal Menstrual Cycles in Women With Severe Condylar Resorption: A Case for Low Serum 17β-Estradiol as a Major Factor in Progressive Condylar Resorption.

Gunson MJ, Arnett GW, et al:


If a female patient presents with severe condylar resorption, she should be evaluated for a history of birth control pill use or extremely irregular menstrual cycles.

**Background:** It is not unusual to encounter a female patient who presents with severe condylar resorption. If such a patient presents to your office, it would be helpful to know if the severe condylar resorption is possibly related to sex hormones.

**Objective:** To evaluate the relationship of severe condylar resorption in females and sex hormone level.

**Participants:** The sample for this study consisted of 27 women who, over a 3-year period with no history of autoimmune disease, presented for orthognathic surgical correction of their skeletal deformity secondary to severe condylar resorption.

**Methods:** Sex hormone dysfunction was evaluated, and midcycle serum levels of 17β-estradiol were measured.

**Results:** 26 of the 27 women with severe condylar resorption had either laboratory findings of low 17β-estradiol or a history of extremely irregular menstrual cycles. Sixteen of the 27 women had both low 17β-estradiol levels and irregular periods. Twenty-five of the 27 women demonstrated abnormally low levels of serum 17β-estradiol at midcycle, and the other 2 women were at the low end of normal. Eight of the 27 women had low 17β-estradiol levels due to ovarian failure, and 19 were oral contraceptive pill users.

**Conclusions:** Severe condylar resorption in women is related to birth control pill use and extremely irregular menstrual cycles.

**Reviewer's Comments:** This is a great study. I was impressed by the fact that, of the 19 women who were oral contraceptive pill users, all reported that chin regression and open bite changes occurred after starting birth control pill use. Even more impressive was the fact that 9 of the 19 women reported that condylar resorption symptoms occurred within the first 6 months of starting birth control pills. Clearly, if you have a female patient who presents with severe condylar resorption, you need to immediately check for the use of birth control pills and extremely irregular menstrual cycles. (Reviewer John S. Casko, DDS, MS, PhD).

Keywords: Severe Condylar Resorption, Female Hormones

Print Tag: Refer to original journal article
The extent of root resorption in this study was generally <0.5 mm and did not differ significantly based on the mechanical approach to arch leveling.

**Background:** Root resorption continues to be a risk of orthodontic treatment that is not avoidable or predictable.

**Objective:** To evaluate the association between root resorption and the specific orthodontic mechanics used for leveling.

**Design:** Prospective clinical trial.

**Participants:** 49 subjects undergoing fixed orthodontic treatment in the Czech Republic.

**Methods:** The subjects were treated with 1 of 3 mechanical strategies for leveling the upper arch: (1) segmental intrusion; (3) 3-component arch for intrusion and retraction, or (3) straight wire continuous arch. Resorption was assessed on a single upper central incisor for each individual by measuring periapical radiographs taken using a custom jig that standardized the angulation. The resorption was assessed by root length differences over a period of 6 months during arch leveling or intrusion. The age and gender of each subject were recorded.

**Results:** The average age of the subjects was 14.5 years, and no correlation was found between age and the amount of resorption. Gender was not correlated with resorption. The 3-component arch system that intruded and retracted incisors showed the most average resorption (0.46 mm), but this was not significantly different than that of the other 2 groups (approximately 0.25 mm). A greater percentage of the subjects had >0.5 mm resorption in the 3-component arch group compared to the other 2 groups.

**Conclusions:** The 3-component arch group that had simultaneous intrusion and retraction tended to have more root resorption than the groups with intrusion alone or straight wire leveling, but this difference was not significant.

**Reviewer's Comments:** The authors made a good attempt to standardize the radiographic technique used for root length assessment, but that standardization limited the root length measurements to a single upper incisor. The difficulty in identifying specific mechanical factors related to root resorption supports the belief that individual biologic factors may be more important than mechanical technique in determining the extent of root resorption. (Reviewer-Brent E. Larson, DDS, MS).

Keywords: Root Resorption, Mechanics

Print Tag: Refer to original journal article
Effect of Tooth, Bone Response to Direct Injury With Anchorage Screws


Dao V, Ranjen R, et al:


Virtually no permanent damage occurs when mini-screws are placed into or adjacent to tooth roots in experimental animals.

**Background:** Mini-screws are commonly used to enhance orthodontic anchorage. Many orthodontists place their own mini-screws. If an orthodontist places the mini-screw too near or into the root of an adjacent tooth, what is the consequence to the vitality, periodontal ligament, and bone around the affected tooth?

**Objective:** To evaluate the repair of the periodontium after iatrogenic root injury with titanium screws.

**Design/Methods:** This was a prospective animal study designed to produce root injury with titanium mini-screws. The authors evaluated the effect of this injury on the cementum, pulp, periodontal ligament, and bone. A sample of 3 beagle dogs was used. A total of 60 self-tapping/self-drilling implants were intentionally placed adjacent or into the roots of teeth. After 12 weeks, radiographs were made, and several of the sites were assessed histologically.

**Results:** In 5 sites, there was direct screw penetration into the pulp chamber, but no pulpal necrosis occurred. When the cemental surface of the root was injured, the authors found continuous cementum repair at each of those sites with no external or internal root resorption ever identified in any histologic specimen. Necrosis and inflammation changes were not seen in the periodontium of any of the damaged roots. Ankylosis occurred once in this study and was observed when the severe injury to the root caused displacement of the root fragment.

**Conclusions:** Root injury is rare during the placement of mini-implants, and the body repairs the root surface and the periodontal ligament, even though injury to the root could be significant.

**Reviewer's Comments:** This study provides good news for orthodontics who place their own mini-screws. The results of this article show that, at least in experimental animals, direct injury to root surfaces does not result in significant damage to the roots of the teeth. Fortunately, the body tends to repair the cementum, periodontal ligament, and bone damage that occurs. (Reviewer-Vincent G. Kokich, DDS, MSD).

Keywords: Mini-Screws

Print Tag: Refer to original journal article
Early correction of pseudo-Class III malocclusion can have excellent long-term stability and may promote normal development of the occlusion.

**Background:** Pseudo-Class III malocclusions, in which the mandible has a functional shift forward, is common among patients presenting with anterior crossbite (>50% of Chinese Class III patients). Diagnosing these cases early can be very important because early correction may offer multiple advantages: elimination of traumatic occlusion, allowing normal eruption of canines and premolars, and promoting normal growth of the maxilla. However, long-term stability of early correction has not been well documented.

**Objective:** To determine the stability of early correction of pseudo-Class III malocclusions 10 years after treatment.

**Design:** Longitudinal clinical study.

**Participants:** 18 patients (9 males, 9 females) whose pseudo-Class III malocclusion was corrected at about 10 years of age. Initially, 27 patients were enrolled in the study, but only 18 were available for follow-up after 10 years.

**Methods:** All patients initially presented with anterior crossbite of >2 teeth along with an anterior functional shift. Positive overjet was established by 8 months of 2 x 4 treatment. Patients were recalled after 10 years to examine the stability of the crossbite correction and to determine whether comprehensive orthodontic treatment had been required. Lateral cephalograms were taken pre-treatment, post-treatment, and at the 10-year recall. Each cephalogram was traced twice using Pancherz analysis, and statistical analysis was performed using a 2-tailed t-test.

**Results:** 17 of 18 patients (94%) had positive overjet 10 years after treatment. A-point moved forward 4.5 mm with growth. Although the mandible outgrew the maxilla (5.7), the anterior crossbite returned in only 1 patient, whose mandible grew forward 19 mm. Fifteen patients (83%) did not undergo further treatment, and only 1 of the 3 patients who underwent comprehensive orthodontics required extractions.

**Conclusions:** Early correction of pseudo-Class III malocclusion can have excellent long-term stability and may promote normal development of the occlusion.

**Reviewer's Comments:** The authors demonstrated that, in their sample of Chinese children, early treatment with a 2 x 4 appliance can be a quick, effective way to correct pseudo-Class III malocclusions. However, it may be unrealistic to assume that this long-term success rate will hold true for all populations. These results demonstrate that simple intervention to create positive overjet in these patients can allow forward maxillary growth and is probably worth trying in most pseudo-Class III patients who can tolerate some incisor compensation. (Reviewer-Brent E. Larson, DDS, MS).

Keywords: Class III, Early Treatment, Stability

Print Tag: Refer to original journal article
Complications Associated With Retained Mesiodens

Clinical Characteristics and Complications Associated With Mesiodens.

Hyun H-K, Lee S-J, et al:


Approximately 50% of adults with mesiodens have no complications associated with the supernumerary tooth.

**Background:** Occasionally, a mesiodens or supernumerary tooth will form in the anterior maxilla between the maxillary central incisors. Most of these mesiodens are positioned palatally. Do these mesiodens cause problems or complications with the development of the dentition adjacent to this supernumerary tooth?

**Objective:** To examine the characteristics and complications associated with 1200 mesiodens identified in 919 patients.

**Design:** This was a retrospective radiographic review of a series of patients who had been examined at a national university dental hospital in Korea. Of that sample, 919 patients were identified as having mesiodens, with a total of 1200 supernumerary teeth. The location, shape, number, and complications of these mesiodens were noted in this sample.

**Results:** More males than females had mesiodens. The shape of the crown was primarily conical, and >90% remained impacted. More than half of the sample had mesiodens that did not cause complications with the adjacent teeth. Of the 563 mesiodens with complications, the most common was a diastema at 35%. The second most common was delayed eruption, which occurred 20% of the time, and displacement of adjacent teeth, which occurred in 16% cases. Other more minor occurrences were root resorption and rotation of adjacent teeth.

**Conclusions:** In the present study, complications from mesiodens were found in about one-half of patients who presented with mesiodens. The authors suggest that prevention of these complications requires timely surgical intervention to remove the mesiodens that are causing problems.

**Reviewer’s Comments:** I have seen several patients during my practice career that have had mesiodens. My typical strategy is to leave the mesiodens alone if they are not causing a problem. As this study stated, more than half the patients who were evaluated had no complications from the mesiodens. If they are causing a problem such as diastema or central incisor tooth malposition, the mesiodens can always be removed, and the complication can be corrected with minor orthodontics. (Reviewer-Vincent G. Kokich, DDS, MSD).

Keywords: Mesiodens, Characteristics, Complications

Print Tag: Refer to original journal article
If patients are about to undergo mandibular advancement surgery, you should advise them of simple exercises they can perform to reduce the length of postoperative altered sensation.

**Background:** Almost all patients who have bilateral sagittal split osteotomy surgery experience some form of altered sensation and sensory function postoperatively, which gradually returns in most patients. Simple exercises that the patient could perform postoperatively to reduce the length of altered sensation and sensory function postoperatively would be a big help.

**Objective:** To determine if sensory retraining after bilateral sagittal split osteotomy has a long-term effect on patient reports of altered facial sensations.

**Participants:** The sample for this study consisted of 186 subjects who underwent bilateral sagittal split osteotomy of the mandible at either a university clinic or a private oral and maxillofacial surgery practice.

**Methods:** The patients were randomly divided into 2 groups. One group received only standard opening exercises postoperatively, and the second group received the standard opening exercises and also underwent sensory retraining exercises. Both groups were evaluated for altered sensations before surgery and at 1, 3, 6, 12, and 24 months after surgery.

**Results:** After controlling for age and psychological distress, patients who received opening exercises were >2 times more likely to report postoperative altered sensations than those who also received sensory retraining exercises.

**Conclusions:** A simple noninvasive exercise program started shortly after orthognathic surgery can decrease the likelihood that a patient will report altered sensations in the long term after undergoing bilateral sagittal split osteotomy.

**Reviewer's Comments:** I was surprised that the simple sensory retraining exercises described in this study, which involved using an inexpensive cosmetic brush and a mirror, could significantly reduce the length of time that patients would experience postoperative sensory alterations. Based on the results of this study, it makes sense to advise your patients of the availability of these sensory retraining exercises and also to make sure that the oral and maxillofacial surgeon with whom you work is aware of them. While it is not possible to totally avoid some form of postoperative sensory deprivation for most patients who undergo sagittal split osteotomies, it is nice to know that simple exercises are available to reduce the length of time they experience these altered sensations. (Reviewer-John S. Casko, DDS, MS, PhD).

**Keywords:** Postoperative Altered Sensations, Sensory Retraining

**Print Tag:** Refer to original journal article
Subjects with Class III skeletal patterns have a tendency for mandibular tooth size excess, and subjects with Class II patterns tend to have maxillary tooth size excess.

**Background:** Obtaining an ideal orthodontic result is facilitated by an ideal ratio between the maxillary and mandibular (mesiodistal widths) tooth size. Most notably, Bolton examined this ratio for the anterior teeth (canine to canine) and overall dentition (first molar to first molar). Tooth size discrepancies greater than 2 standard deviations (SD) (approximately 3 mm) from the mean are considered clinically significant, and may need to be addressed during treatment.

**Objective:** To examine the relationship between skeletal malocclusion, gender, and tooth size discrepancy.

**Design:** Retrospective case review.

**Methods:** Dental casts and lateral cephalographs were chosen from the records of the orthodontic department at the University of Zagreb, Croatia. A total of 301 subjects (127 males and 174 females) with no previous orthodontic treatment, all teeth erupted, and no large restoration or tooth deformities were chosen. The average age of the subjects was 16.9 ± 2.9 years. Skeletal classification was determined using a lateral cephalogram (Class I, ANB 0 to 5 degrees; Class II, ANB >5 degrees; Class III, ANB <0 degrees). Casts were measured with digital calipers by a single examiner, and intra-examiner reliability was found to be good. Statistical analysis was done using the Kolmogorov-Smirnov test, a Student's t-test, and Scheffé's tests with Statistical Package for Social Sciences software.

**Results:** A statistically significant gender difference in the anterior ratio was found, with males having relatively larger mandibular teeth. Class II cases tended to have relatively larger maxillary teeth, while Class III cases tended to have relatively larger mandibular teeth. This trend was statistically significant for the posterior and overall ratios, but not the anterior ratio. A clinically significant discrepancy (2 SD from the Bolton mean) was found for 16.28% of patients in the anterior region and 4.32% of patients overall. These percentages are similar, but slightly less than other studies.

**Conclusions:** Tooth size discrepancies are not uncommon and may be related to Class II and III growth in the posterior. These discrepancies may need adjustment to achieve an ideal occlusal result.

**Reviewer's Comments:** These results would suggest that tooth size issues may work against us when trying to correct Class II and Class III malocclusions. For example, Class III subjects tended to have increased lower tooth size making it harder to create positive overjet. Fortunately, the tooth size differences between skeletal types tended to be found in the posterior dentition meaning it would not affect obtaining a solid Class I canine position. (Reviewer-Brent E. Larson, DDS, MS).

Keywords: Tooth Size, Bolton Discrepancy

Print Tag: Refer to original journal article
New Remineralizing Cream Gets Rid of White-Spot Lesions

Regression of Post-Orthodontic Lesions by a Remineralizing Cream.
Bailey DL, Adams GG, et al:


A new remineralizing cream containing casein phosphopeptide-amorphous calcium phosphate complexes promotes remineralization of white-spot lesions in enamel.

**Background:** One of the most disappointing aspects of orthodontics is when brackets are removed from a patient who has had poor oral hygiene and there are significant white-spot lesions in the enamel on the anterior teeth. This results in a compromised esthetic appearance and unhappy patients and parents. Many techniques have been tested over the years for reducing these white-spot lesions after they have occurred, with little success. However, in a recent study, researchers have developed a remineralizing cream that may provide a solution to this clinical problem.

**Objective:** To test the hypothesis that more white-spot lesions would regress in participants using a remineralizing cream compared with a placebo cream in a postorthodontic population of patients.

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

**Participants/Methods:** The sample consisted of 45 patients who had just concluded orthodontic treatment and had their orthodontic appliances removed. There were a total of 408 white-spot lesions in these individuals. Patients were randomly divided into 2 treatment groups. One group received a placebo cream that was applied to these white-spot lesions in the morning and at night for 12 weeks. The treatment group received a remineralizing cream that contained casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) complex that had been shown to reduce white-spot lesions in animal studies. This group also applied the cream in the morning and at night for 12 weeks. After 12 weeks, the white-spot lesions were compared in both groups to determine the effect of the 2 creams.

**Results:** After 12 weeks, home application of a remineralizing cream containing CPP-ACP resulted in a significant reduction in white-spot lesions compared to a placebo cream. The authors believe that the CPP-ACP cream is able to localize and stabilize the calcium and phosphate ions at the tooth surface in a bioavailable form that promotes remineralization of enamel subsurface lesions in situ, restoring the white opaque appearance of the lesions to translucency.

**Conclusions:** This this new remineralizing cream successfully causes regression of white-spot lesions in clinical patients.

**Reviewer's Comments:** Although this material is not yet commercially available, I am anxious to try this remineralizing cream on some of my patients. The biochemistry makes sense. If the calcium and phosphate ions can be stabilized within the cream at the tooth surface, then they are available for the remineralizing process. Hopefully, this new cream will be as successful in clinical patients as it was in this clinical trial. (Reviewer-Vincent G. Kokich, DDS, MSD).

Keywords: White-Spot Lesions, Remineralizing Cream

Print Tag: Refer to original journal article
The genetically verified diagnosis of PFE can protect patients and orthodontists from years of futile treatment.

**Background:** Patients who have a posterior open bite are usually very difficult to treat orthodontically. One of the causes of posterior open bite is primary failure of eruption (PFE), and it would be helpful to the orthodontist to be able to confirm this condition.

**Objective:** To identify the gene responsible for PFE.

**Participants:** The sample for this study consisted of 4 families with a total of 15 patients who had PFE.

**Methods:** Panoramic radiographs were used to identify the presence of PFE. Molecular genetics analysis was performed on the patients who were identified with this condition.

**Results:** As early as 1974, researchers suspected that nonsyndromic PFE was a genetic disorder; however, it was not until this current study that the parathyroid receptor 1 gene was identified as the gene responsible for PFE.

**Conclusions:** The genetically verified diagnosis of PFE can protect patients and orthodontists from years of futile treatment.

**Reviewer’s Comments:** In 1981, Proffit and Vig coined the term “primary failure of eruption” to describe a condition in which posterior teeth failed to erupt. In this condition, all teeth distal to the most anterior tooth affected usually failed to erupt. By using genetic analysis to confirm the presence of PFE, orthodontists can avoid the problem of having negative effects on unaffected teeth while attempting alignment. (Reviewer–John S. Casko, DDS, MS, PhD).

Keywords: Primary Failure of Eruption, Genetics

Print Tag: Refer to original journal article
Is Mandibular Advancement More Stable if Done by Distraction Osteogenesis?

Bilateral Sagittal Split Osteotomies and Mandibular Distraction Osteogenesis: A Randomized Controlled Trial Comparing Skeletal Stability.

Ow A, Cheung LK:


Although mandibular advancement using distraction osteogenesis tends to have less relapse than traditional osteotomies, the differences are not significant and therefore the choice of procedure should be made on other factors, not on stability.

**Background:** Traditionally, surgical treatment of Class II mandibular hypoplasia patients consists of a bilateral sagittal split osteotomy (BSSO). While very effective for advancements <6 mm, larger advancements show less predictable stability. Mandibular distraction osteogenesis (MDO) has become another common surgical treatment, especially for advancements >10 mm. However, little research has been done comparing stability between the 2 techniques in the 6- to 10-mm range.

**Objective:** To compare BSSO and MDO stability for moderate mandibular advancement.

**Design:** Randomized prospective clinical trial.

**Participants:** 14 Class II mandibular hypoplasia patients (18 were originally assigned, but 4 did not complete recalls) were included. Average age was 24.9 years (range, 19 to 42 years) for the BSSO group and 25.0 years (range, 18 to 32 years) for the MDO group. Patients with systemic diseases, asymmetry, and craniofacial syndromes were excluded.

**Methods:** Patients were randomly allocated to the BSSO or MDO group. Eight patients had a standard BSSO procedure stabilized with titanium miniplates; maxillary surgery was also performed on 7 of these patients. The other 6 patients had bilateral vertical osteotomies distal to the lower last molar. Intraoral distraction plates were placed and advanced 1 mm per day after a 5- to 7-day latency period. The distraction plates were surgically removed 3 months later. Maxillary surgery was performed on 3 of these cases. Miniscrews were placed in the distal and proximal segment as radiographic markers. Patients were recalled for a lateral cephalograph after 2 weeks, 6 weeks, 3 months, 6 months, and 1 year.

**Results:** No statistically significant differences between the 2 groups were found even though the BSSO group did show a 20% total skeletal relapse compared to 5% in the MDO group.

**Conclusions:** Both BSSO and MDO are good surgical techniques for mandibular advancement of 6 to 10 mm. Factors other than stability (eg, patient preference, surgeon preference, need for second surgery) may determine the use of one technique over the other.

**Reviewer’s Comments:** Although the authors should be commended for the randomized trial design, the resulting sample was quite small making it very difficult to find differences between groups. They found 20% relapse in the BSSO group compared to 5% in the MDO group, and yet this difference was not significant because of the small sample size and the variability. The inclusion of maxillary procedures in some patients also adds a variable that is difficult to sort out. As an orthodontist, I still prefer a BSSO in these 6- to 10-mm advancements because of the precise positioning that is possible. (Reviewer-Brent E. Larson, DDS, MS).

Keywords: Class II, Surgical Treatment, Distraction Osteogenesis, Stability

Print Tag: Refer to original journal article
Sagittal split osteotomy to correct mandibular prognathism also improves mandibular movement when measured with a kinesiograph after surgery.

**Background:** Patients with mandibular prognathism and anterior cross-bite often have unusual patterns of chewing. As the mandible closes during chewing, it must often be protruded farther anteriorly to avoid immature contact with the maxillary incisors thus making the anterior crossbite even worse. What happens to mandibular movements once the anterior crossbite and mandibular prognathism are corrected with sagittal split osteotomy to produce a normal overbite/overjet? Does the patient still maintain the same chewing pattern or does it resemble a more normal chewing pattern?

**Objective:** To evaluate the effects of sagittal split ramus osteotomy on mandibular movement tracings of patients with mandibular protrusion after they had been surgically corrected to a normal overbite and overjet relationship.

**Design/Participants:** This was a retrospective evaluation of 14 subjects who had mandibular prognathism who were compared to a control sample of 30 subjects with normal occlusions.

**Methods:** Initially, prior to surgery, a kinesiograph was used to trace the pattern of chewing using the mandibular incisors during the chewing process. Both control subjects and patients with mandibular prognathism were evaluated. Then, after surgery, the surgical sample was re-evaluated to determine if any change had occurred in the mandibular movement during chewing.

**Results:** The results of this study showed that prior to jaw surgery, there is a significant difference in the mandibular movement and chewing pattern of patients with mandibular prognathism compared to those with a normal overbite/overjet relationship. After the jaw surgery, the surgical patients assume a more normal pattern of chewing and resemble the control subjects with their mandibular movement following surgery.

**Conclusions:** Sagittal split osteotomy to correct mandibular prognathism not only corrects the static occlusion, but also improves mandibular movement when measured with a kinesiograph after surgery.

**Reviewer's Comments:** Although I did not know the outcome of this article prior to reading it, I had assumed that some patients would have problems accommodating to the new chewing pattern after the jaw surgery had been performed. However, this study clearly shows that using a kinesiograph to measure the mandibular movement proves that patients who have anterior cross-bites correctly adapt quickly to a more normal mandibular movement during chewing. (Reviewer-Vincent G. Kokich, DDS, MSD).

Keywords: Mandibular Protrusion, Bilateral Sagittal Split Ramus Osteotomy, Mandibular Movement
Background: Today, periodontally involved or hopeless teeth are often extracted, and implants are used to replace these teeth. However, in some situations, it is not amenable to place the implants at the time of tooth extraction. In order to avoid alveolar bone loss, bone grafts are placed into the sockets. But, which bone grafting material is best in the human alveolus?

Objective: To compare the osteoconductive effects of deproteinized bovine bone mineral (DBBM), irradiated cancellous allograft (ICA), and solvent-dehydrated allograft (SDA) bone grafting in preserving extraction sockets.

Design/Participants: This was a retrospective evaluation of 20 patients who had received bone grafting of extraction sockets.

Methods: In 7 of these subjects, DBBM was used. In the remaining sample, either ICA (n=8) or SDA (n=5) was used. When the patients were scheduled for implant placement at 4 to 6 months after the surgery, all sites had healed uneventfully. A trephine was used to harvest a 2-mm diameter sample of each grafted area. These biopsies were prepared histologically to analyze the material within the socket.

Results: When the DBBM sites were evaluated, most of the grafted particles were incorporated with thin cortical bone that was newly deposited, forming osteophytes, while only a few DBBM particles were directly connected with the adjacent connective tissue. The authors found that the ICA and SDA sockets did not provide as mature of a bony response as the DBBM sites.

Conclusions: The authors conclude that the DBBM bone grafting technique resulted in the most favorable osteoconductive effect in extraction sockets prior to dental implantation.

Reviewer’s Comments: Although orthodontists are not actively involved in these types of bone grafting procedures, they may be involved in the treatment of patients who will have bone grafts placed prior to implant placement. It is good for orthodontists to be aware of the types of procedures that are being performed to enhance implant placement in some of our compromised adult patients. (Reviewer-Vincent G. Kokich, DDS, MSD).

Keywords: Extraction Sockets, Healing, Allografts

Print Tag: Refer to original journal article
Tooth transposition is a rare anomaly that occurs primarily in the maxilla.

**Background:** All orthodontists eventually are confronted with treating a patient with tooth transposition. Depending upon the treatment plan, the correction of tooth transposition can be very difficult. One option is to leave the teeth in a transposed position and the other is to correct the order and alignment of the affected teeth. How often does tooth transposition occur? Does it occur more commonly in males or females? In which arch is it more prevalent?

**Objective:** To perform a systematic evaluation and meta-analysis of the prevalence of tooth transposition in the population.

**Methods:** This meta-analysis initially evaluated 591 articles that had been published on tooth transposition. After careful scrutiny and comparison with the inclusion criteria, 9 studies were eventually analyzed and used to provide the data for this meta-analysis.

**Results:** The results of this study show that tooth transposition is relatively equally distributed between males and females. The incidence of tooth transposition in the population is <1% (0.33). The incidence of maxillary transposition was much higher than for mandibular tooth transposition. In addition, it has also been observed that unilateral transposition occurs much more frequently than bilateral tooth transposition.

**Conclusions:** Tooth transposition is a rare phenomenon that occurs primarily in the maxilla and is more commonly found unilaterally.

**Reviewer’s Comments:** This was an excellent overview of the existing literature and provides good information for orthodontists who occasionally have to treat this problem. Although this article did not discuss the actual treatment of transposed teeth, it did give valuable data regarding prevalence. (Reviewer-Vincent G. Kokich, DDS, MSD).

**Keywords:** Tooth Transposition

**Print Tag:** Refer to original journal article
Many root fractures that appear to be in the middle third of the root on 2-D radiographs actually are fractured in the cervical third on the palatal side when imaged in 3-D.

**Background:** Root fractures of permanent teeth are a relatively uncommon finding (0.5% to 7% of dental injuries), yet orthodontists are called upon to manage patients with these injuries. These fractures are typically classified based on the location of the fracture along the root (apical third, middle third, and coronal third). Those in the coronal third have the poorest prognosis. Traditional diagnosis utilizes periapical (PA) and occlusal (OC) radiographs. However, cone beam computed tomography (CBCT) offers a 3-D image for diagnosis with less radiation than a standard CT.

**Objective:** To compare PA and OC radiographs to CBCT for the diagnosis of root fractures.

**Design:** Observational

**Participants:** 38 patients (26 males and 12 females) treated for root fractures between 2004 and 2008 were included; 44 teeth were examined (43 central maxillary incisors and 1 lateral maxillary incisor).

**Methods:** OC and PA radiographs were taken of each fractured tooth using a standard dental radiographic technique. A limited view CBCT was also acquired with a 3 DX Accuitomo machine. The fracture had to be detectable on either the OC or PA radiograph to be included in the study (those just detected on CBCT were excluded). The fracture was classified using the OC and PA radiograph, the facial CBCT view, and the palatal CBCT view.

**Results:** Comparing OC and PA radiographs to the facial aspect of the CBCT image, 70.5% of cases were classified the same. However, when comparing OC and PA radiographs to the palatal CBCT view, only 31.8% of cases received the same classification. Using the palatal view from a CBCT image, 68% of cases showed a fracture in the cervical third.

**Conclusions:** Diagnoses of root fractures from 2-D and 3-D images do not correlate well. CBCT images offer significant advantages by viewing from multiple perspectives. Past literature concludes that the majority of fractures occur in the middle third, yet the current study found a majority (68%) are fractured in the cervical third on the palatal side. Further research will be needed to examine this result.

**Reviewer's Comments:** Obtaining a CBCT image on a patient with a suspected root fracture may yield valuable diagnostic information. Orthodontic patients receiving trauma to the anterior maxilla may benefit from a limited field of view CBCT to insure a proper diagnosis. An orthodontist with a CBCT machine in the office may offer to take such images on patients from their referring dentists as a good will, practice-building gesture. (Reviewer-Brent E. Larson, DDS, MS).

**Keywords:** Radiology, CBCT, Trauma

**Print Tag:** Refer to original journal article
In this report from the Dutchcleft study, infants with unilateral cleft lip and palate treated with infant orthopedics showed essentially the same growth pattern as those treated without early orthopedics.

**Background:** Retrospective studies have shown conflicting results for infant orthopedic treatment used on unilateral cleft lip and palate patients.

**Objective:** To conduct a randomized clinical trial comparing growth in children treated with and without infant orthopedic treatment.

**Design:** Prospective randomized clinical trial.

**Participants:** 54 subjects, recruited at birth, with unilateral cleft lip and palate were included. Half of the subjects received infant orthopedic treatment and the others did not.

**Methods:** Lateral cephalometric films were taken of all subjects at age 4 years and again at age 6 years. The films were traced, and a series of hard tissue and soft tissue measurements were made to assess growth changes. The children treated with infant orthopedics (IO+) were compared to those who did not receive orthopedic treatment (IO-). Those in the IO+ group used a passive orthopedic appliance adjusted every 4 to 6 weeks until the time of soft palate closure. All subjects had lip closure surgery at about 18 weeks of age and soft palate closure at about 1 year of age. There were no differences in the surgical timing or protocol between groups, and other interventions, such as lip revision or pharyngoplasty, were evenly divided between groups.

**Results:** Of the 27 subjects in each group at the beginning of the study, about 21 in each group were available for the 4- and 6-year follow-up. For the large majority of measurements, no difference was seen between the IO+ and the IO- groups. There was a difference at age 4 in the interincisal angle and at age 6 in the mentolabial angle.

**Conclusions:** In general, there was no measurable benefit to the use of infant orthopedic appliances when analyzing cephalometric outcomes at age 4 or age 6.

**Reviewer's Comments:** There continues to be those that advocate the use of infant orthopedics to improve the esthetic or functional outcome in cleft children. Frequently, these techniques are supported by retrospective studies showing improved results. However, as this study demonstrates, it is difficult to demonstrate improved outcomes with infant orthopedics when the techniques are subjected to randomized trials. (Reviewer-Brent E. Larson, DDS, MS).

Keywords: Cleft Lip/Palate, Infant Orthopedics, Treatment Outcome

Print Tag: Refer to original journal article
In this group of cleft subjects from 13 to 56 years of age, teeth adjacent to an alveolar cleft did not appear to be significantly more susceptible to gingival recession than the contralateral teeth.

**Background:** Rehabilitation of cleft patients requires good periodontal health adjacent to cleft sites.

**Objective:** To compare the degree of gingival recession of teeth adjacent to the cleft site with the contralateral teeth.

**Design:** Clinical study using calibrated examiners.

**Participants:** 193 subjects with cleft lip/palate presenting with 641 maxillary central incisors and canines.

**Methods:** Each subject was examined by 1 of 3 periodontists. The amount of gingival recession of the maxillary central incisors and canines was assessed along with other periodontal parameters, including gingival index, frenum attachments, and amount of keratinized tissue. Other data collected included the age, cleft location, tooth position, and history of orthodontic treatment. The gingival recession of each tooth was compared to its contralateral control.

**Results:** The presence of gingival recession in teeth adjacent to the cleft was approximately 1 in 5 with the canines affected slightly more than the central incisors. Most teeth with recession were in the age group of 22- to 42-year olds with too few subjects >42 years of age for comparison. Most observed recession was mild (majority <3 mm). In this population, the presence of a secondary bone graft did not correlate with recession and nor did the frenal attachment. A history of orthodontic appliances was correlated with increased recession on the right central incisor, but not any other teeth, making the authors think it may have been a spurious result.

**Conclusions:** The overall prevalence of gingival recession in the maxillary anterior region of this cleft group was low (21%). The teeth adjacent to the cleft were only slightly more affected than the contralateral teeth.

**Reviewer's Comments:** This study was done in Brazil where many of the subjects did not have secondary alveolar bone grafting done prior to restoration. So, these results may differ from a typical U.S. or European population where the majority of patients receive grafting during their rehabilitation. (Reviewer-Brent E. Larson, DDS, MS).

Keywords: Cleft Lip/Palate, Gingival Recession

Print Tag: Refer to original journal article
Airway volume and shape vary among patients with different anteroposterior jaw relationships.

**Background:** Constricted airways have long been thought to influence facial form. Is there in fact a relationship between pharyngeal airway volume and shape to facial morphology?

**Objective:** To assess the differences in airway shape and volume among subjects with various facial patterns.

**Participants:** The sample for this study consisted of 62 nongrowing patients.

**Methods:** Cone-beam computed tomography (CBCT) was used to evaluate the pharyngeal airway volume and shape for each patient. Subgroups of the sample, based on anteroposterior jaw relationships and vertical proportions, were identified. Differences in airway volume and shape were compared between the different subgroups.

**Results:** Face size is significantly larger in men than in women. There were no significant differences in the inferior, superior, and total airway volumes when the patients were divided into long-, normal-, and short-faced groups. Skeletal Class II patients often had a forward inclination of the airway, and skeletal Class III patients had a more vertically oriented airway. Airway volume and shape varied among patients with different anteroposterior relationships.

**Conclusions:** 3-D CBCT provides a way to better evaluate airway volume and shape.

**Reviewer's Comments:** The main value of this study was that it was pioneering the use of 3-D imaging to more accurately evaluate 3-dimensional structures such as the airway. While it has long been suspected that constricted airway volume has an effect on facial morphology, until the introduction of 3-D scanning, most evaluations were based on 2-D cephalometric radiographs. At this time, I believe the greatest contribution from 3-D to CT will be to improve the accuracy of research studies similar to this one. While there are certainly clinical advantages to 3-D CT, such as better isolation and location of impacted canines, I believe it will be awhile before 3-dimensional scanning becomes routine in orthodontic offices. (Reviewer-John S. Casko, DDS, MS, PhD).

Keywords: Facial Morphology, Airway Volume, Cone-Beam CT
Orthodontic patients who are taking bisphosphonates should be informed that treatment time could be prolonged and treatment results compromised.

**Background:** Drugs, such as bisphosphonates, reduce osteoclastic activity. Therefore, it is important to understand the effects of bisphosphonates on orthodontic tooth movement in order to provide proper informed consent to your patients.

**Objective:** To assess orthodontic tooth movement in rats receiving bisphosphonate treatment. **Materials:** 50 Sprague-Dawley rats.

**Methods:** The 50 rats were randomly divided into 2 groups of 25 each. One group was a control group and the second consisted of a treatment group that received alendronate (a bisphosphonate), which was administered at 1-week intervals for 5 weeks in the experimental group. A coil spring was activated across the span from the central incisors to the first molar. Vinyl polysiloxane impressions and a charged-couple device microscope camera were used to measure the space opening between the first and second molars at 2 and 4 weeks.

**Results:** There was statistically less orthodontic tooth movement in the alendronate group when compared with the control group at 2 and 4 weeks.

**Conclusions:** Administration of alendronate inhibits orthodontic tooth movement in rats by 75% at 2 weeks and by 58% at 4 weeks.

**Reviewer’s Comments:** This is another study that demonstrates the negative effects of bisphosphonates on tooth movement. The fact that some tooth movement did occur makes the decision as to whether or not you should treat patients on bisphosphonates even more difficult. It seems to me that attempting to provide limited tooth movement for some patients who are on oral bisphosphonates and do not require tooth extraction may be reasonable as long as the patient has been provided informed consent and understands that orthodontic treatment may need to be discontinued at any point. The American Association of Orthodontists now has a specific informed consent form related to the use of bisphosphonates that is available on its web site. (Reviewer-John S. Casko, DDS, MS, PhD).

**Keywords:** Tooth Movement, Bisphosphonates

**Print Tag:** Refer to original journal article
Rapid maxillary expansion results in an increase in nasal volume, which should be helpful for mouth breathers.

**Background:** Many patients require rapid maxillary expansion (RME) to correct a skeletally constricted maxilla. Some studies have suggested that RME also increases nasal volume, which would be helpful for mouth breathers. Wouldn't it be nice to know if this is true?

**Objective:** To evaluate the effect of RME on the volume of the nasal cavity by using computed tomography (CT).

**Participants:** The sample for this study consisted of 10 patients who had skeletal Class I relationships and 14 patients who had Class II relationships. All of the patients underwent a 3-month period of RME.

**Methods:** CT images of the head were obtained before treatment and at the end of a 3-month retention period following removal of the RME appliance. Changes in nasal airway volume before and after expansion were statistically analyzed.

**Results:** In both the Class I and Class II malocclusion groups and in the entire sample, there was a statistically significant increase in the volume of the nasal cavity after expansion. There was a statistically significant difference in the increase in the volume of the nasal cavity when the Class I and Class II patients were compared. The authors suggested that this difference was primarily due to the longer length of expansion in the Class II patients. There is no significant difference in the increase in volume of the nasal cavity related to skeletal maturity or sex.

**Conclusions:** RME results in a significant increase in nasal cavity volume.

**Reviewer's Comments:** In the past, much of the research evaluating airway volume has been done on traditional cephalometric radiographs that provided only a 2-dimensional view. Three-dimensional CT provides an excellent tool to measure 3-dimensional structures such as the nasal airway. The results of this study confirm previous studies that suggested that RME did have a positive effect in increasing the nasal airway, which could be helpful for mouth breathers. For your patients with skeletally constricted maxilllas who require RME, you can advise them that this procedure also has the benefit of increasing their airway. It is important, however, to understand that if a patient does not have a skeletally constricted maxilla, it would not be appropriate to use RME just to increase airway volume. (Reviewer-John S. Casko, DDS, MS, PhD).

Keywords: Nasal Cavity Volume, Rapid Maxillary Expansion, CT

Print Tag: Refer to original journal article