Initial force levels for incisor tipping using a clear aligner are found to be much higher than force levels generally thought to be ideal for such movements.

**Background:** Treatment of minor malocclusions with clear thermoplastic aligners is more commonly being used as an aesthetic alternative to fixed appliances. This can be done by manually resetting teeth on a plaster model or by models generated from a 3D computer model (Invisalign®). However, little research has been performed on the complex force systems generated by these types of appliances.

**Objective:** To determine the initial forces placed on a tipped central incisor by 3 types of thermoplastic aligner materials

**Design:** In vitro laboratory study using a simulated dentition.

**Methods:** A sensor cap able of measuring all forces and moments generated on a tooth was attached to a manual positioning system and placed into a standardized resin model of a maxillary arch. A plaster model was made of the arch with the incisor in a neutral position, and 5 aligners were manufactured from each of 3 thermoplastic materials: Ideal Clear® 1.0 mm; Erkodur® 1.0 mm; and Biolon® 1.0 mm. The tooth was then tipped in 9 steps from 0 to 0.416 degrees in both a palatal and facial direction (which corresponded to an incisal edge deviation of 0.15 mm). Forces were measured at each step, and statistical analysis was done using the Kruskal-Wallis and Wilcoxon tests.

**Results:** The mean tipping forces ranged from $-2.82 \pm 0.62$ N to $5.42 \pm 0.56$ N, and the mean intrusive forces ranged from $-0.41 \pm 0.52$ N to $-2.3 \pm 0.43$ N. The Biolon appliances produced significantly higher forces.

**Conclusions:** These force values are larger than those previously reported and are approximately 5 to 10 times higher than suggested ideal tipping forces (0.35 N to 0.60 N). Intrusive forces were present when tipping movements were simulated.

**Reviewer’s Comments:** The authors acknowledge that the lack of a periodontal ligament (PDL) is a major limitation of their model, as the PDL would decrease force levels after initial ligament compression. It is helpful to realize that there are side effects, such as intrusion forces, that are not readily apparent and that not all thermoplastic materials behave the same. It is clear that thermoplastic aligners can generate significant force levels, at least on initial insertion, that may be much higher that force levels thought to be ideal. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Force Levels, Invisalign, Clear Aligners

Print Tag: Refer to original journal article
Loading miniscrews immediately does not reduce their effectiveness.

**Background:** There are a number of different factors ranging from screw size to time of loading that can affect the success of miniscrews used as temporary anchorage devices. It is important for any orthodontist using miniscrews to understand these factors.

**Objective:** The aims of this review article were to analyze the reported success rates of miniscrews and to define guidelines for their selection and application.

**Methods:** To accomplish this, the authors did a Medline search that identified 734 articles. Using specific criteria, such as eliminating case reports or studies with <30 miniscrews, the authors identified 14 articles that matched all of their criteria.

**Results:** Based on a review of the 14 articles, the authors reached the following conclusions. An average success rate of approximately 83% was recorded. There was no difference related to sex, and older patients had a higher success rate. The success rate for the maxilla was higher than for the mandible, and there was no difference in the success rate between miniscrews that were immediately loaded versus those that had a delayed healing period. Miniscrews that were <8 mm in length and <1.2 mm in diameter had lower success rates and should be avoided. There was also no advantage to performing a surgical flap prior to screw placement.

**Conclusions:** There are specific characteristics related to miniscrew placement that can affect success rates.

**Reviewer’s Comments:** This was an excellent article. Because the authors reduced their Medline search from 734 articles to only 14 that met their specific criteria, the conclusions that they reach have a much higher level of validity. All of the conclusions reached in this study were very practical and clinically relevant, especially the need to avoid using miniscrews that were <8 mm in length and <1.2 mm in diameter. Also, since there is no advantage to using flap surgery, the flapless method should be used because it is less complicated and more patient friendly. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Miniscrews, Effectiveness, Characteristics

Print Tag: Refer to original journal article
Comparison of Posttreatment Occlusal Changes in Adults, Adolescents

*Age-Related Long-Term Posttreatment Occlusal and Arch Changes.*

Park H, Boley JC, et al:

Angle Orthod 2010; 80 (March): 247-253

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**Adolescents show significantly greater increases in mandibular incisor irregularity postretention compared to adults.**

**Background:** A common question asked of orthodontists is, “How long do patients have to wear their retainers?” I would like my patients to continue to wear retainers long-term at night. The reason is that changes can occur with time. But, are these changes related to the age at which the patient was treated? If an adult and a child both receive the same type of orthodontic treatment, when retainers are discontinued, would one or the other have greater or lesser postretention changes in their occlusion and tooth alignment?

**Objective:** The objective of this present study was to compare postretention occlusal and arch changes of adolescents and adults.

**Design/Participants:** This was a retrospective evaluation of randomly selected adolescent and adult subjects from 2 private orthodontic practices. The sample consisted of 96 subjects, with 51 adolescents and 45 adults.

**Methods:** Most of the patients were treated with extraction, and a few were treated nonextraction. The average age of the adolescents was 14 years, and the average age of the adults was 21 years. All subjects wore retainers for 3 years after treatment, and then were followed an additional average of 6 years to determine changes. Dental casts were measured before orthodontics, at the end of treatment, and after the postretention period. The authors measured several variables, including incisor irregularity, overjet, overbite, intercanine width, intermolar width, arch length, and the PAR index.

**Results:** The results of this study showed that besides midlines in adults, all of the occlusal variables increased over time. In other words, incisor irregularity, overjet, overbite, and the PAR index all increased in number. The arch length and intercanine width decreased with time. When the authors compared the results for adolescents and adults, they found that adolescents consistently showed greater increases of the occlusal variables than adults.

**Conclusions:** Over a long-term, postretention period, adolescents show significantly greater increases in mandibular incisor irregularity and the PAR index compared to adults.

**Reviewer’s Comments:** I personally treat a lot of adults, and I was unaware of this tendency. However, in reviewing this study, I am wondering if the reason for less change in adults was due to the fact that adults tend to wear their retainers more regularly and for a longer time. Perhaps the changes seen in adolescents are due to the tendency for younger individuals to be less cooperative with retainer wear compared to the adults. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Postretention, Age, Occlusal/Arch Changes

Print Tag: Refer to original journal article
Innovative Mechanics to Close an Anterior Open Bite

Correction of Anterior Open Bite Using Maxillary Third Molar Anchorage.

Uribe F, Posada L, Nanda R:

J Clin Orthod 2009; 43 (December): 773-778

In this case, the third molars, rather than temporary anchorage devices, were used as anchorage for rotation of the maxillary occlusal plane and extrusion of the upper incisors for closing an anterior open bite.

Background: Closure of a significant anterior open bite can often be very challenging, often leading clinicians to at least consider skeletal anchorage or surgery. However, an expendable tooth, such as a third molar, can be used as an anchor unit instead of using skeletal anchorage.

Design: Expert opinion and case report. Case Report: A 44-year-old male presented due to difficult chewing. The patient had minimal incisor display on smile and a 4-mm anterior open bite. He had a Class II subdivision right malocclusion with moderate upper crowding and mild lower crowding. Transversely, he showed an edge-to-edge tendency. The lateral cephalogram revealed a skeletal Class I relationship, with increased lower facial height, and a steep mandibular plane. The patient was reluctant to proceed with a surgical or skeletal anchorage treatment plan, so a purely orthodontic approach was used with extraction of the upper right first premolar to resolve the anterior crowding and achieve Class I canine on the right; 0.022" preadjusted appliances were bonded, and initial alignment and space closure was done. After 20 weeks, the extraction space was closed, and a 0.017" x 0.025" stainless steel archwire was sectioned between the laterals and canines to create an anterior and 2 posterior segments. A 0.017" x 0.025" beta titanium archwire was run from the third molars to vertical tubes distal to the canines. This rotated the posterior segments clockwise and extruded the maxillary incisors. The case was finished with a 0.017" x 0.025" beta titanium archwire and debonded after 26 months total. Composite buttons were placed on the incisors to engage a vacuum-formed clear retainer and prevent relapse of the open bite.

Conclusions: Using third molars and extrusion arches, clockwise rotation of the occlusal plane can be done to correct an anterior open bite. This may avoid the need for skeletal anchorage in some cases.

Reviewer’s Comments: This case report reminds us that significant orthodontic changes can be made using conventional anchorage techniques. The segmental mechanics employed were supplemented with vertical elastics, and the final superimposition shows the lower incisors extruded somewhat to help with the anterior open bite closure. In this case, surgical and skeletal anchorage options were rejected by the patient and yet an excellent outcome was obtained. Another helpful suggestion was that the open bite be retained by adding composite buttons to the upper incisors that engaged the vacuum-formed retainer. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Open Bite, Mechanics

Print Tag: Refer to original journal article
Prevalence of Temporomandibular Disorders in Obstructive Sleep Apnea Patients Referred for Oral Appliance Therapy.

Cunali PA, Almeida FR, et al:

J Orofac Pain 2009; 23 (October): 339-344

A high prevalence of pain associated with TMD exists in OSA patients referred for oral appliance therapy.

**Background:** Obstructive sleep apnea (OSA) is a commonly diagnosed problem today in the United States. These subjects have difficulty breathing while sleeping, and this can be a life-threatening problem. Oral appliance therapy to position the mandible forward is a common treatment. Is there any association between temporomandibular joint symptoms in these subjects with OSA who are referred for oral appliance therapy?

**Objective:** To evaluate the prevalence of pain associated with temporomandibular disorders (TMD) in OSA syndrome patients referred for oral appliance therapy.

**Design/Participants:** This was a retrospective analysis of 87 patients who had been referred for oral appliance therapy for their OSA. The sample consisted of 46 men and 41 women between the ages of 18 and 65 years.

**Methods:** The subjects had an apnea-hypopnea index of >5 and <30 events per sleep hour. In addition, all subjects had a body mass index of >30 kg/m². These subjects were then evaluated using research diagnostic criteria for TMD to determine the presence of signs of TMD.

**Results:** The results of this study showed that among the 87 patients with mild to moderate OSA, 52% presented some type of sign or symptom of TMD.

**Conclusions:** The authors conclude that the prevalence of pain associated with TMD and the impact of this dysfunctional pain were high in OSA patients referred for oral appliance therapy.

**Reviewer's Comments:** I found this correlation between TMD and OSA to be very interesting. In the area that I practice, there are some general dentists who are routinely placing oral appliances on OSA patients in order to improve their breathing at night while they sleep. I wonder if these clinicians are also assessing these patients for temporomandibular joint pain or muscle pain, which, in this study, appeared to be highly prevalent in their sample of OSA subjects. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: TMD, Obstructive Sleep Apnea, Oral Appliance Therapy

Print Tag: Refer to original journal article
SARME Can Increase Airway Dimensions

Effects of Surgically Assisted Rapid Maxillary Expansion on Nasal Dimensions Using Acoustic Rhinometry.

Mitsuda ST, Pereira MD, et al:


Both total nasal volume and minimal cross-sectional area are found to significantly increase in adult subjects undergoing SARME for treatment of maxillary constriction.

**Background:** Once patients reach skeletal maturity, orthopedic expansion of the maxilla for treatment of transverse deficiency typically involves surgically assisted rapid maxillary expansion (SARME). This consists of osteotomies in the walls and pillars of the maxilla to reduce the resistance to expansion prior to the activation of an orthopedic device. Patients have reported respiratory improvements after expansion, but nasal obstruction is difficult to measure. Acoustic rhinometry can be used to study nasal dimensions by analyzing acoustic wave reflection on the nasal cavity walls.

**Objective:** To evaluate the affects of SARME on nasal dimensions using acoustic rhinometry.

**Design:** Prospective clinical study.

**Participants:** 27 patients (11 males and 16 females) with maxillary transverse deficiency >7 mm, bilateral posterior crossbite, and no evidence of nasal obstruction were included.

**Methods:** Hyrax appliances were cemented to the dentition in all patients, and then the midpalatal suture was surgically released and osteotomies were performed on all maxillary walls, including bilateral pterygomaxillary disjunction. The Hyrax was activated 1.6 mm the day of surgery and, after initial healing, 0.4 mm each day until the planned expansion was achieved. Acoustic rhinometry was done prior to expansion and 6 months following expansion and was used to measure total nasal volume and the minimal cross-sectional area. At each time point, 5 measurements were done without decongestant and then 5 measurements were done following use of a decongestant.

**Results:** For the right nasal cavity, nasal volume increased a mean of 60% with a decongestant and 47% without a decongestant. For the left nasal cavity, nasal volume increased a mean of 65% with a decongestant and 59% without a decongestant. A statistically significant increase in minimal cross-sectional area and total nasal volume was found after SARME both with and without decongestant use.

**Conclusions:** SARME can increase the minimal cross-sectional area and total volume of the nasal cavity.

**Reviewer’s Comments:** This study demonstrates that SARME can impact nasal dimensions, but still does not really address whether it can improve nasal function. Can it change an obligate mouth breather into a nose breather? I am still a bit leery of the nasal rhinometry as a measurement tool that provides meaningful information, and I am also somewhat concerned that the rhinometry in this study seems to have been done by the surgeon who was involved in the SARME rather than an independent, blinded observer. But, it is encouraging to see that several studies now seem to support the airway improvement with SARME.

(Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Maxillary Expansion, SARME, Nasal Airway, Acoustic Rhinometry

Print Tag: Refer to original journal article
**Interceptive Orthodontic Tx Alone Better Than Doing Nothing**

*Effectiveness of Interceptive Orthodontic Treatment in Reducing Malocclusions.*

King GJ, Brudvik P:


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Approximately one-third of patients who receive only interceptive orthodontic treatment have results that are not improved or worse.

**Background:** Is interceptive treatment more effective than no treatment in improving malocclusions? This is a critical question for countries with limited financial and treatment options.

**Objective:** To compare the effectiveness of doing only interceptive orthodontic treatment versus doing no treatment at all.

**Participants:** The sample for this study consisted of 2 groups of patients whose initial ages were slightly >9 years.

**Methods:** For the control group of 113 subjects, models were taken initially and 2 years later with no treatment being done. In the treatment group, models were taken initially and after the completion of interceptive orthodontic treatment. The index of complexity, outcome and need (ICON) was used to evaluate the initial need for treatment and final treatment outcome acceptability. The changes between the 2 groups after the 2-year period were statistically analyzed.

**Results:** The untreated group, as might be expected, showed no improvement in their malocclusions. The scores for the treatment group improved approximately 39%; however, approximately one-third of the treatment group had final malocclusions that were categorized as "not improved or worse." Also, the mean scores for the final models in the treatment group were above the cut-off line that is considered acceptable treatment.

**Conclusions:** A systematic program of interceptive orthodontic treatment during the mixed dentition is more effective than doing nothing to improve malocclusions over the near term.

**Reviewer's Comments:** This was an interesting study that has more relevance for countries with limited financial and treatment resources and that provides a basis for using these limited financial resources to perform interceptive orthodontic treatment versus doing nothing. It has much less relevance in countries where comprehensive orthodontic treatment is widely available. It did not surprise me that the treatment group had a greater improvement in malocclusions versus doing nothing, but it did surprise me that in that group approximately one-third of the patients had final results that were categorized as not improved or worse. I would like to have seen a breakdown of the specific treatment regimens and appliances that were used in the treatment group. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Malocclusions, Interceptive Orthodontic Tx

Print Tag: Refer to original journal article
Acupuncture Effective in Reducing TMD Myofascial Pain

Randomized Clinical Trial of Acupuncture for Myofascial Pain of the Jaw Muscles.
Shen YF, Younger J, et al:

J Orofac Pain 2009; 23 (October): 353-359

Acupuncture produced a significant reduction in myofascial pain in a group of chronic TMD subjects.

Background: Myofascial pain is a common symptom of temporomandibular joint disorders (TMD). In most patients, this problem is aggravated by clenching or tooth bruxing. A common treatment is the use of an occlusal splint; however, in some individuals, the splint is not effective. Are there other alternatives? How about acupuncture?

Objective: To evaluate the effectiveness of acupuncture in treating symptoms associated with myofascial pain of the jaw muscles.

Design/Participants: This was a prospective, randomized, clinical trial of 28 subjects with chronic myofascial pain.

Methods: The subjects were evaluated and then randomly divided into 2 groups. One group received real acupuncture, while the other received a sham acupuncture procedure. Prior to the acupuncture, the subjects were asked to clench their teeth steadily for 2 minutes and were given a visual analog scale to assess their level of myofascial pain. Following this, one group received true acupuncture and the other received the sham procedure. This was followed by a second evaluation using a visual analog scale to rate the pain following the acupuncture procedure. The responses were then compared between the groups.

Results: The results of this study showed that the real acupuncture subjects experienced a significant reduction in pain compared to those subjects who only received the sham acupuncture. No pain reduction was observed in the sham acupuncture group.

Conclusions: The authors conclude that acupuncture can provide short-term relief of myofascial pain in subjects with chronic TMD.

Reviewer's Comments: I was unaware of the benefit of acupuncture for treating myofascial pain. My typical treatment for subjects with muscle pain is to provide them with an occlusal splint to be worn predominantly at night. Most dentists are aware that these splints can work favorably in a high percentage of individuals if they wear the splint. However, there are certain subjects who simply cannot tolerate the splint or it is unsuccessful. It appears from this study that acupuncture could be applied to some of these subjects, at least over a short-term. Hopefully, these researchers will continue to determine if there is any long-term benefit of myofascial pain relief in patients with chronic TMD in the future. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Jaw Muscles, Myofascial Pain, Acupuncture

Print Tag: Refer to original journal article
In this survey of post-orthodontic patients in Australia, the respondents generally preferred bonded retainers over removable retainers based on comfort and quality of life.

**Background:** Since many studies have shown frequent relapse after orthodontic treatment, long-term retention has become much more common. Fixed retainers, especially in the mandibular anterior, are often advocated because they do not rely on patient compliance. However, little research has been done on patient opinions of long-term retainers.

**Objective:** To solicit patient opinions on bonded versus removable retainers.

**Design:** Survey.

**Participants:** 61 patients treated by the primary author (671 patients were randomly selected, 236 had valid phone numbers, and 61 consented to the study – 9.1% of the initial sample). Forty-six patients had at least 1 bonded retainer placed, and 15 patients who wore maxillary Hawley retainers and mandibular spring aligners served as a control group.

**Methods:** A questionnaire was given to each patient to determine demographics, general and dental health, oral hygiene practices, and opinions on retainer comfort and results. A clinical examination was also done on each patient to assess relapse by the Little Irregularity Index.

**Results:** The percentage of patients who rated removable retainers as good or very good were 54% for comfort, 69% for hygiene, and 45% for impact on quality of life. For fixed retainers, these percentages were 95% for comfort, 78% for hygiene, and 95% for impact on quality of life. However, these differences were not statistically significant. For 30 patients who had both a fixed and removable retainer, 100% found the fixed retainer the same or more comfortable, and 73% rated their hygiene as the same or better. Patients given removable retainers often stopped wearing them, and 63% of patients noticed relapse in their result.

**Conclusions:** Many patients preferred fixed retainers for comfort, hygiene, and quality of life. Patients did not seem to find oral hygiene with fixed retainers more difficult.

**Reviewer’s Comments:** I was initially surprised that patients did not find hygiene more difficult with bonded retainers, but this makes more sense when you consider only 33% of these patients flossed daily. Although these results generally seemed to favor bonded retainers, there was no strong negative reaction to either fixed or removable retainers. Ultimately, the retention decision will still depend on clinician and patient preference. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Retention, Bonded Retainers, Survey

Print Tag: Refer to original journal article
Using Miniscrews to Avoid Maxillary Surgery

Mandibular Deviation and Canted Maxillary Occlusal Plane Treated With Miniscrews and Intraoral Vertical Ramus Osteotomy: Functional and Morphologic Changes.

Hashimoto T, Fukunaga T, et al:


In unique circumstances, using miniscrew anchorage to correct a maxillary canted occlusal plane can avoid the need for bimaxillary surgery in patients with an asymmetric mandible.

**Background:** Most patients who have a canted maxillary occlusal plane and a horizontally deviated mandible require both maxillary and mandibular surgery. Are there specific instances in patients with this type of malocclusion in which maxillary surgery can be avoided?

**Objective:** The purpose of this case report article was to describe the treatment of a 16-year-old male who presented with a canted maxillary occlusal plane and chin deviation to the left. **Case Report:** The patient had a Class III malocclusion on the right side and a Class II malocclusion on the left side with normal overjet and minimal crowding in both arches. The patient had a normal profile with a significant deviation of the chin to the left. Treatment for this patient consisted of leveling the canted maxillary occlusal plane by intruding the maxillary right posterior teeth with a segmented archwire anchored by a miniscrew placed between the first and second molars. After leveling the maxillary arch, an intraoral vertical ramus osteotomy was performed to correct both the horizontal and vertical asymmetries of the mandible. The dental and facial post-treatment results are excellent.

**Conclusions:** By using miniscrew anchorage to level the maxillary occlusion, surgery was limited to only the mandibular arch.

**Reviewer's Comments:** The treatment in this case was successful because the patient presented with a unique set of problems. He had a cant to the maxillary occlusal plane due to extrusion of the maxillary right posterior teeth and also had a normal anteroposterior position of the maxilla and normal overjet. If the patient had required any anteroposterior repositioning of the maxillary bimaxillary, surgery would have been required. This case report provides an excellent example demonstrating how miniscrew anchorage can be used as an excellent adjunct to treatment. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Mandible, Maxillary, Miniscrews, Osteotomy

Print Tag: Refer to original journal article
Immediate vs Early Loading on Osseointegration of Orthodontic Micro-Screws

Osseointegration of Orthodontic Micro-Screws After Immediate and Early Loading.
Zhang L, Zhao Z, et al:

Angle Orthod 2010; 80 (March): 354-360

A 4-week waiting period prior to loading of self-tapping micro-screws results in significantly more bone-to-implant contact.

Background: A common question following insertion of mini-implants is the time to load these titanium screws. If no drilling has occurred and the implant is self-tapping, most research articles suggest early loading is possible. What happens if a waiting period occurs prior to loading of self-tapping implants? Will further osseointegration occur?

Objective: To investigate the desirable healing time of micro-screws by histomorphologic and histomorphometric evaluations of osseointegration. Design/Subjects: This was an experimental study performed on beagle dogs.

Methods: 9 adult beagle dogs were used and 6 micro-screws were placed in the maxilla between the maxillary premolars and molars in all animals. The animals were divided into 3 groups. In one group, the self-tapping implants were placed and a 100-gm load was placed immediately. In the second group, a 2-week waiting period occurred before loading of the micro-screws. In the third group, a 4-week waiting period was allowed prior to loading of the micro-screws. All loading occurred over an 8-week period. At that time, bone blocks were removed to perform histomorphometric and histomorphologic analysis of the bone-implant relationship.

Results: The results of this study showed that the bone implant contact ratios were 43.74% for the immediate loading group, 66.26% for the 2-week wait group, and 73.28% for the group where a 4-week waiting period occurred before loading.

Conclusions: The authors conclude that a longer waiting period after placement of micro-screws may be desirable to allow more osseointegration and greater stability for those implants that may be used over a longer term.

Reviewer's Comments: This was an interesting study. In most investigations of loading of mini-implants, it is recommended that for self-tapping implants, immediate loading is possible. However, several of my colleagues report failure and loss or loosening of the mini-implants. Perhaps a longer waiting period is necessary to allow for integration, especially if the implant is to be used over a longer period of time. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Micro-Screws, Osseointegration

Print Tag: Refer to original journal article
Supracrestal fiberotomy using a laser reduces rotational relapse significantly.

**Background:** The stability of orthodontically rotated teeth is a concern after treatment. One of the primary causes of rotational relapse is due to the transseptal fibers of the periodontium, which are stretched when a tooth is rotated. In the past, it has been suggested that supracrestal fiberotomy can improve this relapse tendency. Today, lasers are used for some types of periodontal surgery. Could either laser-aided supracrestal fiberotomy, or laser therapy, be used to reduce rotational relapse after orthodontic treatment?

**Objective:** To evaluate the effectiveness and periodontal side effects of laser supracrestal fiberotomy and low-level laser therapy on orthodontically rotated teeth.

**Design/Subjects:** This was an experimental study performed in beagle dogs.

**Methods:** 9 dogs were utilized in this sample. The mandibular lateral incisors in all 9 animals were rotated using orthodontic appliances. The animals were divided into 3 groups. In one group, only rotation was performed and then the animals were observed over a 4-week period. In the second group, a laser was used to perform circumferential supracrestal fiberotomy (CSF) immediately after the tooth rotation had occurred. These animals were also observed 4 weeks later. In the third group, low-level laser therapy applying the laser to the labial surface of the gingiva was performed every 3 days for 3 weeks after the teeth had been rotated. After the 4-week interval, the amount of rotation was compared between the animal groups.

**Results:** The results of this study showed that in the control group, the amount of rotational relapse was 41% without any laser treatment. In the sample that had laser-aided CSF, the relapse was only 14%. In the group that received the low-level laser therapy, the amount of rotational relapse was 56% after 4 weeks.

**Conclusions:** The authors conclude that laser-aided CSF is an effective procedure to decrease relapse following tooth rotation and that it causes little damage to the supporting periodontal structures.

**Reviewer’s Comments:** This was a very interesting study. However, I am not certain of the direct application of the periodontal outcome of laser supracrestal fiberotomy can be applied directly from dogs to humans. I would like to see this study duplicated in humans to determine if the same periodontal response would be found after doing laser-aided supracrestal fiberotomy in orthodontic patients. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Laser Treatment, Rotated Teeth, CSF, Relapse

Print Tag: Refer to original journal article
Orthognathic Surgery for Class III Malocclusion Positively Effects Lip Morphology

Lip Morphology Changes Following Orthognathic Surgery for Class III Malocclusion.
Islam R, Kitahara T, et al

344-353

Soft tissue lip morphology shows significant improvement after orthognathic surgery for Class III malocclusion.

**Background:** The objective of orthognathic surgery is to improve the relationship between the skeletal and dental components of the face. In addition, it is important to improve the soft tissue aesthetics, especially the lips. What happens to lip aesthetics during the surgical correction for Class III malocclusion?

**Objective:** To determine the morphologic changes of the lips and the degree of improvement in the smile after surgical correction for Class III malocclusion.

**Design/Participants:** This was a retrospective analysis of 30 adult females with Angle Class III malocclusions and mandibular prognathism.

**Methods:** All subjects underwent orthodontic treatment and mandibular osteotomy to reduce the mandibular prognathism. Prior to treatment, photographs were made of each patient, both in a relaxed lip position as well as a posed smiling situation. Following jaw surgery and removal of orthodontic appliances, the same types of photographs were taken. The authors then digitized landmarks on the photographs to depict the changes in lip form that occurred. These landmarks were placed on x/y coordinates so that the distances could be accurately measured. In addition, a group of control subjects, who had normal occlusions, was also evaluated. The control group was also digitized to determine the form and position of lips at rest and upon smiling. Then the 2 groups (control and surgical subjects) were compared to determine any changes that occurred in the surgical group and how they matched the control group.

**Results:** The results of this study showed that in the smiles of the Class III pretreatment group, both the upper and lower lips moved to an inferior position and the upward movement of the upper lip and corners of the mouth were smaller compared with those of the control group. However, after surgery, the soft tissue morphology of the lips showed a significant improvement for the Class III malocclusion subjects.

**Conclusions:** The authors conclude that orthognathic surgery to correct Class III malocclusion has a substantial positive effect on lip morphology at rest and upon smiling.

**Reviewer's Comments:** This was an interesting study using digitized points on the lips of both control and surgical subjects to compare and determine relationships between the 2 groups as it depicted the aesthetics of their smiles. In the future, this type of study will probably be performed using 3-dimensional imaging of facial form. (Reviewer-Vincent G. Kokich, DDS, MSD).

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Keywords: Malocclusion, Jaw Surgery, Lip Morphology

Print Tag: Refer to original journal article
Prior to orthodontic treatment, the presence of a malocclusion has a negative impact on facial attractiveness.

**Background:** Over the past few years, many studies have been done to evaluate the importance of tooth position and smile on overall attractiveness. Some of these studies simply look at the teeth, while others evaluate the full face view. However, until now, no studies have evaluated the face without looking at the smile. **Objective:** To evaluate the importance of the posed smile and the role of orthodontic treatment on overall facial attractiveness. **Participants/Methods:** A sample of 80 female patients was obtained from pre- and post-treatment orthodontic photographs of treated subjects. From the 80 females, 48 were randomly selected to participate in the assessments of facial attractiveness. Two groups of evaluators were organized. The first panel consisted of 20 laypersons from the general public and the second panel consisted of 20 full or part-time orthodontic faculty members. Pretreatment and post-treatment photographs were evaluated by each of the panelists. Three types of images were presented for each of the 48 subjects both before and after treatment. The first image was a cropped image of only teeth. The second image was a full-face photograph, and the third image was a full-face photograph, but the teeth were blocked out so that only facial characteristics could be seen. This was performed for both pre- and post-treatment subjects. The evaluators used a visual analog scale, which assessed the aesthetics of the patient's facial attractiveness. **Results:** The results of this study showed that overall facial harmony and tooth alignment were most important to both evaluator panels, while skin and hair were least important. With respect to the primary objective of the study, the results showed that the posed smile has considerable impact on facial aesthetics, especially before treatment. More specifically, the authors found that an unattractive smile has a negative influence on overall facial attractiveness. After orthodontic treatment, a correct malocclusion is more in harmony with overall facial attractiveness. In addition, orthodontists and lay evaluators generally agreed on the appraisal of attractive subjects. **Conclusions:** The authors conclude that before orthodontic treatment, the presence of a malocclusion can have a negative impact on facial attractiveness. **Reviewer’s Comments:** This study is intriguing. In the past, I have not seen a study where the mouth was blocked out so that evaluators could only evaluate the facial characteristics without the smile. This study clearly shows the impact of unattractive dentition on both orthodontists and layperson's assessment of overall facial attractiveness. (Reviewer-Vincent G. Kokich, DDS, MSD). © 2010, Oakstone Medical Publishing

**Keywords:** Facial Aesthetics, Smile, Dentition

**Print Tag:** Refer to original journal article
This laboratory study showed increased microleakage between composite and spiral wires when using flowable composites, which could suggest reduced long-term performance in the mouth.

**Background:** Due to the high relapse potential of mandibular incisors, bonded lingual retainers are very common. While many methods exist for fabricating these retainers, flexible spiral wire retainers (FSWRs) are often used because they allow physiologic movement of teeth and provide mechanical retention for the composite. However, bonding failures do occur at both the composite-wire interface and the composite-enamel interface, which may be related to microleakage.

**Objective:** To compare the microleakage of 3 different composites used to bond FSWRs.

**Design:** In vitro laboratory study.

**Materials/Methods:** 45 human lower incisors extracted for periodontal reasons were divided into 3 groups using 3 composites: Transbond XT; Transbond LR; and Venus Flow (flowable). All teeth were scaled, pumiced, and etched for 30 seconds with 37% phosphoric acid. Primer and composite were placed as directed by the manufacturer for each group bonding a multi-stranded 0.0215” spiral wire to the lingual surface. The composite was applied so that the bulk was 4 mm in diameter and 1 mm thick. Teeth were immersed in dye for 24 hours and then sectioned in the transverse plane. Microleakage was determined by direct measurement using an electronic digital caliper.

**Results:** Little or no microleakage was detected at the composite-enamel interface. However, statistically significant microleakage was found for the flowable composite, Venus Flow (mean, 4.8 ± 0.8 mm). The other composites, Transbond XT (0.5 ± 0.3 mm) and Transbond LR (1.1 ± 1.2 mm), showed significantly less microleakage.

**Conclusions:** Flowable composites show significantly higher microleakage at the composite-wire interface. All composites showed little to no microleakage at the composite-enamel interface.

**Reviewer’s Comments:** This study suggests that flowable composites may not be the best choice for bonding lingual retainer wires because of increased microleakage between the composite and spiral wire. However, this is a laboratory study and clinical results are needed before I am ready to reduce my use of flowable composites for bonding lingual retainers. I find the flowable composites very useful for bonding lingual retainers and my clinical impression is that they have excellent longevity in actual use. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Bonding, Lingual Retainers, Composites

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Tongue position, as represented by in-mouth air cavity assessment, is measurably different in Class III and Class II subjects.

**Background:** Tongue position is of interest to orthodontists as it may affect the equilibrium position of the dentition. Tongue position may be estimated by examining the in-mouth air cavity (IMAC), the volume between the surface of the tongue and roof of the palatal vault.

**Objective:** To determine the relationship between tongue position and palatal vault dimensions.

**Participants:** 15 men (23 to 25 years old) and 35 women (21 to 24 years old) selected from 300 dental students at Auvergne University were included. Selected students had no history of orthodontics, orthopedic therapies, or occlusal adjustment and had a cephalogram that clearly displayed tongue and soft palate outlines.

**Methods:** IMAC volume was calculated from a ratio between cross-sectional IMAC and palatal vault area measured on the cephalogram multiplied by the volume of the palatal vault as measured from the dental cast. This resulting volume was correlated to the palatal vault height, width, and length.

**Results:** 10 subjects had the tongue positioned against the palate, so no IMAC could be calculated. For the remaining 40 subjects, the average IMAC volume was 8.9 ± 4.8 mL. The IMAC volume was larger in men (approximately 2 mL) and skeletal Class III malocclusions. It was smallest in skeletal Class II malocclusions. The volume was significantly correlated to palatal vault height, but not to width or length.

**Conclusions:** Palatal vault height, gender, and skeletal malocclusions all affect measured IMAC. A companion article will evaluate this same sample by echography and correlate the measured IMAC volumes.

**Reviewer’s Comments:** We need to develop better methods to study the influence of tongue posture and position on the development of malocclusion, and this was a reasonable effort using available orthodontic records. However, I am not sure at this point how the air-cavity volume relates to the tongue position. This method also assumes the tongue position captured with the teeth in occlusion on the cephalogram is representative of its normal postural position, which may not be the case. (Reviewer-Brent E. Larson, DDS, MS).

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**Keywords:** Tongue Position, Palatal Vault

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The Effect of Lingual Orthodontic Appliances on Periodontal Health

Influence of Lingual Orthodontic Therapy on Microbial Parameters and Periodontal Status in Adults.
Demling A, Demling C, et al:
Eur J Orthod 2009; 31 (December): 638-642

This small clinical study showed an increase in plaque, pocket depth, and bleeding upon probing on the lingual aspect of teeth with lingual orthodontic appliances in place. No shift in bacterial flora was seen.

**Background:** Traditional buccal appliances are known to cause an increase in plaque formation and caries due to the increase in plaque retention sites and difficulty of plaque removal. They have also been linked to increased prevalence of periodontal pathogens, such as *Aggregatibacter actinomycetemcomitans* (Aa) and *Porphyromonas gingivalis* (Pg). However, similar studies have not been done with lingual appliances.

**Objective:** To determine the influence of fixed lingual appliances on periodontal status and microbial flora.

**Design:** Prospective clinical trial with buccal sites used as controls.

**Participants:** 10 consecutively treated patients (8 females and 2 males) receiving lingual orthodontic appliances at the Department of Orthodontics, Hannover Medical School were included. The patients were between 23 and 36 years old and did not have any systemic illness, current smoking history, or periodontitis (pocket depths >4 mm or radiographic bone loss).

**Methods:** All patients were treated with Incognito fixed lingual appliances by experienced clinicians (>5 years of experience). Bonding was done indirectly after enamel etching, and composite flash was removed. Pocket probing depths (PPD), bleeding on probing (BOP), and plaque index (PI) were measured on 6 designated teeth by the same clinician on the day of bonding and after 3 months of treatment. In addition, samples of sulcus fluid were analyzed to determine the prevalence of Aa and Pg.

**Results:** For the lingual sites, BOP increased from 22.2% ± 19.0% to 56.2% ± 31.6%, PPD increased from 2.3 mm ± 0.3 mm to 2.9 mm ± 0.3 mm, and PI increased from 0.1 ± 0.2 to 1.2 ± 1.1. These changes were all statistically significant. No significant differences in Aa or Pg levels were found.

**Conclusions:** Over 3 months, no significant increase in periodontal pathogens was noted. However, fixed lingual appliances increased plaque levels and worsened clinical periodontal measurements.

**Reviewer’s Comments:** Just as normal facial orthodontic appliances increase plaque retention and have periodontal effects, we now know that lingual appliances can have a similar impact on the lingual tissues. While it is difficult to know whether these short-term changes in periodontal indicators could result in long-term periodontal damage, it is important to realize the tendency for plaque retention and tissue irritation. Because of the difficulty in visualizing the lingual side of the teeth, patients receiving lingual appliances should be carefully instructed in cleaning techniques and monitored for periodontal changes. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Periodontal Health, Lingual Appliances

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Direct Relationship Between Breastfeeding and Posterior Crossbite

Relationship Between Breastfeeding Duration and Prevalence of Posterior Crossbite in the Deciduous Dentition.
Kobayashi HM, Scavone H Jr, et al:
Am J Orthod Dentofacial Orthop 2010; 137 (January): 54-58

The longer a mother breast-feeds, the less likely the child will have a posterior crossbite.

**Background:** Is there a relationship between breastfeeding and posterior crossbite in the primary dentition? This is information that an orthodontist should know.

**Objective:** To analyze the relationship between breastfeeding duration and the prevalence of posterior crossbite in the deciduous dentition.

**Participants:** The sample for this study consisted of 1377 Brazilian children in the deciduous dentition from 3 to 6 years of age.

**Methods:** The sample was divided into 4 groups based on the duration of exclusive breastfeeding: group 1 (G1), never; group 2 (G2), <6 months; group 3 (G3), 6 to 12 months; and group 4 (G4), >12 months. The presence of posterior crossbite was recorded for each group. Statistical analyses were used to evaluate the difference in the percentage of patients in each group who presented with a posterior crossbite.

**Results:** Of the total sample, the prevalence of posterior crossbite was slightly >16%, with approximately 3% of the children having bilateral crossbite, 4.4% with true unilateral crossbite, and 9.4% having functional unilateral crossbite. Posterior crossbite was recorded in 31.1%, 22.4%, 8.3% and 2.2% of the children in G1, G2, G3, and G4, respectively. Children who were breastfed for >12 months had a 20-fold lower risk for the development of posterior crossbite compared with children who were never breastfed. They also had a 5-fold lower risk for posterior crossbite when compared with those breastfed between 6 and 12 months.

**Conclusions:** There is a direct relationship between the prevalence of posterior crossbite in the deciduous dentition and the length of time of breastfeeding.

**Reviewer's Comments:** This was a well-done study that had a very large sample size. Based on the results, there appears to be no question that children who are breastfed for at least 12 months have a significantly reduced likelihood of having a posterior crossbite in the primary dentition. This is good information for parents to know; however, I suspect that there are probably a number of other equally or more important reasons for mothers to make the decision about the length of breastfeeding. (Reviewer-John S. Casko, DDS, MS, PhD).

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**Keywords:** Posterior Crossbite, Breastfeeding

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Important to Know Which Patterns of Tooth Wear Are Normal

Tooth Wear Patterns in Subjects With Class II Division 1 Malocclusion and Normal Occlusion.

Janson G, Oltramari-Navarro PVP, et al:


It is normal to see greater tooth wear on the palatal surfaces of the maxillary central incisors and the incisal surfaces of the maxillary canines for patients with a normal occlusion versus a Class II malocclusion.

Background: Is it normal for patients with a Class I occlusion to have different tooth wear patterns than patients with a Class II Division 1 malocclusion? Knowing the answer to this question would be helpful to identify tooth wear patterns that are normal.

Objective: To evaluate the prevalence of tooth wear in adolescents with Class II malocclusion compared to adolescents with normal occlusion. Sample: The sample for this study consisted of dental casts from 310 subjects.

Methods: The subjects were divided into 3 groups. Group 1 consisted of patients with normal occlusion, Group 2 patients had complete Class II Division 1 malocclusion, and Group 3 patients had half-cusp Class II Division 1 malocclusion. Dental wear on the casts from the 3 groups was assessed by using a modified version of the tooth-wear index (TWI), and the difference in tooth wear patterns was evaluated statistically.

Results: The casts from the normal occlusion group had greater wear on the palatal surfaces of the maxillary central incisors and the incisal surfaces of the maxillary canines compared to both Class II malocclusion groups. The complete and half-cusp Class II Division 1 malocclusion groups had greater wear on the occlusal surfaces of the maxillary second premolar and first molar, the occlusal surfaces of the mandibular premolars, and the buccal surfaces of the mandibular posterior teeth when compared with the normal occlusion group. The half-cusp Class II Division 1 malocclusion group had greater wear on the incisal surfaces of the mandibular incisors compared with the complete Class II Division 1 malocclusion group.

Conclusions: Subjects with normal occlusion or complete or half-cusp Class II Division 1 malocclusions have different tooth wear patterns.

Reviewer’s Comments: This was an interesting study. Some of the findings made sense to me and some did not. It seems reasonable to me that patients with normal occlusion would have greater tooth wear on the palatal surfaces of the maxillary central incisors because they did not have excessive overjet, and it also made sense that they would have more wear on the incisal surfaces of the maxillary canines because they would be more likely to have a cuspid-protected occlusion. What did not make sense to me was why the half-cusp Class II Division 1 group had greater tooth wear on the incisal surfaces of the mandibular incisors compared with the complete Class II Division 1 malocclusion group. In any case, I believe it is helpful to know which patterns of tooth wear are normal for each group. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Malocclusion, Normal Occlusion, Tooth Wear Patterns

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There is no significant difference in oral discomfort based on the specific type of palatal expander that is used.

**Background:** When you place a palatal expander in one of your patients, should they expect to have an initial period of pain and discomfort? If so, how long should this period last. Understanding the answers to these questions can help you better inform your patients prior to treatment.

**Objectives:** To assess whether patients in different age groups undergoing palatal expansion with various types of expanders experience discomfort, speech impairment, chewing difficulty, and swallowing disturbances.

**Participants:** The sample for this study consisted of 165 patients who were treated with 4 different types of palatal expanders by a number of different orthodontists.

**Methods:** A questionnaire was distributed to each of these patients who had received palatal expanders in the last 3 to 12 months. These questionnaires evaluated oral discomfort and problems with speech and mastication. The 4 different types of expanders included in the study were a Hyrax expander, a Haas expander, a bonded expander, and a quad-helix.

**Results:** An overwhelming majority of the patients experienced oral discomfort and had problems with speech and mastication. However, these symptoms lasted for only 1 week. There was no relationship between problems experienced and the type of expander that was used, and there was also no relationship between the problems that were experienced and age or sex.

**Conclusions:** Potentially negative impacts of placing a palatal expander are mild, transitory, and independent of appliance design, sex, or age.

**Reviewer's Comments:** This is good information to know. You can use the results of this study to better inform your patients of what they might expect prior to placing the palatal expander. It is nice to know that there is no difference in discomfort based on the type of expander. Prior to placement of the expander of your choice, you can tell patients that they will likely experience a number of different forms of discomfort; however, this should not last more than 1 week. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Palatal Expanders, Oral Comfort, Speech, Mastication

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