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Issue Highlights

These articles have been selected by the Coordinating Editor as Key Reviews.

Dialogue

Treatment Management: A Powerful Practice Management Tool

By critically evaluating their management approach, orthodontists may sharpen management tools to enable them to thrive in any environment

By Straty Righellis, DDS

At any stage of an orthodontic practice, practice management strategies catch our attention. Progressive orthodontic practices all have appealing websites, pleasant-sounding front desk personnel and extremely competent cheerful dental assistants. And with the countless practice management experts, many progressive practices begin to look alike. Yet, with these strategies in place, an orthodontic practice may still experience a decline in new patient flow from the referring dentists. Why do dentists refer to certain orthodontists? Hall, et al asked that question and reported in the *Angle Orthodontist*, 2009. One thousand dentists were asked why they refer to certain orthodontists. The responses actually surprised me. Those dentists who responded said "that the orthodontic result was more important than orthodontist location, fee or reputation". The respondents also stated they expected canine guidance, even contact on all teeth with no posterior interferences during various jaw movements. In addition, they equally expected patient/parental satisfaction.

What satisfies a patient? It is getting the patients braces off "on time" as expected. We say 18 months of braces, and they expect 18 months with a great outcome! A 2009 *JCO* article correlated that offices with more "on-time finishes" have higher net incomes. "On time" with high-quality treatment outcomes, as the referring dentists expect, will help your dental referral pattern thrive.

With those two recent studies as a guide, this presentation will give you a checklist for your treatment management systems. I contend that treatment management may be your most important practice management tool. Successful treatment management systems have three components — thorough diagnosis, efficient mechanics and consistent treatment goals

Thorough Diagnosis

The basic premise is the more you see, the more effectively you can diagnose. If the findings are not discovered at the initial diagnosis, your treatment plan may not address the "hidden" findings. If missed findings surface during treatment, they can affect efficient treatment outcome and/or extend treatment time.

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Have you looked at your day schedule and seen a few names that are over the estimated treatment time or the patient that you originally thought was originally diagnosed a Class I minor crowding that now presents as an end-on Class II after the first six months of treatment? Let's review two diagnostic points:

1) Accuracy of the position of the mandible relative to the maxilla. Several questions are related to the accuracy of the interocclusal relationship. a) Was the interocclusal recording taken with the mandibular condyles in the most centered jaw position at the time of wax registration? b) Were the muscles of mastication relaxed during record gathering? If not, does the patient need de-programming either with a simple few minutes of a leaf-gauge anterior jig, or does this patient require an orthotic appliance for a few months? c) Can you measure the difference between maximum intercuspation and the centered jaw joint position, and is that measurable difference vertical and/or horizontal distraction of the condyle? This added information will

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Intended Audience: Orthodontists and others interested in orthodontics.

Learning Objectives: At the conclusion of this activity, participants will demonstrate the ability to:
- Provide Orthodontists with an understanding, overview and critical analysis of the most current and clinically useful information available in the literature related to Orthodontics.
- Read reviews of the latest basic scientific findings and the impact of these on clinical problems, as well as concise, targeted lectures by noted specialists on the most important practice-oriented subjects in these areas.
- Evaluate where controversy exists and with our distinguished editorial board of orthodontists examine the evidence and presents advantages and disadvantages of the method in question. Also, controversies, advantages and disadvantages of diagnosis and treatment plans will be emphasized.
- Find useful guidance on integrating non-conventional principles and practices with conventional ones — and they'll learn how to select and employ the best of all available approaches.
- Expand upon, reinforce and give additional perspective to the participant's own regular journal review.
- After completing each issue's activity the participant is expected to have a working familiarity with the most clinically important information gleaned from the articles reviewed.

Special Prerequisites for Participants: There are no prerequisites for participants.

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alter your treatment plan. d) What images of the jaw joints do you take and when?

What are the consequences if you are not accurate in relating the position of the mandible to the maxilla? Studies show that up to 20% of asymptomatic orthodontic patients have enough of a bite difference between maximum intercuspation and a centered jaw position to alter the treatment plan from what is typically seen upon clinical examination.

In these 20%, the occlusion changes enough during orthodontic treatment (Class I to end-on Class II or end-on to a Class II) to change the outcome and/or extend the treatment time to get the best outcome.

In summary, it is important to measure "how big" the overjet is and how large the open bite is before you begin treatment.

2) How does the patient's facial pattern influence treatment outcome? a) A refresher of Bjorks predictors of open rotators and closed rotators and the Jarabak analysis provide helpful clues in understanding how your mechanics may effect a particular facial pattern. Questions like "will chin projection get worse or better with certain mechanics and /or growth?" will be answered. b) Pre-treatment visualization of your outcome. While visualized treatment outcomes (VTO) may not be precise to a "pencil mark width" or in magnitude as seen on the computer, VTOs do show the orthodontist and patient the effect of various treatment modalities on the facial balance. This is also an excellent communication tool. c) What about three-dimensional (3D) Imaging? Is 3D imaging needed to pinpoint precise location of impacted teeth or view jaw joint topography to improve the accuracy of your diagnosis.

These diagnostic checkpoints were studied in our office. In 1997, a cohort study with three (100 consecutively started patients) samples over a seven-year time period, a control group in 1990 and two additional samples at five-year intervals in 1992 and 1997. The 1992 and 1997 samples included routine diagnostic articulated models using the two-piece wax technique, VTO, consistent measurable treatment goals and efficient mechanics with the 1997 sample having five additional years of clinical experience.

The results showed not only treatment times and office visit reduction, but the treatment outcomes were measurably improved with these simple diagnostic steps. Extended treatment times were reduced from almost 50% to less than 7% of all patients started. These diagnostic changes made a difference in our office and helped to improve our management of treatment.

Efficient Mechanics

The second component to treatment management is mechanics. Are your mechanics efficient and organized? I suggest a three-point efficiency checklist:

1) Self-ligation brackets: While studies are conflicting of self-ligating bracket systems reduce treatment time, a number of studies do demonstrate reduced treatment times and fewer office visits. Studies also show the benefit of reduced bacteria in those patients with inadequate oral hygiene. My experience with over 10 years with self-ligating brackets is both reducing treatment times and fewer office visits. The answer could be as simple as there is less "doing" like tying elastics

and more of an opportunity to actually look and see bracket positions, tooth positions and intercuspal relationships. Since changing an archwire with self-ligation brackets takes less time than twin brackets, the orthodontist might be more likely to make the archwire change at that time. In 2004, with a fourth sample in our ongoing cohort studies (100 consecutively started cases), the additional change of the self-ligation bracket system together with the previously mentioned diagnostic changes, showed a continued reduction in treatment times and number of office visits while maintaining the continued high on-time treatment and measurable treatment outcomes as measured by the ABO grading system.

2) Accuracy of bracket placement: To assist in mechanical efficiency, we have used indirect bonding, which allows for more accurate bracket placement. With the newer transfer materials and high-intensity blue lights, transfer jig accuracy has improved as well as provided a more comfortable experience for the patient during brace application.

3) Wire sequencing: Knowledge of wire sequencing and high-tech alloys will improve treatment efficiency. We strive that our wire sequencing will be the protocol for 90% of our patients (clinical time efficiency), and we train all staff to know what to see and look for. Continued improvements in the self-ligation brackets and bracket wire play interface will continue to streamline treatment mechanics.

To provide structure and organization to mechanics, we divide tooth movement into three movement stages — stage 1 includes aligning and leveling brackets or straightening the teeth; stage 2 is the working stage (anteroposterior, transverse and vertical changes) and involves closing spaces, moving incisors to match your VTO, and improving the interocclusal relationships of the teeth; stage 3 is the finishing stage which finalizes the axial inclination and angulation of the teeth for aesthetics and function. By organizing your treatment protocols in this manner, another layer of efficiency can be achieved

Consistent and Measurable Treatment Goals

Can you imagine if you had different treatment goals for every patient? What would be your end point? How do you know when you are finished? Yes, every patient is an individual and there are individual treatment plans, but these individual plans should lead to consistent outcomes.

Remember your orthodontic resident days? On Monday clinic days, you diagnosed and treated like one doctor, on Wednesday like a different doctor. You get the picture. This model may work in a learning environment, but in a private practice treatment efficiency leads to consistent outcomes.

Seven measurable treatment goals:
1) Functional occlusion: Countless studies, clinical observations and researchers such as Okesson, Lundeen and Gibb, Dawson, and Slavecek support a mutually protected occlusion. The studies agree that, when a mutually protected occlusion is in place, the muscles of mastication are quiet as seen in EMG studies. The inference is less wear on teeth, less muscle tension and arch stability. Clinically, the three elements required are upper lingual cusps fit in the corresponding lower teeth's central fossa, 3–4 mm of vertical overbite and a seated condyle. In addition, clinically check patient mandibular excursions, but in some patients the defensive proprioceptive avoidance patterns are operating and a " deprogrammer" is often required in the symptomatic patient with casts mounted on an articulator to examine and measure the dynamics of the occlusion.

2) Facial balance: Studies by Farkas, Arnett, Bergman and Ayala have shown ranges of facial balance that are universally accepted. The use of a vertical construct line from true horizontal through subnasal is an example of one of several criteria to judge acceptable facial profile balance. With these studies, there are ranges of acceptability. This information together with the VTOs determines if certain treatment plans will detract or enhance from facial aesthetics or balance. In particular, for the patient with a Class II large overjet you ask, "Will retraction of the upper incisors result in upper lip retraction that flattens the upper lip?"

3) Smile aesthetics or dentogingival aesthetics: The last 10 years has produced data pointing out what both dentists and laypeople prefer in an attractive smile. Such elements are gingival symmetry, teeth well-proportioned, minimal gingival display upon smiling, broader arches specifically in the first bicuspid area and the smile arc mimicking the curvature of the lower lip. These elements can be diagnosed easily during the initial examination, and a treatment plan can be designed to address those issues.

4) Improving periodontal health: With the advent of and continuing research using CBCT technology, we will learn more about how much bone really surrounds the teeth. Currently, we use gingival height to assess the underlying bone. We must use caution in overexpansion, as it may compromise the vascular supply in patients, particularly those with biotypes exhibiting thin gingiva.

5) Relative stability: Most long-term data on stability focus on lower arch crowding as a hallmark of a successful outcome. No study ever reports that lower cuspid width can be expanded and be stable without a lingual bar. Why do we keep trying? However, long-term studies do show that first bicuspids can be uprighted (often called expanded or developed) and be stable. This works nicely to create a broader arch form. Are wear facets on cuspid tips an indicator of instability or functional aberrations?

6) TMJ health: Again, with advances in CBCT and MR imaging, we are learning that up to 30 % of pretreatment asymptomatic teenagers have displaced discs. This is our target population. We as orthodontists must be careful to examine the jaw joints clinically (ROM, external and internal palpation and path of mandible opening). A careful TMJ exam and appropriate imaging techniques help the orthodontist provide the best plan of action.

7) Patient satisfaction: This really addresses the initial question when a client comes into your office — Why are you here or how can I help you? Are realistic expectations part of your treatment plan?

In summary, this presentation invites you to critically evaluate your current approach to diagnosis and efficiency in treatment mechanics and review your treatment goals. You may discover that your treatment management may be sharpened. With this self-analysis, these potential changes may create your most powerful practice management tool to thrive in any environment.

What Type of Retention Do You Use in Your Practice?

Use of vacuum-formed retainers is becoming more popular and is a trend that will likely continue for the next five years

By John S. Casko, DDS, MS, PhD
Based on: Pratt MC, Kluemper GT, et al. Evaluation of Retention Protocols Among Members of the American Association of Orthodontists in the United States. *Am J Orthod Dentofacial Orthop* 2011; 140 (October): 520–526.

What type of retention do you use in your practice? Do you use mostly Hawley type appliances, vacuum-formed retainers or fixed retention? How does the type of retention you use compare with other orthodontists in the United States? Is the trend for retention in the next five years going toward or away from the type of retention that you are using? These questions were addressed in a recent article.

The purpose of this study was twofold — first to identify the general retention protocols used in the United States, and secondly to identify how these protocols have changed over the past five years and how they might continue to change over the next five years. To gain this information, the authors used an online 36-question survey, which was sent to the United States members of the American Association of Orthodontists and was returned by 1,632 orthodontists, 18% of the number of questionnaires sent out.

The results of the survey indicated that United States orthodontists used mostly Hawley retainers and vacuum-formed retainers for retention in a maxillary arch and fixed retention in a mandibular arch. Almost half of the orthodontists surveyed reported reducing their use of Hawley retainers over the past five years, which the authors identified as a trend most likely to continue after the next five years. Significantly, more orthodontists indicated they intended to increase the use of vacuum-formed retainers over the next five years versus those who indicated that they would tend to decrease the use of vacuum-formed retainers. The survey also indicated that orthodontists who extract less frequently reported increased use of fixed retention for the maxillary and mandibular arches, and these orthodontists were more likely to prescribe lifelong retention. More than half of the orthodontists surveyed reported they believed that patients were more compliant with vacuum-formed retainers than with Hawley retainers, and only a small number indicated that they believed that the opposite was true.

One of the more interesting observations in this study was that there was no significant difference in the frequency of extracted teeth between orthodontists who practiced one-phase versus two-phase treatment. The authors suggested that this finding supported the concept that two phases of treatment did not result in an increased arch perimeter over a single phase of treatment. Also, orthodontists who extract fewer teeth and use removable retainers were more likely to tell their patients to wear their retainers at night for the rest of their lives. The authors also noted that, on average, orthodontists stopped seeing their patients for retention checks between two and three years after debonding.

Other than the lack of difference in extraction versus nonextraction for one-phase versus two-phase treatment, I did not find the results of this study to be very surprising. I think it is obvious to most orthodontists that there is an increase in popularity for the use of vacuum-formed retainers, a trend which will likely continue. My only concern with the use of vacuum-formed retainers is that they are not as effective in allowing post-treatment settling of the teeth when compared to Hawley appliances. The one thing this study did not do was relate the type of retention used to long-term stability. As the authors suggest, hopefully in the future we will have some studies that relate the effectiveness of different types of retention with specific orthodontic problems.

Longer-Term Postop Antibiotics Offer Better Protection Against Wound Infections

Extended-term antibiotic therapy after jaw surgery is significantly more effective at preventing wound infection than is short-term therapy

By Vincent G. Kokich, Sr, DDS, MSD
Based on: Danda AK, Ravi P. Effectiveness of Postoperative Antibiotics in Orthognathic Surgery: A Meta-Analysis. *J Oral Maxillofac Surg* 2011; 69 (October): 2650–2656.

Suppose you are seeing one of your adult patients in your private practice. She is having jaw surgery next week. The plan is to do a combination maxillary advancement and mandibular setback for her severe Class III malocclusion. You are simply making final adjustments in the rectangular archwires prior to surgery. At the appointment, the patient asks you an interesting question. The oral surgeon has given the patient some antibiotics to take prior to the surgery to avoid the possibility of infection following the jaw surgery. But, the oral surgeon did not give her enough antibiotics to last her until after the surgery. Her question is this — does she need to continue to take antibiotics following the jaw surgery? How would you answer? Is there any evidence in the literature that taking antibiotics either before or after orthognathic surgery has any impact on wound infection following jaw surgery? That question was addressed in a recent systematic review.

Since systematic reviews are near the top of the evidence ladder in research today, I think this is a great article for us to review. The purpose of this study was to provide a systematic analysis of the literature on this topic. This was an exceptional study in that the authors found eight articles that were all randomized clinical trials that comprised a total sample of

over 500 patients. In these samples, some of the patients were given antibiotics only pretreatment, and others were given antibiotics pretreatment and from one to seven days postoperatively. The authors could then compare and determine the impact of the varying ranges of antibiotic delivery on the incidence of wound infection following jaw surgery.

What did these researchers find? Remember the question — is there a difference in the degree of wound infection if patients take antibiotics short term or long term following jaw surgery? The authors found that in the short-term group, the frequency of wound infection following jaw surgery was 11%. In the extended-term group, who took the antibiotic before treatment and up to seven days after surgery, the frequency of wound infection was under 4%. When these groups were compared, the authors found the difference to be statistically significant. When the authors calculated the odds ratio, they found that subjects who only took a preoperative dose of antibiotics were 3.2 times more likely to have wound infection following jaw surgery compared to a group who took preoperative and extended postoperative antibiotics up to one week following surgery.

In the case of your patient, there would be a much less likely chance of developing wound infection if she continued to take antibiotics up to seven days after jaw surgery as well as preoperatively.

Do Premolar Extractions Alter Sagittal Jaw Growth?

Extraction treatment in growing patients may affect sagittal jaw development, especially in the mandible, for Wits Class II and Class III patients

By Brent E. Larson, DDS, MS
Based on: Kalwitzki M, Godt A, Göz G. Effects of Extraction Treatment on Maxillary and Mandibular Sagittal Development in Growing Patients. *Eur J Orthod* 2011; 33 (October): 544–550.

Few subjects have generated more debate over the years in orthodontics than the extraction/non-extraction question. Dating back to the early 1900s, there has been controversy, and that controversy continues today. At the risk of adding fuel to the fire, I am going to share some recent research findings that compare sagittal jaw growth in subjects that have undergone premolar extractions with a group of non-extraction controls.

This was a retrospective study that involved patients treated at the University of Tubingen in Germany. There were 40 subjects in the extraction group and 100 in the non-extraction control group. Lateral cephalometric films were compared from before treatment and sometime after treatment — an average of five years later. The authors state that all patients were treated with removable appliances and then with fixed multibracket appliances. The cephalometric comparison involved a sagittal measure of maxillary base, a measure of maxillary alveolar process length, a measure of mandibular base and a measure of mandibular alveolar process length. The two groups were also divided into Cl I, Cl II and Cl III subgroups based on the Wits measurement. The change in sagittal dimension from before treatment to the follow-up was then calculated and compared between the extraction and non-extraction groups.

What this study found may or may not surprise you. According to the authors, there was less sagittal growth in the extraction group as measured at the maxillary base and the mandibular base and alveolus. The magnitude of the difference was 1–3 mm. So, this would suggest that premolar extraction treatment may be associated with less sagittal jaw growth. These effects were particularly pronounced in the Cl II and Cl III subgroups. Do these findings mean there is a cause and effect between premolar extraction and less forward jaw growth? Not necessarily.

Although the findings may pique our interest, there are several significant limitations to the study. We do not know that the groups were really equivalent at the pretreatment stage. Though the measurements used in this study seemed to be similar at the start, the extraction group presumably received that treatment for some reason and the others did not, a potential susceptibility bias. Also, the landmarks used typically have larger envelopes of error in the direction used for measurement in this study. In addition, age was several months different between groups, with the control group younger at the start, perhaps with more growth yet to happen.

The bottom line is that this is an interesting report that deserves some follow-up studies to see if the findings can be confirmed.

Dentofacial Surgical Correction Improves Quality of Life

Orthognathic surgery was found to have a positive impact on quality of life regardless of the type of deformity or if the occlusion was affected

By Brent E. Larson, DDS, MS
Based on: Khadka A, Liu Y, et al. Changes in Quality of Life After Orthognathic Surgery: A Comparison Based on the Involvement of the Occlusion. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011; 112 (December): 719–725.

How much of a patient's perceived improvement in quality of life after orthognathic surgery is related to improvements in occlusion and function? Researchers in China have found a way to begin answering this question by comparing quality-of-life outcomes in patients undergoing orthognathic surgery for the correction of malocclusion with those patients undergoing similar surgery for facial disproportion that involve no occlusal change. The results of their investigation are published in a recent article.

One hundred fifty-two consecutive patients seeking surgical correction for dentofacial deformities were included. One hundred ten of these patients had Class II, Class III or asymmetric jaw relations and had combined orthodontic and surgical procedures with resulting occlusal and facial changes. The remaining 42 patients had square faces or faces with prominent zygomas and had orthognathic surgery that involved no occlusal changes. All subjects completed two questionnaires during the preoperative period and again at the postoperative follow-up. The first questionnaire was the 36-item Short-Form Health Survey, which assessed general health-related quality of life. The second questionnaire, the 22-item Orthognathic Quality of Life Questionnaire, was more specific to dentofacial conditions and assessed facial aesthetics, oral function, awareness of dentofacial aesthetics and social aspects of dentofacial deformity.

The presurgical orthodontics group was treated by sagittal split osteotomy, Le Fort I osteotomy, or anterior subapical segmental osteotomy. Patients without occlusal problems were treated by mandibular outer cortex ostectomy, mandibular angle ostectomy or zygomatic "L"-shaped osteotomy.

The results showed that, preoperatively, the patients with occlusal disorders had a higher awareness of oral function and higher facial aesthetics impairment compared to patients without an occlusal complaint. Postoperatively, the only quality-of-life difference between the two groups was that the patients treated for occlusal disorders still felt more impaired in terms of oral function, but they also showed a significant improvement between the two time points. Overall, the average quality-of-life score improved in both groups.

The bottom line is that surgical correction of dentofacial deformities results in improved quality of life regardless of whether the occlusion is affected. Keep in mind that this study was done on an Asian patient population, and some aspects of quality of life may be perceived differently than in a North American or European sample.

No Prevalent Delivery Method for Intruding Mandibular Incisors

When using bone anchorage and a segmented archwire or a utility arch anchored on the mandibular first molars, there are no differences in the effects on mandibular incisors following tooth intrusion

By Vincent G. Kokich, Sr, DDS, MSD
Based on: Aydoğdu E, Özsoy ÖP. Effects of Mandibular Incisor Intrusion Obtained Using a Conventional Utility Arch vs Bone Anchorage. *Angle Orthod* 2011; 81 (September): 767–775.

What kind of mechanics would you apply in this situation? You are about to begin orthodontic treatment on a 32-year-old male. He has a Class I malocclusion with mild crowding in both arches. He has a flat facial profile, so your plan is to treat him nonextraction. Here is the big problem: he has a 100% overbite. When you assess the position of the maxillary central incisors, they are well related to his upper lip and the maxillary posterior occlusion. The reason for the deep overbite is the overeruption of the mandibular incisors. So, you need to intrude these teeth at least 4 mm. How are you going to do that? What are your options? One option would be to use a conventional utility arch with anchorage on the molars to deliver an intrusive force to the mandibular incisors. The other option would be to use miniscrews in the mandibular symphysis to provide anchorage to intrude the incisors. Would there be a difference between these two? Would one be more advantageous? Those questions were addressed in a recent article.

The purpose of this study was to evaluate the effects of mandibular incisor intrusion achieved using a segmented arch and two miniscrews compared to conventional intrusion with a utility arch. This was a randomized clinical study. A total of 26 patients were involved in this project. Half were randomized to a group where a mini-implant was placed in the mandibular symphysis to support anchorage for intruding mandibular incisors with a segmental archwire. The other half of the sample was enrolled in a group where molar bands were placed on the mandibular first molars, and a utility arch was used from first molars to mandibular incisors with intrusive force directed on the utility arch. For those subjects having tooth intrusion anchored by the mini-implants, a segmental archwire was attached to the incisors, and then nickel-titanium coil springs were attached from the archwire down to the miniscrews. The teeth were intruded until the mandibular incisal edges were at the same level as the mesiobuccal cusps of the mandibular first molars. Lateral cephalometric head films were taken on patients before and after the intrusion to determine the angulation of the mandibular incisors during intrusion, as well as the absolute amount of intrusion achieved.

What happened when the authors compared these two means of intrusion? First of all, the duration of intrusion was about five months for those subjects who had implant anchorage and about four months for those who utilized a utility arch. When the authors compared the time to intrude the teeth, they found that there was no statistically significant difference in duration of intrusion between the two groups. The vertical movement of the mandibular incisors was evaluated from both the incisal edge and the center of resistance. When the authors compared these movements, there were no statistically significant differences between the groups. Both groups showed an increase of about 7–8º in angulation during the intrusion. The big difference was in the amount of molar movement. Since the molars were not bracketed in the group that had implant anchorage, there were no changes in molar position in that group. But when the utility arch was anchored to the molars, there was a significant reaction in the molars, which were tipped and altered vertically.

The authors conclude that the amount of incisor intrusion achieved using miniscrews is no different than the amount of movement achieved using conventional mechanics with a utility arch. However, the reaction of the molars to the intrusion force using the utility arch is, in most cases, negative and must be corrected after the intrusion.

Asymmetric Lip Pressures Noted in Repaired UCL/P Patients

Cleft Palate/Deformities

Take Home Pearl:

Unilateral cleft lip/palate patients have decreased vertical lip-closure forces in the upper lip and increased oblique lip-closure forces on the non-cleft side when compared to unaffected controls.

Background: Surgical cleft lip closure is required at an early age for adequate function during feeding. However, it does produce scar tissue that may affect future growth and lip function.

Objective: To assess the effects of cleft lip and/or palate on forces produced during maximum lip closure.

Design: Descriptive study.

Participants: 15 Japanese children (7 females, 8 males; aged 8 to 13 years) with a history of a repaired unilateral cleft lip (UCL; n=6) or unilateral cleft lip and palate (UCL/P; n=9). All subjects had a primary lip-closure surgery done between 3 and 5 months after birth, and 6 subjects underwent lip revision at age 6 to 7 years. Additionally, 15 gender-matched Japanese children (aged 9 to 13 years) without a history of CL/P were used as controls.

Methods: A custom multidirectional lip-closure force measurement apparatus was developed, composed of 8 strain gauges surrounding an octagonal prism. Subjects pursed their lips around the force sensors as hard as possible for 5 to 6 seconds to record directional lip-closure forces. Measurements were repeated 3 times for each subject.

Results: No significant differences were found between average total lip-closure forces in each group. Patients with UCL or UCL/P showed higher oblique lip-closure forces on the non-cleft side compared to the cleft side (0.7 NS vs 0.5 NS) and to unaffected controls (0.5 NS). Patients with UCL/P also demonstrated decreased vertical lip-closure force with the upper lip compared to the lower lip (1.5 NS vs 1.0 NS), while the UCL group and controls showed symmetrical vertical forces in the upper and lower lip.

Conclusions: Patients with UCL/P displayed asymmetric lip-closure forces that may lead to alterations in facial growth and secondary deformities.

Reviewer's Comments: UCL obviously affects not only the epithelium but also muscles of the upper lip. Therefore, some amount of asymmetric function after repair is not unexpected, and I actually would have expected more asymmetric function. Any asymmetric muscle function may cause side effects, including affecting the equilibrium of tooth position.

Reviewer: Brent E. Larson, DDS, MS
Article Reviewed: Nakatsuka K, Adachi T, et al. Asymmetric Lip-Closing Forces in Children With Repaired Unilateral Cleft Lip and/or Palate. *J Oral Rehabil* 2011; 38 (December): 921–928.

Biofilm More Likely to Attach to Metal Brackets

Clinical

Take Home Pearl:

Ceramic brackets have a significantly lower tendency for biofilm attachment compared to metal brackets during orthodontic therapy.

Background: Occasionally, prior to orthodontic treatment, it may be obvious that a patient could have less-than-ideal oral hygiene. Would it be best to place ceramic brackets or metal brackets in this type of patient in order to alter the biofilm attachment to the bracket?

Objective: To compare the biofilm attachment to metal brackets or ceramic brackets during orthodontic treatment.

Methods: This study evaluated 2 groups of 10 patients each. One group wore metal brackets, and the other wore ceramic brackets. Average age of both groups was around 14 years, and the length of treatment was 18 months. At the end of treatment, the maxillary central incisor, canine, and second premolar brackets were assessed in all groups. In addition, periodontal evaluations of plaque index, gingival index, and probing pocket depth were also assessed.

Results: The surface area of metal brackets had 12.5% of the surface covered with biofilm. On the other hand, the ceramic bracket had only 5% of the surface area covered with biofilm. The periodontal health around teeth that had metal brackets was less healthy than that with ceramic brackets.

Conclusions: Biofilm attaches much more readily to metal brackets than to ceramic brackets.

Reviewer's Comments: This was an interesting study. Although the sample size was not large, I believe that the outcome of this study was valid. I am not certain why the difference exists between biofilm attachment of metal brackets and ceramic brackets, but it probably has something to do with the surface texture or roughness of brackets. I am not certain that the difference is large enough to warrant altering one's choice of brackets, but if a person were concerned about oral hygiene in a patient, perhaps it would be better to use a bracket where less biofilm would attach, such as a ceramic bracket, in patients who have less-than-ideal oral hygiene.

Reviewer: Vincent G. Kokich, Sr, DDS, MSD
Article Reviewed: Lindel ID, Elter C, et al. Comparative Analysis of Long-Term Biofilm Formation on Metal and Ceramic Brackets. *Angle Orthod* 2011; 81 (September): 907–914.

Compliance With Maintenance Treatment Ends Well

Clinical

Take Home Pearl:

Erratic maintenance significantly increases the risk for progression of periodontal disease compared to regular maintenance in a sample of patients with moderate periodontal disease.

Background: Patients with moderate to advanced periodontal disease will typically require periodontal maintenance therapy to keep the bacteria and plaque removed from susceptible sites in order to enhance healing. What if patients are erratic in their attendance or compliance with periodontal maintenance therapy?

Objective: To compare compliance practices with periodontal maintenance therapy in a sample of subjects who have moderate periodontal disease.

Design: Case-control study.

Participants/Methods: A sample of 238 patients undergoing periodontal maintenance for moderate periodontitis comprised the main sample. It was determined that 106 of these subjects were regular compliers, and 132 were erratic compliers. The probing pocket depths, bleeding upon probing, attachment levels, and bone levels were compared for these 2 groups of subjects before and after 3 years. In addition, smoking and diabetes were also factored into the evaluation to determine their impact on the progression of periodontal disease in both groups.

Results: The results of this study showed that regular compliers had a reduced progression of periodontal disease compared to subjects who were erratic compliers with their periodontal maintenance therapy. In addition, smoking and diabetes were confounding risk factors for both groups of subjects.

Conclusions: Regular compliance with periodontal maintenance therapy results in a much more predictable and reduced progression of periodontal disease compared with subjects who are erratic at their compliance with periodontal maintenance therapy.

Reviewer's Comments: Although the sample of patients followed in this study did not wear orthodontic brackets, orthodontists today do treat adult subjects who have periodontal disease. These subjects must be followed and maintained with periodontal maintenance therapy by a periodontist or general dentist during orthodontic treatment. This study shows that, for susceptible patients, compliance with maintenance therapy has a significant impact on outcome and/or progression of periodontal disease over a 3-year period.

Reviewer: Vincent G. Kokich, Sr, DDS, MSD
Article Reviewed: Costa FO, Cota LOM, et al. Progression of Periodontitis in a Sample of Regular and Irregular Compliers Under Maintenance Therapy: A 3-Year Follow-Up Study. *J Periodontol* 2011; 82 (September): 1279–1287.

Combined RME/Facemask Mostly Successful for Long-Term Class III Treatment

Clinical

Take Home Pearl:

Class III patients with high gonial and mandibular plane angles are less likely to be treated successfully by combined rapid maxillary expansion/facemask therapy.

Background: Many orthodontists use combined rapid maxillary expansion (RME) facemask therapy to treat growing Class III patients. How does this treatment regimen work, and if it is successful, is it successful long term? These are important questions to ask.

Objective: To analyze long-term outcomes of combined RME facemask therapy in Class III patients.

Participants: 22 subjects with Class III malocclusion who were consecutively treated with RME and facemask therapy followed by fixed orthodontic appliances.

Methods: Cephalometric radiographs were taken at the initiation of treatment, at the end of the first phase of RME/facemask therapy, at the end of the second phase of fixed appliance treatment, and at approximately 8.5 years after the end of RME, at an average age of 18.7 years. Changes in this treatment group were compared with those of a control group of Class III patients.

Results: >70% of patients in the treatment group could be considered clinically successful in the long term. Approximately 30% of patients were unsuccessful long term due to relapse of occlusal relationships. Successful long-term changes were mainly due to significant improvements in the sagittal position of the mandible. Maxillary changes reverted completely in the long term. Unsuccessful patients showed a significantly greater gonial angle and downward inclination of the mandibular plane.

Conclusions: Combined RME/facemask therapy in growing patients with a Class III malocclusion is successful about 70% of the time long term.

Reviewer's Comments: I congratulate the authors on developing a sample of consecutively treated patients. It did not surprise me that most favorable orthopedic changes were due to repositioning of the mandible. It also did not surprise me that patients with high gonial and high mandibular plane angles were more likely to have unsuccessful treatment. Class III patients with deep bites and anterior facial overclosure have a greater likelihood of success because downward and backward rotation of the mandible improves both the anterior overclosure and protrusion of the chin.

Reviewer: John S. Casko, DDS, MS, PhD
Article Reviewed: Masucci C, Franchi L, et al. Stability of Rapid Maxillary Expansion and Facemask Therapy: A Long-Term Controlled Study. *Am J Orthod Dentofacial Orthop* 2011; 140 (October): 493–500.

PRP Gel Offers Beneficial Effects After Third Molar Extraction

Clinical

Take Home Pearl:

Platelet-rich plasma gel enhances healing of extraction sockets after third molar surgery.

Background: Occasionally, patients will have dry socket, swelling, and/or pain following third molar extraction. Third molars are commonly extracted after orthodontic treatment. Is there a way to reduce the incidence of pain and swelling in these subjects?

Objective: To determine whether a platelet-rich plasma (PRP) gel added or placed into the extraction socket would reduce the pain and swelling following third molar extraction.

Design: Prospective, randomized, comparative clinical study.

Participants/Methods: 60 subjects were stratified into 2 groups. In 1 group, after third molar extraction, PRP was placed into the extraction socket. In the other group, no material was placed in the socket, and patients were simply allowed to heal. Then, patients were compared to determine if there was any difference in healing that occurred afterward. A visual analog scale was used so that patients could inform researchers about their experiences.

Results: The results of this study showed that the mean postoperative pain score was lower for the group that had PRP at all time points when compared to the group that did not have PRP inserted into the socket. In addition, the facial swelling for the PRP group was also less than that of the control group. Finally, the control group also had consistently lower maximal interincisal mouth opening from postoperative days 1 through 14 when compared to the PRP group.

Conclusions: PRP gel has a beneficial effect on healing of extraction sockets after third molar surgery.

Reviewer's Comments: This was an interesting study; however, the sample size was fairly small. In fact, the authors even suggested that perhaps this preliminary study would encourage a survey of more patients to determine if, in fact, PRP insertion after third molar surgery will have a similar effect in a larger sample.

Reviewer: Vincent G. Kokich, Sr, DDS, MSD
Article Reviewed: Ogundipe OK, Ugboko VI, Owotade FJ. Can Autologous Platelet-Rich Plasma Gel Enhance Healing After Surgical Extraction of Mandibular Third Molars? *J Oral Maxillofac Surg* 2011; 69 (September): 2305–2310.

Are All Retainers Created Equally?

Clinical

Take Home Pearl:

The survival time after one year with Hawley retainers is slightly better than that with clear overlay retainers.

Background: After orthodontic treatment, patients typically require retainers. Today, choices for removable retainers are usually either a traditional Hawley retainer or a clear overlay retainer. Patients sometimes prefer a clear overlay retainer, but are these retainers any less likely to be lost or broken compared to a Hawley retainer?

Objective: To compare survival time and to determine breakage factors when comparing Hawley retainers to clear overlay retainers after 1 year.

Design: Randomized clinical trial.

Participants/Methods: 120 patients were enlisted in the trial; 61 were given Hawley retainers, and 59 were given clear overlay retainers. Over a 1-year period, all retainers were analyzed to determine the incidence of breakage, loss, and location of breakage.

Results: The results of this study showed that fracture was the most often cited reason for breakage, followed by retainer loss. There were no statistically significant differences in breakage reasons between groups for maxillary and mandibular retainers. However, there were significant differences in fracture location between maxillary and mandibular retainers. Patients with clear overlay mandibular retainers reported significantly more fractures in the midline, while those with Hawley retainers reported more fractures between mandibular canines and premolars. After 1 year, survival times for the Hawley retainer group were longer than those for the clear overlay retainer group, but the difference was not statistically significant.

Conclusions: Survival times of Hawley retainers and clear overlay retainers are not statistically significantly different.

Reviewer's Comments: I find it hard to believe that clear overlay retainers did not break more often than did Hawley retainers. In my experience, clear overlay retainers tend to break more easily and can also deform more easily. Perhaps materials used in the present study are thicker than materials that I currently use.

Reviewer: Vincent G. Kokich, Sr, DDS, MSD
Article Reviewed: Sun J, Yu YC, et al. Survival Time Comparison Between Hawley and Clear Overlay Retainers: A Randomized Trial. *J Dent Res* 2011; 90 (October): 1197–1201.

Fluoridated Paste Increases Bond Failure Rates

Clinical

Take Home Pearl:
Preparing teeth with plain pumice prior to bonding with self-etching primers is recommended for the best results.

Background: Do you use a self-etching primer to bond brackets in your office? If so, is it helpful to prepare teeth with a fluoridated paste prior to bonding?

Objective: To determine the effect of fluoridated paste on bond failure rates of pre-coated brackets bonded with self-etching primer.

Design: Prospective, randomized clinical trial.

Participants: 34 orthodontic patients with a total of 627 brackets.

Methods: In this split-mouth study design, half the quadrants in each patient was prepared with a fluoridated paste only, and the other half was prepared with plain pumice prior to bonding with a self-etching primer and pre-coated brackets. Individual bracket failures were recorded over a 6-month period and were statistically analyzed.

Results: The overall failure rate was 8%. The failure rate for brackets on pumice-treated teeth was 4.8%, and on teeth treated with fluoride paste it was 11.2%, which was statistically significantly different. Four maxillary canine brackets bonded to fluoride paste-treated teeth failed, whereas there were no failures when bonded to pumice-treated teeth. Also, 3 mandibular central incisor brackets on paste-treated teeth failed, compared to none on pumice-treated teeth.

Conclusions: Use of fluoridated paste to prepare teeth prior to bonding with a self-etching primer and pre-coated brackets increases the bond failure rate.

Reviewer's Comments: This was a good study. Previous studies using a 2-step bonding technique indicated that use of fluoride did not significantly affect bond failure rates. I am not sure why there is a difference using a self-etching primer; however, this is good information for those of us who routinely use self-etching primers and pre-coated brackets.

Reviewer: John S. Casko, DDS, MS, PhD
Article Reviewed: Talic NF. Effect of Fluoridated Paste on the Failure Rate of Precoated Brackets Bonded With Self-Etching Primer: A Prospective Split-Mouth Study. *Am J Orthod Dentofacial Orthop* 2011; 140 (October): 527–530.

Girls Seek Orthodontic Treatment for Milder Occlusal Problems

Clinical

Take Home Pearl:
Spacing and incisor irregularity are of more concern to girls than to boys.

Background: Studies have shown that the incidence of malocclusion is the same for boys and girls. However, more girls seek orthodontic treatment. Why is this?

Objective: To determine if girls are treated orthodontically for milder occlusal issues than are boys.

Participants: 357 white adolescents who were seeking orthodontic treatment either from a private practice or a university orthodontic clinic.

Methods: The dental aesthetic index (DAI) was used to score the severity of the initial malocclusion for each subject. Differences were statistically analyzed.

Results: Girls had significantly lower DAI scores than did boys, which meant that girls were seeking orthodontic treatment for less severe occlusal problems than were boys. Spacing and incisor irregularity were 2 factors that separated girls from boys, related to seeking orthodontic treatment. DAI scores were significantly higher in the university orthodontic clinic when compared with the private practice, which indicated that more severe orthodontic problems were being treated in the orthodontic clinic. Even though the overall problems were more severe in the orthodontic clinic, DAI scores were still lower for girls.

Conclusions: Girls are more likely to seek orthodontic treatment than are boys with the same severity of malocclusion.

Reviewer's Comments: I thought the results of this study were interesting. They help explain why there are usually more girls than boys in an orthodontic practice, even though there is no difference in the occurrence of malocclusion between the 2 sexes. It would be interesting to know why girls are more sensitive than boys to spacing and incisor irregularity.

Reviewer: John S. Casko, DDS, MS, PhD
Article Reviewed: Harris EF, Glassell BE. Sex Differences in the Uptake of Orthodontic Services Among Adolescents in the United States. *Am J Orthod Dentofacial Orthop* 2011; 140 (October): 543–549.

Phase I Treatment Does Not Reduce Incisor Fracture Incidence

Clinical

Take Home Pearl:
There is no correlation between initial overjet and the prevalence of incisor trauma during phase I treatment of patients with protrusive maxillary incisors.

Background: It has been inferred that patients with protrusive maxillary incisors have a greater likelihood of experiencing trauma to these teeth. Is this a valid basis for phase I treatment?

Objective: To examine the prevalence and incidence of incisor trauma in subjects who participated in a randomized clinical trial designed to investigate early growth modifications in the treatment of Class II malocclusion.

Participants: 261 patients with a Class II malocclusion who were enrolled in a clinical trial to evaluate the effectiveness of phase I treatment.

Methods: The Ellis classification was used to evaluate the incidence of trauma at baseline, at the end of phase I treatment, and at the end of phase II treatment in the treatment groups and at similar periods in a control group. Differences in the incidence of incisor trauma were recorded and statistically analyzed.

Results: At baseline examination, 25% of participants had some form of incisor trauma, and 28% experienced new or worsening maxillary incisor trauma during the study. There was no significant difference in the incidence of trauma when the 2-phase treatment group, the 1-phase treatment group, and the observation group were compared. There was no correlation between the amount of initial overjet and the prevalence of trauma. Patients with a history of previous trauma were more likely to incur additional trauma, and boys were more likely than girls to incur trauma.

Conclusions: Phase I treatment cannot be justified on the basis of reducing the incidence of incisal trauma.

Reviewer's Comments: I found it surprising that there was no correlation between the amount of overjet and incisor trauma, as suggested by some previous studies. I am not sure why this is; however, based on these results, it would be hard to justify 2-phase treatment in order to reduce the likelihood of incisal trauma. I believe 2-phase treatment could be justified, however, for patients who have severe maxillary incisor protrusion and overjet that is causing psychological problems.

Reviewer: John S. Casko, DDS, MS, PhD
Article Reviewed: Chen DR, McGorray SP, et al. Effect of Early Class II Treatment on the Incidence of Incisor Trauma. *Am J Orthod Dentofacial Orthop* 2011; 140 (October): e155–e160.

How Will You Compete in the Dental Market?

Communication

Take Home Pearl:
Internal marketing may provide the most effective and least expensive form of marketing for your practice.

Background: The current economic crisis is just one of a number of factors that has increased competition for orthodontic patients. How will you effectively address this competition in your office?

Objective: To address the question of increased competition in dentistry today.

Discussion: The current downturn in the economy has combined with a number of other factors such as the influence of insurance companies and the commercialization of orthodontic services in large national retail chains to significantly increase competition. The author suggests that perhaps the most effective way to address this competition is through internal marketing, which he believes is the least expensive and most effective form of marketing available. If you are going to improve internal marketing in your practice, you will have to approach it as a science. Dr. Levin suggests that you incorporate a minimum of 15 customized interconnected strategies. These strategies can start with improved training for your front office staff so that they can make a more favorable impression on your new patients, which often involves use of scripting responses to common questions. It also involves providing an environment in which your staff can comfortably suggest that patients refer other patients to your practice, with a target of having 40% to 60% of your patients refer at least 1 new patient per year. The bottom line is that, if patients like your practice and trust you, they are more likely to refer other patients if you provide that opportunity for them. The alternative to internal marketing is external marketing, which Dr. Levin views with some skepticism and suggests that it can be successful for some practices and a poor financial investment for others. Social media have caused an entirely different way of communicating for young people and the way they seek information. If you are going to get involved in social media, be aware that it requires a significant time commitment by you and your staff.

Conclusions: At this time of increased competition, internal marketing may be the least expensive and most effective way to maintain your patient base.

Reviewer's Comments: I thought this was a very practical article. However, I would like to have seen more attention paid to the importance of maintaining quality in your practice. I believe that all marketing strategies discussed in this article can be effective only if you are providing quality treatment for your patients. The combination of the declining economy and significant changes in communications due to social media is an important wake-up call for you to decide how you will address competition in your practice.

Reviewer: John S. Casko, DDS, MS, PhD
Article Reviewed: Levin RP. The Reality of Competition. *J Am Dent Assoc* 2011; 142 (November): 1301–1302.

Customizing Lingual Appliances Using CBCT

Construction

Take Home Pearl:
Customized lingual appliances with indirect trays can be designed and manufactured using current CAD/CAM software and a cone-beam CT scan with an 80-µm voxel size.

Background: Current customized lingual orthodontic appliances use high-resolution digital scans of plaster casts or orthodontic impressions that accurately scan only visible dental crowns. Use of cone-beam CT (CBCT) may help to accurately scan partially overlapped teeth and provide information on root position.

Objective: To introduce a novel method for fabrication of custom lingual appliances using a CBCT scan.

Methods: A high-resolution CBCT scan (40 mm × 40 mm field of view, 18 seconds, 80-µm voxel size) is first taken of the patient and then exported in DICOM format. The DICOM file is

imported into Mimics software (Materialise), reconstructed in .stl format, and then transferred into 3ds Max software (Autodesk, Inc). 3ds Max software can analyze teeth based on Andrew's 6 keys to occlusion, including crown angulation, labiolingual inclination (requiring an additional step in AutoCAD software), archform, and occlusion. Once the digital set-up is complete, the model is loaded in SolidWorks software (Dassault Systèmes). In this computer-aided design and manufacturing (CAD/CAM) program, a virtual 0.018" × 0.025" archwire can be created with first-order bends, and virtual brackets can be created to incorporate second- and third-order bends. Each completed virtual bracket is loaded into a 3-dimensional (3D) printing system that produces wax bracket analogs that can be cast in stainless steel. Additionally, customized positioners can be fabricated to accurately place each bracket clinically. The final archwire can be fabricated by hand using an accurate printout of the archform.

Conclusions: A new technique for fabrication of customized lingual appliances using a CBCT scanner and CAD/CAM technology is presented.

Reviewer's Comments: The article presents this method as "relatively inexpensive." While this may be true for individual material costs, it requires a CBCT scanner, expensive CAD/CAM software, a 3D printer, and a great deal of experience with the software and orthodontic set-ups. Additionally, it remains to be seen if benefits of using a high-resolution CBCT scan to obtain root parallelism is worth the radiation burden. Overall, though, it is an amazing display of what is possible using existing technology, and I am excited to see how this technique develops.

Reviewer: Brent E. Larson, DDS, MS
Article Reviewed: Ye N, Li J, et al. Computer-Aided Design of a Lingual Orthodontic Appliance Using Cone-Beam Computed Tomography. *J Clin Orthod* 2011; 45 (October): 553–559.

Are Orthognathic Miniscrew Implants Effective?

Take Home Pearl:
Mini-implants significantly decrease or negate the loss of orthodontic anchorage.

Background: Orthodontists often need to enhance anchorage during orthodontic treatment. In the past, extraoral devices were used to enhance anchorage, but this method required patient cooperation. Recently, mini-implants or miniscrews have been developed. Are they truly effective? What is the success rate?

Objective: To compare the best studies on this topic to determine the answers to these questions.

Design: Systematic review and meta-analysis.

Methods: >3,000 original articles met the initial inclusion criteria. Of these articles, 8 met the final inclusion criteria. These articles were analyzed to determine answers to the questions posed in this systematic review.

Results: Based on their analysis, the authors determined that use of mini-implants significantly decreased or negated the loss of anchorage. In addition, the authors found that mini-implants were more effective in supporting anchorage when they were used in the mandible between the second premolar and first molar, and when 2 miniscrews were inserted into a patient's jaw and were directly connected. Mini-implants used in this study for anchorage had a success rate of 87.7%, with no significant differences between the various subgroups.

Conclusions: Mini-implants significantly decrease or negate the loss of orthodontic anchorage.

Reviewer's Comments: Although the conclusions in this study are probably understood and seem logical to most orthodontists, the number of systematic reviews and meta-analyses on this topic are not numerous, so I decided to review this systematic review. The authors did an excellent job of identifying an appropriate sample of 8 papers to include in their meta-analysis. The methodology was carried out properly, and the results and conclusions are presented appropriately.

Reviewer: Vincent G. Kokich, Sr, DDS, MSD
Article Reviewed: Papadopoulos MA, Papageorgiou SN, Zogakis IP. Clinical Effectiveness of Orthodontic Miniscrew Implants: A Meta-Analysis. *J Dent Res* 2011; 90 (August): 969–976.

CBCT Scans May Reveal More Than Expected

Other

Take Home Pearl:

In this study, in dental patients undergoing cone-beam CT scanning, an average of 3 incidental findings were found per scan, with 16% requiring intervention or referral.

Background: Cone-beam CT (CBCT) provides valuable 3-dimensional (3D) information for dental patients, but the full scan volume should be evaluated for additional findings.

Objective: To assess the prevalence of incidental findings from CBCT scans and to categorize those that require intervention/referral, monitoring, or no further evaluation.

Design: Retrospective study.

Methods: 300 consecutive CBCT scans were reviewed by an Oral and Maxillofacial Radiology resident for incidental findings. All scans using the 6-inch or 9-inch field of view on the NewTom 3G or the 6-inch field of view on the Sirona Galileos 3D Comfort were included. This excluded most orthodontic and orthognathic surgery patients, as a 12-inch field of view scan was usually taken in these patients. Incidental findings were recorded and categorized into airway, soft-tissue calcifications, bone, temporomandibular joint (TMJ), endodontic, dental developmental, and pathological findings.

Results: A total of 881 incidental findings were identified on 272 CBCT scans, leaving only 28 scans (9%) with no incidental findings. This equates to an average of about 3 incidental findings per scan. These findings were distributed as follows: airway (35.0%), soft-tissue calcifications (20.0%), bone (17.5%), TMJ (15.4%), endodontic (11.3%), dental developmental (0.7%), and pathological findings (0.1%). Intervention or referral was required for 16% of incidental findings, monitoring was required for a further 16%, and the remaining 68% required no monitoring.

Conclusions: Full examination of a CBCT scan is crucial, as incidental findings are common and some may require intervention or referral.

Reviewer's Comments: This article did not include many orthodontic patients and consisted of many older patients who were imaged for implant treatment planning, so it would not be surprising if the exact prevalence of some findings were different in an orthodontic office. However, I still believe the main message is important: incidental findings are very common, and some may require referral.

Reviewer: Brent E. Larson, DDS, MS
Article Reviewed: Price JB, Thaw KL, et al. Incidental Findings From Cone Beam Computed Tomography of the Maxillofacial Region: A Descriptive Retrospective Study. *Clin Oral Implants Res* 2011; September 30: epub ahead of print.

Severe Malocclusions Increase Risk for Maxillary Incisor Trauma

Other

Take Home Pearl:

Patients with a definite need for orthodontic treatment (ICON score >43) are more than twice as likely to experience some form of incisor trauma.

Background: Conflicting evidence exists on whether severe malocclusion, especially excessive overjet, is linked to an increased risk of incisor trauma.

Objective: To investigate associations between incisor trauma and orthodontic treatment need, malocclusion complexity, and gender.

Design: Retrospective study.

Participants: 502 Iranian schoolchildren (249 males, 253 females; aged 11 to 14 years). Only 6 subjects (1 female, 5 males) were excluded due to active orthodontic appliances.

Methods: Each patient's malocclusion was assessed using the Index of Complexity, Outcome, and Need (ICON). This index scores 5 components related to treatment need: aesthetic assessment, upper arch crowding, crossbite, incisor openbite/overbite, and buccal segments (A–P). Subjects were categorized as easy (<29), mild (29 to 50), moderate (51 to 63), difficult (64 to 77), or very difficult (>77) based on the final ICON score. Additionally, they were also designated as subjects in need of orthodontic treatment (ICON >43) or subjects without need of treatment (ICON <44). Each maxillary and mandibular incisor was also assessed clinically for signs of fracture or trauma.

Results: Overall, 9% of subjects (n=45) had at least 1 incisor that experienced trauma. The prevalence was twice as high in males (12.0%) as in females (5.9%). Trauma most frequently affected maxillary incisors (93%) and was frequently limited to the enamel (69%). Subjects categorized as "difficult" had a statistically significantly higher rate of trauma (odd ratio [OR], 3.2 compared to the easy category), but those categorized as "very difficult" did not have a significantly higher rate of trauma compared to "easy" cases. Subjects categorized as "needing orthodontic treatment" (ICON >43) did show a significantly higher rate of incisor trauma (OR, 2.4).

Conclusions: Patients with increased orthodontic treatment need may also be at higher risk for maxillary incisor trauma.

Reviewer's Comments: Some clinicians cite excessive overjet as a major risk factor for trauma and as a reason to intervene early. Interestingly, overjet was not a criteria assessed in this study. While concerns may be raised about applying a study on Iranian schoolchildren to our patients, it is unique to find such a large sample of 11- to 14-year-old subjects with only 6 orthodontic patients. Although this research suggests an association between malocclusion and incisor trauma, there is still no strong evidence to suggest that early treatment is necessarily protective for incisors.

Reviewer: Brent E. Larson, DDS, MS
Article Reviewed: Borzabadi-Farahani A, Borzabadi-Farahani A. The Association Between Orthodontic Treatment Need and Maxillary Incisor Trauma, a Retrospective Clinical Study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011; 112 (December): e75–e80.

Two Important Factors Influence Initial Miniscrew Stability

Take Home Pearl:

Insertion site and clinician experience were found, in this study, to have the most influence on the rate of miniscrew stability at 1 week.

Background: Orthodontic miniscrews can be extremely effective for controlling anchorage, but they require good stability.

Objective: To assess the initial stability of orthodontic miniscrews 1 week after placement and to identify factors affecting the success rate.

Design: Retrospective study.

Participants: 168 patients (51 males, 117 females; mean age, 23 years) treated at the Graduate Orthodontic Clinic of Chonnam National University Hospital.

Methods: A total of 407 tapered miniscrews (Orlus) were placed using a hand driver without pre-drilling. Different diameter (1.6 and 1.8 mm) and different length (6, 7, 8, and 10 mm) miniscrews were used. Placement location, tissue type (keratinized vs non-keratinized), gender, and patient age were recorded. Additionally, a total of 17 orthodontic residents were involved in miniscrew placement, and their previous experience with miniscrews was tracked. The initial stability of each miniscrew was assessed after 1 week, with no initial loading after placement. Crude odds ratios and adjusted odds ratios were calculated for each confounding variable.

Results: Overall, 93% of miniscrews had good initial stability at 1 week. Miniscrews placed at a midpalatal insertion site had a 100% success rate (53/53 miniscrews), while all other sites were roughly equivalent to each other. Miniscrews placed by experienced residents (>20 miniscrews previously placed) had a 97.5% success rate compared to a 90.0% success rate for inexperienced residents (<20 miniscrews previously placed). No significant differences in success rate were found based on patient gender, age, tissue type, miniscrew diameter, or miniscrew length.

Conclusions: Initial miniscrew stability is most affected by insertion site and clinician experience.

Reviewer's Comments: When working with miniscrews, be aware that it is not unusual for some to fail in the first week, especially when a clinician is less experienced. It may be helpful for a practitioner to get initial placement experience with a more experienced colleague and to choose the insertion site carefully. Note that miniscrews in the midpalatal area were 100% successful after 1 week; there are several indications that this may become a site of preference for many experienced miniscrew users due to the predictable stability.

Reviewer: Brent E. Larson, DDS, MS
Article Reviewed: Lim H-J, Choi Y-J, et al. Predictors of Initial Stability of Orthodontic Miniscrew Implants. *Eur J Orthod* 2011; 33 (October): 528–532.

Practical Reviews presents Critiques in Orthodontics

Orthodontics quiz Vol. 25 No. 10

Literature review and critical analysis from the publisher of *Practical Reviews*

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E-quiz code: 31701N

1. Full examination of a cone-beam CT scan is crucial, as incidental findings are common and some may require intervention or referral.

   Practice: T F ***Answer Submitted:*** **T F**

2. Among U.S. orthodontists, there is an overall shift away from Hawley retainers and toward vacuum-formed retainers and fixed retention.

   Practice: T F ***Answer Submitted:*** **T F**

3. A recent study has shown that there is no difference in the progression of periodontal disease in patients who are either regular compliers or erratic compliers with periodontal maintenance therapy.

   Practice: T F ***Answer Submitted:*** **T F**

4. Lim et al found initial miniscrew stability at 1 week to be 100% in the midpalatal area.

   Practice: T F ***Answer Submitted:*** **T F**

5. In a recent study, patients taking extended-term antibiotics following jaw surgery had a much lower incidence of wound infection compared to those on a short-term antibiotic regimen after surgery.

   Practice: T F ***Answer Submitted:*** **T F**

6. When studying sagittal growth in extraction patients, Kalwitzki et al found nearly 3 mm less sagittal growth in the mandibular base in the extraction group compared to non-extraction controls.

   Practice: T F ***Answer Submitted:*** **T F**

7. Combined rapid maxillary expansion/facemask therapy for Class III patients is successful in the long term primarily due to changes in the maxilla.

   Practice: T F ***Answer Submitted:*** **T F**

8. In a recent study, researchers showed that there was no difference in the ability for biofilm to attach to either metal or ceramic brackets during 18 months of orthodontic treatment.

   Practice: T F ***Answer Submitted:*** **T F**

9. Quality of life following orthognathic surgery does not improve in patients who do not originally present with an occlusal problem.

   Practice: T F ***Answer Submitted:*** **T F**

10. Internal marketing is the least expensive and most effective form of marketing for your practice.

    Practice: T F ***Answer Submitted:*** **T F**

11. A utility arch used to intrude mandibular incisors causes greater incisor proclination than does a segmented arch using bone anchorage.

    Practice: T F ***Answer Submitted:*** **T F**

12. Ye et al demonstrated the ability to use a high-resolution cone-beam CT scan and existing CAD/CAM technology to fabricate a custom lingual appliance for orthodontic use.

    Practice: T F ***Answer Submitted:*** **T F**

13. According to a recent study in Iranian schoolchildren, there is no difference in the prevalence of incisor trauma between boys and girls.

    Practice: T F ***Answer Submitted:*** **T F**

14. An unexpected finding from a study of lip-closure forces in cleft children was that no asymmetry in maximum lip-closure force was seen after lip repair.

    Practice: T F ***Answer Submitted:*** **T F**

15. Based on a recent systematic review, mini-implants have no positive effect on orthodontic anchorage success.

    Practice: T F ***Answer Submitted:*** **T F**

16. Ogundipe et al showed that platelet-rich plasma gel inserted into third molar sockets has a significant effect in reducing swelling and pain compared to control extraction sockets.

    Practice: T F ***Answer Submitted:*** **T F**

17. A recent study has shown that, after a 1-year period, clear overlay retainers have significantly less breakage problems than do traditional Hawley retainers.

    Practice: T F ***Answer Submitted:*** **T F**

18. When using a self-etching primer and pre-coated brackets, preparation of teeth prior to bonding with a fluoridated paste increases the bond failure rate.

    Practice: T F ***Answer Submitted:*** **T F**

19. Girls seek orthodontic treatment for less severe orthodontic problems than do boys.

    Practice: T F ***Answer Submitted:*** **T F**

20. Phase I treatment in patients with protrusive maxillary incisors is justified on the basis of reducing the incidence of incisal trauma.

    Practice: T F ***Answer Submitted:*** **T F**

1. F A recent study showed that active ingredients such as fluoride and amorphous calcium phosphate that are contained in prophy paste have no effect on tensile bond strength of orthodontic brackets bonded with the etch-and-rinse technique.

2. T The use of fluoridated miswaks can significantly decrease the severity of post-debonding white spot lesions.

3. T If a bonded bracket fails, it can be rebonded without etching if the remaining composite is just leveled rather than being completely removed.

4. F A recent study has shown that OrthoCAD bracket positioning is much more accurate than an indirect bonding technique.

5. F According to Germec-Cakan et al, premolar extraction always produces a reduction in airway measurements independent of the treatment mechanics involved.

6. F In a recent study, when authors evaluated the long-term effects of ectopic canine eruption on root resorption of maxillary incisors, about 50% of the sample showed worse resorption 15 years after treatment.

7. T Both the Haas-type and hyrax-type rapid maxillary expanders achieve significant increases in maxillary transverse dimensions.

8. T In a retrospective study by Ho et al, oronasal fistulas were a postoperative complication found in 5% of segmental maxillary Le Fort operations.

9. T In a recent study, the effectiveness of arthroscopic surgery at improving intra-articular adhesions of the temporomandibular joint was around 90%.

10. T Having systems in place can help minimize the challenges presented by the departure of a long-term staff member.

11. T Carra et al found that in children aged 7 to 17 years, a brachycephalic facial type was almost 3 times more common in those reporting sleep bruxism than in controls.

12. F Well-aligned teeth lead to a perception of greater academic performance.

13. T Expansion with the quad-helix appliance results in a loss of buccal bone thickness.

14. F Most orthodontists understand the basic terms used in the scientific literature.

15. T In a study of skeletal age in cleft patients, Bowers found that unilateral cleft lip and palate subjects consistently had a skeletal age that was advanced relative to chronologic age.

16. T A cone-beam CT image of unerupted incisors secondary to primary tooth trauma can help visualize the tooth morphology and provide more precise positional information for better clinical decision making.

17. F In a CT study of impacted canines, Cernochova et al found that an enlarged dental follicle was nearly always associated with adjacent root resorption.

18. T In a recent study, researchers found that the length of the soft palate was a strong predictor for velopharyngeal insufficiency in cleft palate patients who were treated with Le Fort I osteotomy to correct their malocclusion.

19. T A preoperative dose of antibiotics may have a slight effect on reducing the implant failure rate, which is already quite low.

20. F A recent study has shown that the addition of platelet-rich fibrin in Class II furcation defects has little positive effect in improving the periodontal parameters compared to simply root planing and scaling.

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