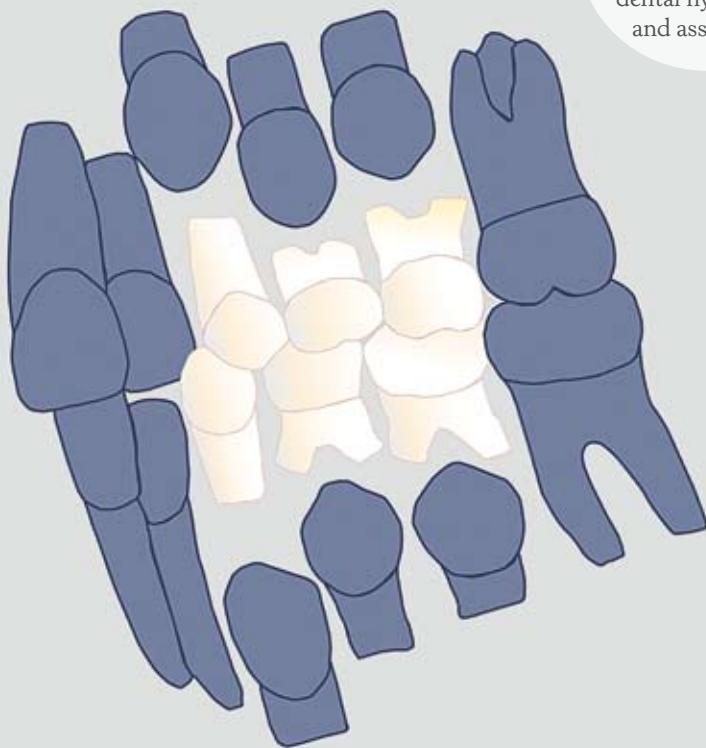


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# Diagnosing Early Interceptive Orthodontic Problems — Part 2

A Peer-Reviewed Publication

Written by Michael Florman, DDS; Rob Veis, DDS;  
Mark Alarabi, DDS, CECSMO and Mahtab Partovi, DDS

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## Educational Objectives

Upon completion of this course, the clinician will be able to do the following:

1. Be knowledgeable about posterior crossbites and the numerous appliances available to treat this problem.
2. Be knowledgeable about the three types of anterior crossbites and the appliances used to treat them.
3. Increase your knowledge of Class III skeletal and dental diagnosis and treatment planning, and the appliances available to aid in their correction.
4. Be knowledgeable about the different philosophies that exist regarding how to treat Class II malocclusions.

## Abstract

Early examination and treatment of the mixed dentition enables the practitioner to identify at an early stage the specific problems discussed in this article, and to determine when to commence treatment and/or refer patients to an orthodontist. In addition to problems discussed in Part I, orthodontic problems discussed in this article (Part II) include crossbites, open bites, excess spacing, and Class II and Class III malocclusions. Treatment options using appliances for early interceptive orthodontics are also addressed.

## Introduction

This continuing dental education article is Part II of "Diagnosing Early Interceptive Orthodontic Problems." After completing this course, the reader will have a clearer understanding of specific problems associated with children in the mixed dentition stage of development. These problems include excess spacing, crowding, crossbites, open bites, and Class II and Class III malocclusions. Appliances that can be used to treat these various orthodontic problems are also discussed.

## Crossbites

The etiology of the crossbite needs to be determined prior to treatment planning. Not all crossbites are the same.

A single-tooth crossbite may have no skeletal component at all. Single-tooth crossbites can be corrected using a Hawley retainer with a finger spring on it. If a single-tooth crossbite has no skeletal component, it can be corrected using fixed appliances at a later date during the comprehensive phase of orthodontic treatment.

## Posterior Crossbites

A posterior crossbite can be unilateral or bilateral. If a bilateral posterior crossbite is present and involves more than one tooth, one of which is a permanent molar, it is most likely a true maxillary skeletal problem and should be addressed by palatal expansion. A unilateral crossbite is usually a maxillary problem.

It is important to note that crossbites that appear unilateral may really be bilateral, and

patients may be biting a certain way to occlude their teeth. This is known as a "comfort bite" or a "functional shift."

## Unilateral or Bilateral Posterior Crossbites

The unilateral posterior crossbite is usually due to a bilaterally underdeveloped maxilla and a shifting of the mandible to one side during closure. If this situation is allowed to continue it can affect the normal growth and development of the TM complex as one condyle becomes anteriorly displaced and the other posteriorly displaced. Correction is imperative. If the patient continues to develop with the crossbite, normal growth of the TM complex may not occur.

Therefore, it is critical that crossbites be corrected as early as possible in the deciduous or mixed dentition to prevent the creation of facial asymmetries and future TMJ problems. It is not uncommon to place a maxillary Schwarz appliance with posterior pads in a patient 4 to 6 years of age. Developing the maxilla to its proper size is often all that is needed to eliminate the posterior crossbite, the facial asymmetry and the deviated skeletal midline. The Schwarz with occlusal coverage corrects crossbites by utilizing a slow constant pressure on the teeth and bone. Another approach that has been shown to be equally effective is the use of rapid expansion to open the mid-palatal suture.

One positive side effect of posterior expansion is associated with increasing patient's airways due to the widening of the maxillary bones and associated soft tissues.

## Appliances

### Schwarz (Removable)

The Standard Schwarz with occlusal coverage (Figure 1) is designed with a smooth posterior bite plane to allow the posterior teeth to move free of any occlusal interferences. By turning the expansion screw one quarter turn a week, a low constant pressure is exerted on the teeth and bone. This appliance is used to develop the arches by expanding the buccal segments.

### Hyrax Appliance (Bonded/Fixed)

The Hyrax appliance is an excellent choice for correcting transverse discrepancies (crossbites). This appliance is hygienic, fixed, and uses a jack screw for palatal expansion. The patient's parent or guardian activates palatal expansion by placing a key in the jack screw and turning the screw. Each turn with the key is really a quarter of one full revolution, equaling one fourth of one millimeter. Regardless if the appliance is turned rapidly or slowly, suture splitting is achieved, along with an increase in arch width and relative length. There are two methods of turning the expansion key: rapidly (two turns per day until the desired expansion is achieved) and slowly (one or two turns per week until the desired expansion is achieved). Generally speaking, overcorrecting the crossbite is recommended

Figure 1. Standard Schwarz Appliance



Figure 2. Hyrax Appliance



to ensure that, after removal of the appliance and the expected minor relapse associated with treatment, the crossbite is corrected.

#### *Haas Expander (Bonded/Fixed)*

The Haas expander is bonded to the maxillary teeth (Figure 3). For patients with an open bite tendency and high angles, practitioners like to use this appliance, as the acrylic functions as a bite plane that controls vertical growth by delivering intruding forces during normal chewing. This appliance is not as hygienic as the Hyrax and can be difficult to remove.

#### *Quad-Helix Appliance (Bonded or Bonded/Removable)*

The Quad-Helix appliance (Figure 4) provides continuous controlled force in a variety of applications. It may be used for rotation or stabilization of molars, expansion or contraction of the arch, and even to assist in thumb, finger or tongue habit control. However it is mainly used because it allows for a differential amount of expansion in the anterior and posterior regions of the arch. If you choose the fixed removable design as shown here, adjustments can be made throughout treatment. Due to its ease of adjustment and the fact that parents are not required to turn an expansion screw, the Quad-Helix is favored by some practitioners.

### **Anterior Crossbites**

Anterior crossbites are one of the most common orthodontic problems that we see in growing children. They usually occur in the primary and mixed dentition as a result of disharmony in either the skeletal, functional, or dental components of the child's orthognathic system.

The anterior crossbite must be treated in the primary and mixed dentition. Allowing this malocclusion to continue into the permanent dentition without correction will result in a

reduction of treatment options and provide a less than ideal environment for growth to proceed.

Specifically, an anterior crossbite can lead to labial displacement of the opposing mandibular incisor; gingival inflammation and recession of the investing tissues surrounding the mal-opposed teeth; occlusal trauma, enamel abrasion or fractures of the anterior teeth; the development of abnormal chewing and swallowing problems; abnormal growth of the maxilla and mandible; the development of a permanent Class III dentofacial abnormality, and possible temporomandibular joint dysfunction.

There are three types of anterior crossbites found in children. They are the simple dental crossbite, the functional or pseudo crossbite, and the skeletal crossbite. Each category is unique and has specific diagnostic criteria.

### **The Simple Anterior Crossbite**

Simple anterior crossbites are generally the result of an abnormal eruption of the permanent incisors. The term simple is used because these crossbites can easily be corrected using removable appliances by practitioners with limited experience in orthodontics. Various etiologic factors can be involved including: trauma to the primary incisors with displacement of the permanent tooth bud; delayed exfoliation of a primary incisor with palatal deflection of the erupting permanent incisor; supernumerary anterior teeth; odontomas; congenitally abnormal eruption patterns, and an arch perimeter deficiency.

Patients who have a simple anterior dental crossbite exhibit the following characteristics:

- a. The crossbite usually involves only one or two teeth.
- b. The facial profile is usually normal in centric relation and centric occlusion.

Figure 3. Haas Expander



Figure 4. Quad-Helix Appliance



Figure 5a. Simple Anterior Crossbite Before Treatment



Figure 5b. Simple Anterior Crossbite After Treatment



- c. Many of these patients exhibit Class I skeletal patterns.
- d. There is usually no shift from rest to intercuspation, as the teeth involved in the crossbite have moved to accommodate the interference.

### The Functional Anterior Crossbite (pseudo Class III)

Patients who have a functional anterior crossbite exhibit the following characteristics:

- a. In centric relation or in a relaxed postural position, the patient presents with a normal facial profile convexity.
- b. In centric relation the opposing incisors generally contact edge-to-edge with the molars separated.
- c. During closing an early occlusal interference causes an anterior shift of the mandible.
- d. As the mandible shifts forward into centric occlusion, the incisors are placed into crossbite and the molars into a Class III relationship.
- e. Depending on the severity of the anterior shift, when the patient closes into centric occlusion the mandible translates forward creating a concave facial profile.
- f. The maxillary incisors over time become retroclined and the mandibular incisors may be proclined.

### The Skeletal Anterior Crossbite

Patients with true skeletal Class III relationships have a discrepancy between the maxilla and mandible, in which either the maxilla is shortened, or the mandible is growing elongated, or a combination of both.

- a. In centric occlusion their facial profile will be straight or concave.
- b. There will be a Class III molar relationship and an anterior crossbite.
- c. The arc of mandibular closure remains smooth without any occlusal interferences.

- d. In an attempt to compensate for the skeletal discrepancy during growth, the maxillary incisors usually become proclined and the mandibular incisors become retroclined.

### Treatment of Anterior Crossbites

The first step in treating an anterior crossbite is to determine whether the crossbite is skeletal, functional, or dental in nature. To do this will require a precise clinical and radiographic examination of the patient. Anterior crossbites that are either single or a few teeth involved, or functional can be corrected. Some early diagnosed and properly treated skeletal crossbites can be corrected or camouflaged if treated early. Others will need surgery, regardless of early treatment.

The following steps should be included in a clinical examination:

- a. Evaluate the number of teeth involved in the crossbite and their inclination — in a dental crossbite usually only one or two teeth are involved. In a functional Class III, all the maxillary incisors are generally retroclined and the mandibular incisors are proclined. In a true skeletal Class III, an attempt to compensate for the skeletal discrepancy occurs, and during growth the maxillary incisors usually become proclined and the mandibular incisors become retroclined.
- b. Examine the profile — direct your patient to close his or her mouth into a rest position with his or her lips together but with the teeth out of contact. This will allow you to evaluate the patient's soft tissues, facial musculature, and overall facial profile for any signs of a skeletal mandibular prognathism.
- c. Examine the arc of closure — when a patient opens and closes into full occlusion, his or her arc of closure will either be smooth and uninterrupted or exhibit an anterior shift to avoid an abnormal incisal interference. A true skeletal Class III patient will close in a smooth uninterrupted arc. A patient with a functional crossbite will experience an anterior shift and a patient with a dental crossbite may or may not shift forward.
- d. Note the relative positions of the primary and permanent molars in both centric occlusion and centric relation. In a skeletal Class III grower, a mesiocclusion is maintained in both positions. In a simple dental crossbite, flush terminal plane of the molars will be maintained in both centric relation and centric occlusion. In a functional pseudo Class III, there may be a shift from a flush terminal plane to a Class III relationship as the mandible closes from centric relation to centric occlusion.
- e. Attempt to manipulate the mandible posteriorly to obtain a more favorable relationship with the maxilla — if the incisors can be brought to an edge-to-edge position, or nearly so, it indicates that the crossbite is

more likely due to a functional rather than a skeletal or dental component.

### Treatment of a Simple Dental Crossbite

The best treatment of a simple dental crossbite is to prevent the condition from ever happening. This can be accomplished by taking routine radiographic images of the maxillary incisor region to look for abnormalities. Observing and managing severe arch perimeter deficiency is also essential to prevent a crossbite from occurring.

Once a dental anterior crossbite exists, many methods have been used to correct it. These range from the use of an acrylic incline plane to a reverse stainless steel crown. Even tongue blades have been used to try to jump a crossbite. The key to success is to use an appliance that is both comfortable and predictable. The appliances shown are two of the most common.

The first appliance is a simple Hawley retainer with recurve springs (Figure 6). Activation of the spring in a labial-gingival direction will put direct pressure on the tooth in crossbite. The typical design has a passive labial bow which is utilized to diminish any lip pressure during active therapy. It also acts as a limitation for anterior tooth movement. Adams clasps or C clasps are typically used for retention. Additional retention can be obtained by placing ball clasps between the first and second primary molars. Posterior occlusal bite planes are often used to open the bite and allow the incisor to advance without any occlusal interference.

The second design is a fixed labial-lingual appliance (Figure 7). It includes a vertical removable lingual arch for ease of adjustment, with a recurve spring to jump the crossbite. As in the removable appliance, the passive labial bow is utilized to diminish any lip pressure during active therapy. This appliance is particularly useful when you are dealing with a patient that is a little less cooperative.

Both of these appliances work by tipping the maxillary teeth forward so that they are in a normal dental relationship to the mandibular teeth. Once this is accomplished it will allow future coordinated growth to occur between the maxilla and the mandible. Activation of these appliances should be carried out every four weeks by opening the springs, so that approximately 2 mm of compression is required to seat the appliance.

### Treatment of a Functional Anterior Crossbite

Treatment of a functional anterior crossbite should be undertaken as soon as possible to eliminate the mandibular shift that takes place. This is important because this shift subjects the incisors to abnormal occlusal interferences, and over time the forward positioning of the mandible may alter the patient's growth, resulting in a skeletal Class III pattern. Similar to the treatment of a dental anterior crossbite, the best way to treat a functional anterior crossbite is to correct its cause before it becomes a problem. To do this, simply identify the early occlusal

interference responsible for the anterior shift of the mandible and eliminate it. For example, mandibular primary cuspids are often the most common area of interference causing a functional shift. A simple adjustment of the cusp tips with a rotary diamond is often all that is needed to correct the problem.

Once a functional crossbite exists, a predictable correction can be obtained with the Upper Anterior Crossbite appliance as seen below (Figure 8). Here the entire anterior segment can be moved labially with an expansion screw placed 90 degrees to the maxillary incisors. The labial arch wire moves with the segment as a unit while using the posterior teeth for anchorage and retention. A posterior bite plane is necessary if the anterior teeth are lingually locked behind the lower incisors. Activation is achieved by opening the expansion screw one quarter turn per week. This will advance the incisor segment 1 mm per month. Retention of the crossbite correction is usually only required if there is not a positive overbite after the crossbite has been jumped.

### Treatment of a Skeletal Anterior Crossbite

There is no simple orthodontic correction for a skeletal anterior crossbite. In the hands of an orthodontist, the first step in treating a skeletal anterior crossbite is to perform a differential diagnosis of the location of the skeletal problem. A careful clinical assessment along with a cephalometric analysis is commonly used to differentiate between a maxillary retrusion and a mandibular protrusion. For example, while looking at a patient's profile if there is a straight or concave tissue contour extending from the inferior border of the orbit down to the corner of the mouth, that patient may be suffering from a mid-face maxillary deficiency. A cephalometric analysis indicating a smaller than normal SNA angle would also support this conclusion. On the other hand, if the chin appears to be in front of a line extending down from soft tissue nasion, it is an indication that the mandible is the causative factor. A larger than normal SNB angle would support this conclusion.

A patient in the mixed dentition presenting as a Class III can be either a true skeletal Class III or a functional Class III. Regardless, if treatment is determined to have a skeletal component, the treatments may be similar in trying to achieve a favorable overbite and positive overjet.

In the event you determine that the problem has a skeletal component, determining which jaw is the culprit is the next step.

In growing children, if the maxilla is deficient, treatment such as reverse pull facemask therapy can be used. In cases where the mandible is causing the class III, slight compensation in both arches may be the plan. In cases where it is obvious that the mandible is growing and will continue to grow based on looking at parents and grandparents skeletal patterns, keeping teeth out of harms way may be the only treatment plan option, recognizing that surgery will be only option after growth has ceased.

Figure 6. Hawley Retainer with Recurve Springs



Figure 7. Labial-Lingual Appliance



Figure 8. Upper Anterior Crossbite Appliance



Figure 9. Patient Presents with Underbite



In the preceding case, it was determined that the patient presented with a slight mandibular problem, with a normal maxilla. Due to the spacing and underbite, maxillary protraction was used to jump the crossbite and re-position the jaws into a more favorable relationship.

The appliance used here is a rapid palatal expander with facemask hooks. It is believed by many orthodontists that regardless if there is a posterior crossbite, movement of the maxillary sutures is imperative to achieve correction during protraction. In this case, the patient was informed to have a parent turn the key two turns in one

Figure 10. Pre-treatment Lateral Head Film Demonstrating Underbite



Figure 11. Maxillary Rapid Palatal Expander Appliance with Facemask Hooks



Figure 12. Elastic Hooks on Appliance Connect the Elastics to the Reverse Pull Facemask



direction for one day, then reverse the turning to go backwards. This backward/forward motion is done up to a month every other day.

Elastics are then attached to the hooks on the appliance and attach to the facemask.

After the appliance has been worn for 6-8 months, from 3pm to the next morning every day, correction can be achieved in patients that comply.

### Crowding in the Mixed Dentition Minor Crowding

The mixed dentition analysis is one tool used to determine if there is enough space to resolve minor crowding. In most minor crowding cases, the Leeway space will provide sufficient room to resolve minor crowding in the mixed dentition. This is why it is so important to maintain that space with the appliances discussed in part 1 of this article.

### Moderate Crowding

Moderate crowding can be resolved by performing arch development, using the arch development appliances described in the section on posterior crossbites. For the mandibular arch, the removable Schwarz appliance, or Bonded Lingual Arch Expander, can be used to tip the permanent molars and primary molars, increasing arch length and width.

Figure 13. Reverse Pull Facemask on Patient Connected to Appliance

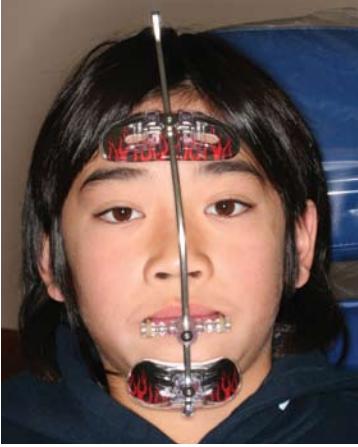


Figure 14. Correction of Underbite with no Retroclination of the Lower Incisors



The developed arch allows the permanent teeth to erupt more buccally, into a larger arch perimeter. Once the arch perimeter has been increased, the appliance acts as a lingual holding arch.

The fixed mandibular expander is bonded onto the lower permanent molars, and then composite arms are attached to the primary molars. In the case shown here (Figure 15a), the arms were bonded on the primary second molars. After expansion of the lower arch is completed, the appliance is still worn and acts as a retainer. To enable exfoliation of primary teeth and leave room for the permanent premolars to erupt, the wires can be cut off the bonded primary molars and the composite can be removed (Figure 15b). The appliance shown had arms bonded on the primary first molars that were removed to allow eruption of the permanent first premolars.

Timing of the removal of the arms is easily determined by use of a progress panoramic film and intraoral inspection of the tissue around the primary molar. For a thorough review of the appliance therapy options to develop the arches go to [www.appliancetherapy.com](http://www.appliancetherapy.com) and review the textbook *Appliance Therapy for Adults and Children*.

### Severe Crowding

If very severe crowding is present in the mixed dentition, serial extractions can be considered. The first teeth to be extracted in serial extraction therapy are the primary canines (Figure 16a). This creates space for the permanent lateral incisors to erupt or straighten out. The next teeth in the series to be extracted are the

Figure 15a. Fixed Mandibular Expander Bonded onto Lower Permanent Molars



Figure 15b. Removal of Wires to Enable Exfoliation of Primary Teeth and to Leave Room for Permanent Molars to Erupt



primary first molars (Figure 16b), followed by the first permanent premolars, to create space for the permanent cuspids to erupt. Graber and Vanarsdall describe different types of patients in need of serial extraction with unique considerations. After extractions are completed, the practitioner needs to determine when either fixed appliance therapy will begin or holding arches on the permanent molars will be used.

### Excessive Spacing

Excessive spacing in the mixed dentition phase is good, because it is space that will be used for the permanent successor teeth. Most parents are concerned that the space looks bad (perhaps one of the reasons for the coining of the term “the ugly duckling phase”). Excessive space can be closed by closing diastemas to bring the maxillary laterals together. Some parents want the space closed for aesthetic reasons, even though it might be perfectly normal. Diastemas in children whose permanent cuspids have not erupted can be treated with either a removable appliance or a fixed appliance. Diastemas under 2 mm usually close on their own.

In some cases, the permanent cuspids may be blocked out and interceptive space closure should be performed. Generally, severely tipped maxillary lateral incisor roots, noticeable on a panoramic film, help to determine the diagnosis.

### Protruded Maxillary Teeth — Excessive Overjet

Protrusion of the maxillary teeth is seen in children with tongue position problems, digit habits, or a

Figure 16a. Serial Extraction of Primary Canines

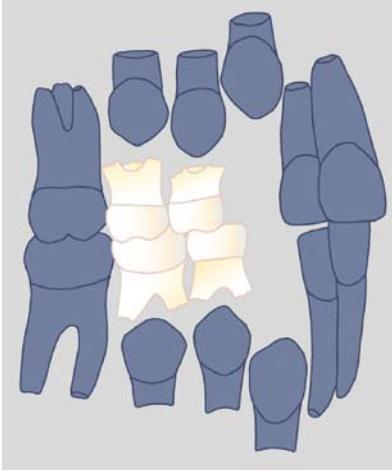


Figure 16b. Serial Extraction of Primary First Molars

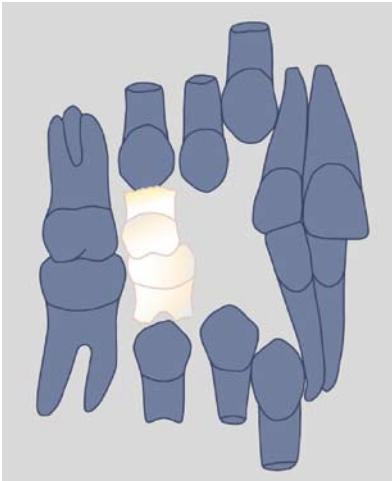
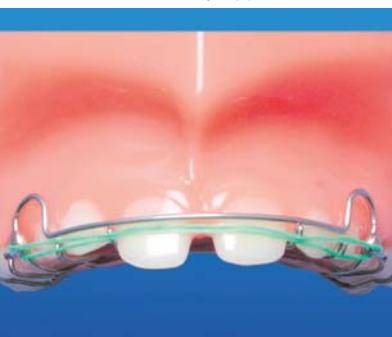


Figure 17. Apron Hawley Appliance



Figure 18. Removable Hawley Appliance



Class II skeletal relationship. Correction of an excessive overjet is important both to prevent trauma to teeth (for instance, from elbows or dodge balls thrown during play) and to help a child avoid having to deal with being harassed and mocked by other children about his or her excessive overjet.

If a patient is in the habit of placing the lip into the overjet area, the lip can act like a functional appliance, thereby perpetuating a Class II relationship that might otherwise self-correct with pre-programmed growth. Therefore, it is important to counsel patients with a lip-wedging habit to discontinue this practice. When a patient only presents with an excessive overjet, removable appliances such as the Apron Spring Hawley (Figure 17), or similar designs that use an elastic to retract the protrusion (Figure 18), can be used to correct excessive overjets. When there are problems beyond an excessive overjet, fixed appliances are the better choice.

Compared to removable appliances, fixed appliances correct midline shifts and intrusive forces can be delivered to move teeth to more favorable positions if needed.

In patients with Class II deep bites, the lower anteriors often supererupt, thereby deepening the mandibular curve of Spee. Using fixed appliances (braces), the curve can be flattened and intrusion of lower incisors can be achieved.

When using fixed appliances to treat cases with excessive overjet, begin by placing two bands on the permanent maxillary molars and four brackets on the maxillary centrals and laterals. Either a utility arch or a simple straight wire with tubing can be used. Using simple mechanics, the practitioner can level and align the teeth, and then achieve subsequent space closure. Once teeth have been retracted and are out of harm's way, the patient may be ready for either a removable retainer or a holding archwire (leaving the brackets and band on) until the permanent cuspids and premolars erupt. During this holding phase, it is important to continue monitoring the patient's oral hygiene and to educate and motivate the patient to adequately perform oral hygiene.

### Excessive Deep Bite

Excessive deep bites may be associated with skeletal components. Minor deep bites in the mixed dentition can be monitored and corrected if required. It is important to continue to monitor patients, as deep bites can continue to deepen over time and can result in the lower teeth impinging on palatal tissues. Lower incisors tend to supererupt as a result of the lack of occlusion with the maxillary anterior teeth. Deep bites are often seen in Class II cases, where excessive overjet is associated with the malocclusion. The deep bite is usually associated with a deficient mandible.

In patients with Class I deep bites, a removable anterior biteplate can be used to prevent further deepening of the bite. If a patient with a deep bite

is being treated using a removable appliance, the patient must wear the appliance all the time. The goal of removable anterior bite plate therapy is to prevent the deep bite from deepening and to intrude the anteriors that cause bite opening, to idealize the vertical relationship and allow the posterior teeth to erupt.

### Open Bites

Open bites in the mixed dentition can be due to multiple causes. Some of the factors that can elicit an open bite are finger habits, tongue habits, airway problems and mouth breathing, and of course the patient's genetic growth pattern. The only way to know how to treat these patients is to take proper records early. You would be amazed at what can be done to affect a child's growth when you eliminate an abnormal swallowing pattern through proper therapy. Or, as we demonstrated in Part 1 of this article a simple tongue thrusting appliance can often be enough for the facial muscles to close an open bite. Severe open bites caused by vertical growth or excessive eruption of the posterior teeth associated with skeletal growth patterns may require more complex orthodontic intervention. Airway obstruction can elicit open bites in children. If you suspect an obstruction, it is important to refer to an ENT specialist for a consultation. Elimination of the airway problem in conjunction with correcting the open bite should be done as soon as possible.

### Class II Skeletal or Dental Problems

Why does the patient have a Class II? Is it the fault of the maxilla, the mandible, or both? Are the teeth in the wrong place as well? There are many questions to be answered prior to deciding treatment. The key to successful treatment is making the right diagnosis. You must have excellent diagnostic records. These should minimally include a lateral cephalometric film, study models and a panorex.

There are many ways to treat a Class II. What is important here is to understand that skeletal problems need to be evaluated early as they generally do not self-correct unless you eliminate the factors that are causing them, through early intervention. Once you have determined the problem, there are different schools of thought on how to correct it.

The first philosophy in treating Class II patients prior to the end of their growth spurt is to restrict the maxilla from growing. Headgear therapy has been used for many decades, and still used today by practitioners believing in this modality. Basically the headgear holds the maxilla back, so the mandible can catch up.

The second philosophy in treating Class II cases is to accept that the mandible is deficient, and to distalize the maxillary molars to create space for further retraction of the remaining teeth. The end result will leave patients with retroclined anterior teeth and Class I molars and canines. The

following case used a Wilson Appliance which is used to distalize the molars and retract the anterior teeth (Figure 19). The appliance uses elastics to pit the maxillary arch against the mandibular Wilson Distalizing Arch, which pushes the molars into a Class I position. After the molars were distalized and the protrusion corrected, the appliance was removed to allow for continued growth until comprehensive treatment could occur when all the permanent teeth were erupted.

Figure 19. Wilson Appliance with Distalizing Arch. Lower Lingual Holding Arch Present on Mandibular Arch Used in Conjunction with this Appliance.



Figure 20. Protrusion Patient Pre-treatment



Figure 21. Protrusive Patient Post-Treatment



The third philosophy involves extracting teeth to allow for space to retract the maxillary teeth to occlude better with the mandible. First premolars are usually the teeth of choice for extraction, leaving the patient with Class I canines and Class II molars. In cases with mandibular crowding accompanying the deficient mandible, mandibular second premolars can be extracted, allowing the space to be used to resolve the crowding and to slip the mandibular first molars mesial into a Class I molar relationship. The end result is Class I molars and Class I canines. In cases where there is no mandibular crowding, it makes little sense to remove teeth in the mandible just to have Class I molars. It would make more sense to leave the patient with Class II molars and Class I canines.

The fourth philosophy is called Functional Therapy. Functional correction of Class II

can be divided into two categories. Expansion and Protraction, or a combination of the two. Functional expansion practitioners believe that most Class II growing patients have some maxillary constriction that is not allowing the mandible to express itself fully, hence causing the retrusion of the mandible. This practice involves maxillary expansion and mandibular development, using either fixed or removable appliances. It is compared to widening a shoe and allowing the foot to move more forward. In conjunction with fixed appliances, the repositioning of the mandible is seen in many patients.

Functional protraction is one of the most studied methods for correction of Class II in dentistry. Numerous appliances, fixed (Herbst) and removable (Twin Block, Bionator), pit the maxillary arch against the mandibular and hold the deficient mandible in an anterior position. Both dental and skeletal changes can occur, resulting in the correction of the Class II. The biggest question asked is “Can we grow mandibles?” Stay tuned as the research continues.

Many practitioners believe that children treated early with functional therapy routinely exhibit less signs and symptoms of TM dysfunction when a Class II correction is accomplished by repositioning the condyles downward and forward. Unfortunately, too often patients are not given this option of any early treatment.

Instead, they are told not to treat the malocclusion early, but rather to wait until all the permanent teeth have erupted.

## Summary

Performing the early treatment examination of the mixed dentition at an early stage, by age 7, enables the identification of orthodontic problems discussed in this article, including Class II and Class III malocclusions as well as problems associated with anterior and posterior teeth, such as crossbites. Early assessment enables the early identification of problems, early intervention, and optimal timing of treatment and/or referral for the patient.

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## Authors Profiles

### Michael Florman, DDS

Dr. Florman received his dental degree from the Ohio State University and completed his post graduate training in Orthodontics at New York University. Dr. Florman is a Diplomate of the American Board of Orthodontics, and has been practicing dentistry since 1991. He has authored over forty scientific publications in the field of dentistry and medicine, and is an active clinical advisor to many pharmaceutical and dental companies. He is a member of the American Dental Association, California Dental Association, and the American Association of Orthodontists.



### Rob Veis, DDS

Dr. Rob Veis began 24 years ago as a general dentist, and taught for twelve years at the University of Southern California as a Clinical Professor in Restorative Dentistry. Dr. Veis lectures for the AGD/California masters program. He also lectures internationally, on the integration of orthodontics and appliance therapy into the general practice on behalf of Space Maintainers Laboratories where he has been a member of the teaching staff since 1990. He is coauthor of the comprehensive textbook *Principles of Appliance Therapy for Adults and Children*, and author of several *Practice Building Bulletins*. Dr. Veis is a member of the California Dental Association and the Academy of General Dentistry.

### Mark Alarabi, DDS, CECSMO

Dr. Alarabi obtained his dental degree from the University of Tishreen, Syria in 1996. He received his training in Orthodontics and Dento-Facial Orthopedics at the University of Aix-Marseille II earning a Certificate of Special Studies in Clinical Orthodontics (CECSMO) in 2002, and is a former member of the French Society of Dento-Facial Orthopedists and the French Society of Bioprogressive. Dr. Alarabi joined the faculty at Jacksonville University in July 2003. He is a member of the American Association of Orthodontists.

### Mahtab Partovi, DDS

Dr. Partovi received her dental degree from New York University College of Dentistry. Dr. Partovi is presently a resident at Jacksonville University, School of Orthodontics, and is a member of the American Dental Association and the California Dental Association.

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## Questions

- Correction of an excessive overjet is important in order to \_\_\_\_\_.
  - prevent trauma to teeth
  - prevent trauma to elbows
  - help a child avoid having to deal with being harassed
  - a and c
- Protrusion of the maxillary teeth is seen in children with \_\_\_\_\_.
  - a Class II skeletal relationship
  - digit habits
  - tongue position problems
  - all of the above
- Fixed appliances never offer any benefits over removable appliances in reducing excessive overjet.
  - True
  - False
- The lip can act like a functional appliance, thereby perpetuating a Class II relationship.
  - True
  - False
- The mandibular curve of Spee \_\_\_\_\_.
  - can be flattened using a fixed appliance
  - may be deepened as a result of supererupting lower anterior teeth
  - is a contributory factor in mastoiditis and hearing loss
  - a and b
- The deep bites often seen in Class II cases are usually associated with a deficient mandible.
  - True
  - False
- If a bilateral posterior crossbite is present and involves more than one tooth, one of which is a permanent molar, \_\_\_\_\_.
  - it is most likely a true maxillary skeletal problem
  - it is most likely a true mandibular skeletal problem
  - it will most likely resolve itself within six months
  - none of the above
- A unilateral crossbite is usually a mandibular problem.
  - True
  - False
- Single-tooth crossbites \_\_\_\_\_.
  - may have no skeletal component
  - can be corrected using a Hawley retainer with a finger spring on it
  - can be corrected at a later date using fixed appliances
  - all of the above
- A "comfort bite" or "functional shift" \_\_\_\_\_.
  - occurs when a patient bites a certain way to occlude his or her teeth
  - may make a bilateral crossbite appear to be unilateral
  - is an appliance used to shift the occlusion into the comfort zone
  - a and b
- The Hyrax appliance \_\_\_\_\_.
  - can correct transverse discrepancies
  - is removable
  - uses a jack screw for palatal expansion
  - a and c
- The expansion key on a Hyrax appliance can be turned rapidly or slowly until the desired expansion is achieved.
  - True
  - False
- The Haas expander \_\_\_\_\_.
  - is bonded to the mandibular teeth
  - controls vertical growth by delivering intruding forces
  - is bonded to the maxillary teeth
  - b and c
- The Quad-Helix appliance \_\_\_\_\_.
  - is favored by some practitioners due to its ease of adjustment and the fact that parents are not required to turn an expansion screw
  - can be used for rotation or stabilization of molars
  - is mainly used because it allows for a differential amount of expansion in the anterior and posterior regions of the arch
  - all of the above
- The standard Schwarz appliance is designed with a smooth posterior bite plane to allow the posterior teeth to move free of any occlusal interferences.
  - True
  - False
- When presented with a patient with an anterior crossbite, the clinical examination should include \_\_\_\_\_.
  - Evaluation of the number of teeth involved in the crossbite and their inclination
  - Examination of the patient's profile and arc of closure
  - the relative positions of the primary and permanent molars in both centric occlusion and centric relation
  - all of the above
- Anterior crossbites are usually caused by excessive spacing in the arches.
  - True
  - False
- \_\_\_\_\_ is one option that can be used to correct an anterior crossbite.
  - A reverse stainless steel crown
  - A removable Hawley appliance with a recurve spring
  - An acrylic incline plane
  - all of the above
- Treatment of a functional anterior crossbite should be undertaken as late as possible to eliminate the mandibular shift that takes place.
  - True
  - False
- Early treatment of a Class III involving mandibular excess is \_\_\_\_\_.
  - generally avoided
  - highly desirable to avoid future problems
  - avoids the need for treatment later
  - none of the above
- Once a functional crossbite exists, a predictable correction can be obtained with the Upper Anterior Crossbite appliance.
  - True
  - False
- Reverse pull facemask therapy can be used to treat growing children with a skeletal anterior crossbite if the maxilla is deficient.
  - True
  - False
- In most minor crowding cases, the Leeway space will provide sufficient room to resolve minor crowding in the mixed dentition.
  - True
  - False
- If severe crowding is present in the mixed dentition, \_\_\_\_\_ can be considered.
  - serial protraction
  - serial extractions
  - a wait-and-see approach
  - all of the above
- A diastema in a child whose permanent cuspids have not erupted can be treated with \_\_\_\_\_.
  - a removable appliance
  - a fixed appliance
  - a bite plane
  - a and b
- Open bites in the mixed dentition can be due to \_\_\_\_\_.
  - an airway problem or mouth breathing
  - finger habits
  - tongue habits
  - all of the above
- Excessive deep bites may be associated with skeletal components.
  - True
  - False
- There are different schools of thought on how to correct Class II problems.
  - True
  - False
- A Wilson appliance is used to push the molars into a Class II position.
  - True
  - False
- Many practitioners believe that children treated early with functional therapy routinely exhibit less signs and symptoms of TM dysfunction when a Class II correction is accomplished by repositioning the condyles downward and forward.
  - True
  - False

# Diagnosing Early Interceptive Orthodontic Problems — Part 2

Name: \_\_\_\_\_ Title: \_\_\_\_\_ Specialty: \_\_\_\_\_  
 Address: \_\_\_\_\_ E-mail: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_  
 Telephone: Home ( ) \_\_\_\_\_ Office ( ) \_\_\_\_\_

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 4 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp.

## Educational Objectives

1. Be knowledgeable about posterior crossbites and the numerous appliances available to treat this problem.
2. Be knowledgeable about the three types of anterior crossbites and the appliances used to treat them.
3. Increase your knowledge of Class III skeletal and dental diagnosis and treatment planning, and the appliances available to aid in their correction.
4. Be knowledgeable about the different philosophies that exist regarding how to treat Class II malocclusions.

## Course Evaluation

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

1. Were the individual course objectives met?  
 Objective #1: Yes No Objective #3: Yes No  
 Objective #2: Yes No Objective #4: Yes No
2. To what extent were the course objectives accomplished overall?  
 5 4 3 2 1 0
3. Please rate your personal mastery of the course objectives.  
 5 4 3 2 1 0
4. How would you rate the objectives and educational methods?  
 5 4 3 2 1 0
5. How do you rate the author's grasp of the topic?  
 5 4 3 2 1 0
6. Please rate the instructor's effectiveness.  
 5 4 3 2 1 0
7. Was the overall administration of the course effective?  
 5 4 3 2 1 0
8. Do you feel that the references were adequate?  
 Yes No
9. Would you participate in a similar program on a different topic?  
 Yes No
10. If any of the continuing education questions were unclear or ambiguous, please list them.  
 \_\_\_\_\_
11. Was there any subject matter you found confusing? Please describe.  
 \_\_\_\_\_  
 \_\_\_\_\_
12. What additional continuing dental education topics would you like to see?  
 \_\_\_\_\_  
 \_\_\_\_\_

Mail completed answer sheet to  
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| 11. (A) (B) (C) (D) | 26. (A) (B) (C) (D) |
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| 15. (A) (B) (C) (D) | 30. (A) (B) (C) (D) |

AGD Code 373

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