CORRECTING ANTERIOR CROSS BITES

**PRACTICE POTENTIAL**

Little Jimmy, age eight, who you have been treating since he was five, doesn’t seem to have enough room for all his teeth. In fact, two of them appear to he in cross-bite. Could you explain to Jimmy’s parents why he doesn’t have enough room for all his teeth? Even more important, could you treat Jimmy’s problem?

During a child’s development the permanent lateral incisors are usually overlapped by and located palatal to the permanent central incisors. When growth is normal, this overlapping becomes minimal and enough space will exist for the laterals to move labially into the arch as they erupt. But when growth is not normal and there is insufficient space in the dental arch for the permanent lateral incisors to move labially before their emergence, these teeth will change their path of eruption and become palatally positioned in cross-bite.

Anterior cross-bites 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 orthognathic system of the child.

Some of the more common etiologic factors are: 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 as in our example, arch perimeter deficiencies. When this happens the pediatric specialist, orthodontist, or general dentist is often called upon to recognize and provide the appropriate treatment to eliminate its potentially far reaching negative effects.

**INDICATIONS**

The anterior cross-bite 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 in an orderly fashion.

Specifically, an anterior cross-bite can lead to the following problems which when left untreated will require more extensive orthodontic therapy at a later time: 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 the mandible; the development of a permanent Class III dentofacial abnormality, and temporomandibular joint dysfunction.

**DESCRIPTION**

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

Simple anterior cross-bites are generally the result of an abnormal eruption of the permanent incisors. 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...
The Practice Building Bulletin

patterns, and a arch perimeter deficiency.¹

Patients who have a simple anterior dental cross-bite exhibit the following characteristics:

a. The cross-bite usually involves only one or two teeth.⁵
b. The facial profile is normal in centric relation and centric occlusion.¹

c. The anterior posterior skeletal relationship is normal.¹

d. The mandible has a smooth arc of closure into an Angle Class I molar and cuspid relationship, with a coincident centric relation and centric occlusion. ²,⁶

e. A disharmony in the dental components results from an abnormal axial inclination of either the maxillary or mandibular anterior teeth as they erupt. This can be cephalometrically verified by looking at the upper incisor to NA angle and the lower incisor to NB angle. The rest of the teeth are usually in a normal occlusal scheme.⁵

The Functional Anterior Cross-bite (pseudo Class III)¹

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 but in an Angle Class I relation.

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 cross-bite and the molars into a Class III relationship.

e. Depending on the severity of the anterior shift when the patient closes into centric occlusion they will either maintain a straight profile or exhibit a concave facial profile.

f. The maxillary incisors are generally retroclined and the mandibular incisors may be proclined.

g. In a pseudo Class III, the gonial angle is more nearly a right angle with the average near 120 degrees. In addition, a false normal ANB angle may be manifested in a pseudo Class III.

The Skeletal Anterior Crossbite

Patients who have a true skeletal Class III or mesiocclusion have a problem of skeletal dysplasia involving mandibular hypertrophy, a marked shortening of the cranial base or maxilla, or a combination of both.⁶ Some of the characteristics they will exhibit are:

a. In centric relation their facial profile will be straight or concave.¹

b. In centric relation there will be a Class III molar relationship and an anterior cross-bite.¹

c. In centric occlusion there will be a Class III molar relationship and an anterior cross-bite.¹

d. The arc of mandibular closure remains smooth without any occlusal interferences.¹

e. In an attempt to compensate for the skeletal discrepancy during growth the maxillary incisors usually become proclined and the mandibular incisors become retroclined.¹

f. Cephalometrically, a reduced or negative value for the ANB angle indicates that either the maxilla is relatively retracted or the mandible is positioned anteriorly. If the SNA angle value decreases beyond the standard deviation for the age and sex of the child, and the SNB angle is normal, the dentist should consider fault in the maxillary dental component. If the SNB angle value increases over the standard deviation for the age and sex of the child, then the dentist should consider fault in the mandibular skeletal component.³

g. Another cephalometric characteristic found in a skeletal Class III is that the gonial angle is more often obtuse with a range between 130 and 140 degrees (this gives a long facial appearance). It should also be noted that a high SN to Mandibular Plane Angle can mask a developing Class III malocclusion. An in-depth cephalometric analysis is a must before treating these cases.³ Note - Space Maintainers has a service that can provide a complete cephalometric analysis.
**TREATMENT**

1. 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. This determination is important because correction and retention is generally thought to be better in an anterior crossbite resulting from a functional or dental problem.

Anterior cross-bites resulting from a skeletal dysplasia have a greater chance of growing out of a corrected normal relationship due to the inherent growth patterns of bone.

The following steps should be included in a clinical examination:

a. Evaluate the number of teeth involved in the cross-bite and their inclination - In a dental cross-bite 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 their mouth into a rest position with their lips together but with their teeth out of contact. This will allow you to evaluate their 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, their 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 cross-bite 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 a mesiocclusion is maintained in both positions. In a simple dental cross-bite, 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 cross-bite is more likely due to a functional rather than a skeletal or dental component.

2. Treatment of a simple dental cross-bite.

The best treatment of a simple dental cross-bite 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 like an odontoma, the delayed exfoliation of a primary incisor, or the presence of a supernumerary tooth. Observing and managing severe arch perimeter deficiency is also essential to prevent a cross-bite 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 cross-bite. The key to success is to use an appliance that is both comfortable and predictable. The appliances shown below are two of the most common:

a. The first appliance is a simple Hawley retainer with recurve springs. Activation of the spring in a labial-gingival direction will put a direct pressure on the tooth in cross-bite. 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.
b. The second design is a fixed labial-lingual appliance. It includes a vertical removable lingual arch for ease of adjustment with a recurve spring to jump the cross-bite. 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.

Labial -lingual Appliance #2061

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.1

Activation of these appliances should be done every four weeks by opening the springs so that approximately 2.0 mm of compression is required to seat the appliance.1

3. 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 patients growth resulting in a skeletal Class III pattern.1

Similar to the treatment of a dental anterior cross-bite, the anterior cross-bite 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 cuspsids 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 cross-bite exists, a predictable correction can be obtained with the Upper Anterior Cross-bite appliance #7073 as seen below. 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 1.0 mm per month. Retention of the cross-bite correction is usually only required if there is not a positive overbite after the cross-bite has been jumped.1

Upper Anterior Cross-bite appliance #1073

4. Treatment of a skeletal anterior crossbite

There is no simple orthodontic correction for a skeletal anterior cross-bite. In the hands of an orthodontist, the first step in treating a skeletal anterior cross-bite is to do 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 patients 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.1

Early treatment of the Class III involving mandibular excess is generally avoided. The treatment of choice for this skeletal problem is
comprehensive orthodontics and/or orthognathic surgery when growth is complete.

Early orthopedic treatment using a fixed rapid palatal expansion appliance with a protraction headgear is the treatment of choice for patients presenting with a retruded maxilla. Turning the screw in this appliance one quarter turn daily will give you 1.0 mm of expansion every four days. This expansion should be started at least one week before starting a protraction force as it initiates a cellular response in the sutures of the midface and will allow a more positive reaction to the protraction force. This treatment has been shown to be most effective in early mixed dentition.

» APPLIANCE ADJUSTMENT TIPS

1. Retention of a removable appliance is often difficult in the primary dentition. To overcome this problem, simply bond a composite button on the buccal surface of the tooth being used for retention to create an undercut for the clasp.

Composite Buttons

2. Once an auxiliary spring has been adjusted they often tend to ride up the lingual surface of the tooth you are trying to move. One method to prevent this from happening and keep a constant force on the tooth is to bond a small button on the lingual surface. This will allow you to engage the spring under the button preventing it from riding away from the tooth.

3. Once a positive overbite and overjet have been established the occlusal relationship will usually retain the corrected tooth position. If the tooth is not fully erupted the bite planes should be removed off of the appliance and the appliance should be worn as a retainer until a positive overbite is established.

4. To remove an occlusal bite plane, use an extra stiff Robinson brush to cut across the occlusal surface of the acrylic without damaging the wires. Then use an acrylic bur to shape the appliance to follow the lingual contours of the teeth. This will allow you to remove the acrylic without damaging any of the clasps needed for retention.

» CONTRA-INDICATIONS AND CONCERNS

The correction and retention of an anterior crossbite which is caused by a skeletal dysplasia is much more difficult to accomplish. This is because the inherent growth patterns of bone in a true skeletal Class III give it a greater potential to grow out of a corrected normal relationship.

In such cases, labial tipping of the maxillary teeth would be inappropriate. For the beginner or for the dentist who is only interested in treating minor tooth movement, I strongly recommend referring these cases to the orthodontist.

One of the most common mistakes a beginner makes when trying to correct a crossbite is to try to move a tooth into position when there is inadequate space. So, before initiating the cross-bite correction, always make sure there is adequate space. This may involve slenderizing primary cuspids, extraction of the primary cuspids, and expansion of the arches.

Appliances can only be effective when they are properly designed to adhere to the principles of retention, force application and anchorage. Because spring pressure is applied to an inclined plane, the reaction tends to dislodge the appliance. Therefore, it is very important that some form of retention be placed near the spring. To accomplish this, circumferential clasps can be placed on the deciduous canines or first permanent molars.

The dentist should always try to anticipate whether other anterior teeth will erupt into crossbite. If this is likely treatment should be postponed to allow correction of the additional teeth at the same time with one appliance.

The position of an unerupted cuspid should be determined prior to proclining a lateral incisor which is in cross-bite. This is to ensure that the root of the incisor will not be forced against the crown of the canine and possibly be damaged.

Retention therapy following correction of an anterior crossbite is dependent not only upon...
which component is involved but also on the degree of overbite. If a patient presents with a deep overbite, retention therapy may not be necessary, as the mandibular incisors will naturally retain the maxillary anterior teeth in the corrected axial position. However, the patient presents with an end to end occlusion, an open bite, or a persistent neuromuscular habit, it is necessary to leave a retention appliance in the corrected position until new bone is formed and the teeth are stable. In the primary dentition, retention may be needed for several months.

» REFERENCES

» CUSTOMARY FEES
Fees are always subject to the cost of doing business in your area. However, early treatment of an anterior cross-bite can usually be done rapidly and inexpensively.

The average fee for this treatment around the country seems to range between $300 and $800.

» LAB FEES
Usually only one appliance is necessary to correct an anterior cross-bite.

The cost of an average appliance is between $50 and $75.

» INCOME POTENTIAL
Anterior cross-bites are relatively common. By treating just two patients a month you can conservatively add $12,000 a year to your bottom line.

By Rob Veis D.D.S.
Director of Practice Development

» SUPPLY LIST

Removable
- Acrylic Burs*
- Acrylic Polishing Burs*
- Acrylic Repair Kit*
- Pressure Pot*
- 139 Bird Beak Pliers*
- Three prong Pliers*
- Wire Cutter*
- Expansion Screw Key*
- Stiff Robinson Brush*
- Retainer Brite*
- Sonic Appliance Cleaner*
- Patient Appliance Care CD*
- Patient Calendar Booklets*
- Colored Retainer Cases*
- Fixed
- Fluoride Releasing Band Cement*
- Regular Or Light Cure*

- Band Biter*
- Band Removing Plier*
- Interproximal Stripping Tool*
- Howe Plier*
- 139 Bird beak pliers**
- Three prong pliers**
- Stiff Robinson Brush**
- Composite or Crown contours***
- Fluoride releasing band cement*
- Expansion screw key**
- Micro-screw screwdriver***
- Boley gauge****

(See Practice Building Bulletin on Alginate Impression Technique) Bite registration material (Baseplate wax)
* All supplies are available from Success Essentials
**These supplies can be purchased separately or as part of an Appliance Adjustment Kit.

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