

Cross bite

Cross bite: a discrepancy in the bucco-lingual relationship of the upper and lower teeth. The transverse relationship of the arches is described in terms of the position of the lower teeth relative to the upper teeth.

Buccal crossbite: the buccal cusps of the lower teeth occlude buccal to the buccal cusps of the upper teeth.

Lingual crossbite: the buccal cusps of the lower teeth occlude lingual to the lingual cusps of the upper teeth. This is also known as a *scissors bite*.

Functional cross bite/Displacement: on closing from the rest position the mandible encounters a premature contact(s) and is displaced to the left or the right, and/or anteriorly, into maximum interdigitation.

Etiology:

A variety of factors acting either singly or in combination can lead to the development of a crossbite.

1.Local causes: The most common local cause is crowding where one or two teeth are displaced from the arch. For example, a crossbite of an upper lateral incisor often arises owing to lack of space between the upper central incisor and the deciduous canine, which forces the lateral incisor to erupt palatally and in linguo-occlusion with the opposing teeth. Posteriorly, early loss of a second deciduous molar in a crowded mouth may result in forward movement of the upper first permanent molar, forcing the second premolar to erupt palatally. Also, retention of a primary tooth can deflect the eruption of the permanent successor leading to a crossbite.

2.Skeletal factors: Generally, the greater the number of teeth in crossbite, the greater is the skeletal component of the etiology. A crossbite of the buccal segments may be due purely to a mismatch in the relative width of the arches, or to an anteroposterior discrepancy, which results in a wider part of one arch occluding with a narrower part of the opposing jaw. For this reason, buccal crossbites of an entire buccal segment are most commonly associated with Class III malocclusions, and lingual crossbites are associated with Class II malocclusions. Anterior crossbites are associated with Class III skeletal patterns. Crossbites can also be associated with true skeletal asymmetry

and/or asymmetric mandibular growth.

3. Soft tissues: A posterior crossbite is often associated with a digit-sucking habit, as the position of the tongue is lowered and a negative pressure is generated intra-orally.

4. Rarer causes: These include cleft lip and palate, where growth in the width of the upper arch is restrained by the scar tissue of the cleft repair. Trauma to, or pathology of the temporomandibular joints can lead to restriction of growth of the mandible on one side leading to asymmetry.

Types of crossbite:

Anterior crossbite:

An anterior crossbite is present when one or more of the upper incisors is in linguo-occlusion relative to the lower arch. Anterior crossbites are frequently associated with displacement on closure.

Posterior crossbites:

Crossbites of the premolar and molar region involving one or two teeth or an entire buccal segment can be subdivided as follows:

1. Unilateral buccal crossbite with displacement:

This type of crossbite can affect only one or two teeth per quadrant, or the whole of the buccal segment. When a single tooth is affected, the problem usually arises because of the displacement of one tooth from the arch. When the whole of the buccal segment is involved, the underlying etiology is usually that the upper arch is of a similar width to the lower arch (i.e. it is too narrow) with the result that on closure from the rest position the buccal segment teeth meet cusp to cusp. In order to achieve a more comfortable and efficient intercuspation, the patient displaces their mandible to the left or right. This type of crossbite may be associated with a midline shift in the lower arch in the direction of the mandibular displacement.

2. Unilateral buccal crossbite with no displacement:

This category of crossbite is less common. It can arise as a result of deflection of two (or more) opposing teeth during eruption, but the greater the number of teeth in a segment that are involved, the greater the likelihood that there is an underlying skeletal asymmetry.

3. Bilateral buccal crossbite:

Bilateral crossbites are more likely to be associated with a skeletal discrepancy, either in the anteroposterior or transverse dimension, or in both.

4. Unilateral lingual crossbite:

This type of crossbite is most commonly due to displacement of an individual tooth as a result of crowding or retention of the deciduous predecessor.

5. Bilateral lingual crossbite (scissors bite):

Again, this crossbite is typically associated with an underlying skeletal discrepancy, often a Class II malocclusion with the upper arch further forward relative to the lower so that the lower buccal teeth occlude with a wider segment of the upper arch.

Management of Crossbites: Treatment of crossbite should be treated as soon as possible, because:

- ✓ Displacing contacts may predispose towards TMJ dysfunction syndrome in a susceptible individual.
- ✓ Unilateral crossbite associated with mandibular displacement results in asymmetric mandibular growth. Therefore, a crossbite associated with a displacement is a functional indication for orthodontic treatment.
- ✓ Treatment for a bilateral crossbite without displacement should be approached with caution, as partial relapse may result in a unilateral crossbite with displacement. In addition, a bilateral crossbite is probably as efficient for chewing as the normal buccolingual relationship of the teeth. However, the same cannot be said of a lingual crossbite where the cusps of affected teeth do not meet together at all.
- ✓ Anterior crossbite associated with displacement can lead to movement of a lower incisor labially through the labial supporting tissues, resulting in gingival recession

Management of anterior crossbite:

The following factors should be considered:

- What type of movement is required? If bodily or apical movement is required then fixed appliances are indicated; however, if in the mixed dentition tipping movements is enough, a removable appliance can be used.
- How much overbite is expected at the end of treatment? For treatment to be successful there must be some overbite present to retain the corrected incisor position.
- Is there space available within the arch to accommodate the tooth/ teeth

to be moved? If not, are extractions required and if so which teeth?

- Is reciprocal movement of the opposing tooth/teeth required?

Treatment of Single tooth anterior cross bite:

In the mixed dentition, provided that there is sufficient overbite and tilting movements will be enough, treatment can often be accomplished more readily with a removable appliance that consist of Z spring or screw on the affected tooth. The appliance should incorporate good anterior retention to counteract the displacing effect of the active element and posterior bite plate just thick enough to free the occlusion with the opposing arch.

Note:

Tongue blade therapy is used to treat the developing anterior crossbite by placing the wooden tongue blade behind the tooth in crossbite at an angle of about 60 degrees to the occlusal plane. The patient should exert force by biting on it using the lower teeth as a fulcrum for a period of 5-10 minutes. Usually the tooth will erupt into normal position over a period of time. This method is effective when the clinical crown is not completely visible in the oral cavity and is to be used only if sufficient space is available for the correction. This method requires full patient cooperation.

Treatment of Multiple teeth anterior cross bite:

For treatment of multiple teeth anterior crossbite, the same design of the removable appliance can be used except for the active component which was replaced with Recurved Z spring or two Z springs or screw with different position.

Note:

In CI III malocclusion, Early orthopaedic correction to enhance or encourage maxillary growth and/or restrain or re-direct mandibular growth. There is an increasing body of evidence that orthopaedic correction treatment is more likely to be successful if it is carried out prior to the pubertal growth spurt. We can manage such case by using: Protraction face+ expander.

- Chin-cup.
- Frankel III myofunctional appliance.

Management of posterior cross bite:

It is important to consider the etiology of this feature before starting on treatment. For example, is the crossbite due to displacement of one or more tooth from the arch? is there is a skeletal component, and will it be possible to compensate for this by tooth movement? The inclination of the affected teeth should also be evaluated.

Upper arch expansion is more likely to be stable if the teeth to be moved were initially tilted palatally.

❖ Removal of premature contacts in the deciduous dentition is effective in preventing posterior crossbites continuing into mixed/permanent dentition.

Furthermore, when grinding alone was not effective an upper removable appliance can be used to expand the upper arch to reduce the risk of the crossbite persisting.

❖ Transverse problems which are amenable to orthodontic correction are best treated in the pre-pubertal growth spurt.

❖ As expansion will create additional space; it may be advisable to defer a decision regarding extractions until after the expansion phase has been completed.

❖ Where a crossbite is due to skeletal asymmetry then a thorough assessment is required to determine the etiology and contribution of both the maxilla and mandible to the presenting features. Correction will require a combined approach involving orthognathic surgery once growth has slowed to adult levels.

Unilateral buccal crossbite:

Single tooth in crossbite:

Where this problem has arisen owing to the displacement of one tooth from the arch, for example an upper premolar tooth which has been crowded palatally, treatment will involve movement of the displaced tooth into the line of the arch, relieving crowding where and if necessary. If the displacement is marked, consideration can be given to extracting the displaced tooth itself. If correction of a crossbite requires movement of the opposing teeth in opposite directions, this can be achieved by the use of cross elastics attached to bands or bonded brackets on the teeth involved.

Multiple teeth in crossbite:

A unilateral crossbite involving all the teeth in the buccal segment is usually associated with a displacement, and treatment is directed towards expanding the upper arch so that it fits around the lower arch at the end of treatment. If the upper buccal teeth are tilted palatally, this can be accomplished with an upper removable appliance incorporating a midline screw and buccal capping. More commonly a quadhelix appliance can be used, particularly if comprehensive fixed appliance treatment is indicated. As a degree of relapse can be anticipated, some slight overexpansion of the upper arch is advisable, but stability is aided by good cuspal interdigitation. It is important to avoid severe over-expansion as a lingual crossbite or fenestration of the buccal

periodontal support may result.

Bilateral buccal crossbite:

Unless the upper buccal segment teeth are tilted palatally to a significant degree, bilateral buccal crossbites are often accepted. Rapid maxillary expansion to try to expand the maxillary basal bone. Surgically assisted rapid maxillary expansion can also be considered.

Bilateral buccal crossbites are common in patients with a repaired cleft of the palate. Expansion of the upper arch by stretching of the scar tissue is often indicated in these cases and is readily achieved using a quadhelix appliance.

Lingual crossbite:

If a single tooth is affected, this is often the result of displacement due to crowding. If extraction of the displaced tooth itself is not indicated to relieve crowding, then fixed appliances can be used to move the affected upper tooth palatally. More severe cases with a greater skeletal element usually need a combination of buccal movement of the affected lower teeth and palatal movement of the upper teeth with fixed appliances.

❖ ***The quadhelix appliance:***

The quadhelix is a very efficient fixed slow expansion appliance. The quadhelix appliance can also be adjusted to give more expansion anteriorly or posteriorly as required and can also be used to derotate rotated molars. When active expansion is complete it can be made passive to aid retention of the expansion. A quadhelix is fabricated from 1 mm stainless steel wire and attached to the teeth by bands cemented to a molar tooth on each side. The usual activation is about half a tooth width each side.

❖ ***Rapid maxillary expansion (RME):***

This upper appliance incorporates a Hyrax screw (similar to the type used for expansion in removable appliances) soldered to bands, usually to both a premolar and molar tooth on both sides. The screw is turned twice daily, resulting in expansion of the order of 0.2–0.5 mm/ day, usually over an active treatment period of 2 weeks. The large force generated is designed to open the midline suture and expand the upper arch by skeletal expansion rather than by movement of the teeth. For this reason, some advocate limiting this approach to patients in their early teens

before the suture fuses, or cleft palate patients where it can be utilized to expand the cleft segments by stretching the scar tissue. If considering this approach, it is advisable to check that there is adequate buccal supporting bone and soft tissues.

Single tooth anterior cross bite	Multiple teeth anterior crossbite
Tongue blade	Removable orthodontic appliance
Removable orthodontic appliance	Face mask+expander
	Chin cup
	Frankel III
	Fixed orthodontic appliance
Single tooth posterior crossbite	Multiple teeth posterior crossbite
Removable orthodontic appliance	Removable orthodontic appliance
Cross elastics	Fixed orthodontic appliance
Fixed orthodontic appliance	Cross elastics
	Quadhelix
	Hyrax

Summary to the means of correction of cross bite: