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Treatment of a Unilateral Crossbite with no Mandibular Displacement using a Modified Quad Helix

Abstract: This paper describes the treatment of a malocclusion involving a unilateral crossbite where there was no mandibular deviation into maximum intercuspation. Treatment involved the use of a modified quad helix which was active mainly on the affected side. This modification allowed arch expansion in the area where it was required.

Clinical Relevance: By modifying the quad helix to maximize anchorage on one side, by enlisting the help of the palatal vault, expansion is achieved specifically where it is needed.

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Unilateral posterior crossbites have a prevalence of between 8% and 22%.¹ A unilateral crossbite is where the buccal cusps of one or more lower posterior teeth occlude buccal to the buccal cusps of the upper teeth.² Most unilateral crossbites have an element of mandibular deviation as, owing to the narrowing of the upper arch, a premature contact occurs which then encourages the mandible to slide laterally into maximum intercuspation. This mandibular deviation usually results in a mandibular centre line shift.

In a unilateral crossbite with no mandibular deviation the discrepancy in arch form is asymmetric, with a transverse discrepancy localized to the side displaying the crossbite. These discrepancies are not as common as those with mandibular deviation and can be more challenging to treat. Posterior

crossbites are usually associated with a narrowing of the upper arch and, where there is mandibular deviation, some evidence exists that it may cause temporomandibular joint dysfunction syndrome in susceptible patients.²

Treatment of posterior crossbites is usually provided by expansion of the upper arch using a number of different methods:

- Upper removable appliances with a palatal screw or coffin spring;
- A rapid maxillary expansion appliance such as the Hyrax;
- Expanding the arch with a transpalatal arch or a quad helix; and finally
- By simple expansion and contraction of the opposing archwires of fixed appliances

The quad helix is probably seen as the gold standard for the treatment of arch width discrepancies. It is reliable and effective in providing a constant force to the

teeth affected by the crossbite. It requires no extra patient compliance for expansion to be achieved. It is inexpensive to construct and easy to modify.³

The case study presented demonstrates the treatment of a unilateral crossbite using a modification of the traditional quad helix.

Case study

A 13-year-old male presents with a Class I malocclusion with a unilateral crossbite on the right side affecting UR6, UR5 and UR4, with no detectable mandibular deviation. The upper and lower centre lines were coincident and located in the mid-face. An anterior crossbite of UR2 was also present but this did not interfere with the occlusion and therefore did not lead to any mandibular displacement.



Figure 1. Pre-treatment, showing the right unilateral posterior crossbite with coincident midlines.



Figure 2. Post-treatment, showing the teeth in Class I occlusion.



Figure 3. Modified quad helix with the acrylic button on the left palatal mucosa.

The buccal segment relationship was Class I, on both sides the overjet and the overbite were normal, and the upper and lower centre lines were coincident with the mid-face (Figure 1). The patient desired correction of the anterior

malalignment and the transverse discrepancy.

Appropriate levels of oral hygiene were achieved and treatment was provided with upper and lower straightwire appliances and a modified quad helix.

Treatment progressed through a standard archwire sequence to achieve alignment and levelling. The crossbites were corrected and the Class I occlusion was maintained on both buccal segments. The centreline was also unchanged (Figure 2).

Quad helix modification

The quad helix appliance was modified by adding a large acrylic button to one side of the palatal arm to increase anchorage in this area so that the major movement occurred on the side contributing to the crossbite. The acrylic button minimized any unwanted arch expansion on the unaffected side by coverage of the palate in this area (Figure 3).

Discussion

Most crossbites have an element of mandibular displacement to allow the patient to achieve maximum intercuspation. Treatment involves expanding the arch, and this is usually required on both sides of the arch. When the crossbite is truly asymmetric, it occurs with no mandibular deviation and arch expansion is therefore only required on the affected side. All methods of arch expansion occur by reciprocal forces to each side of the arch producing expansion. This modified quad helix allows the force to be concentrated where it is needed and does not cause any unwanted arch expansion on the unaffected side.

Conclusion

Unilateral crossbites without any mandibular deviation are not as common as those with an element of mandibular deviation and can be more difficult to treat. The simple modification of the quad helix described uses an appliance which is already accepted as the gold standard for the treatment of crossbites. The success of this treatment also requires accurate diagnosis of the nature of the crossbite to ensure that the appropriate treatment is carried out.

References

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