

Rapid Correction of Anterior Crossbite using a Fixed Appliance: A Case Report

R.M. SKEGGS AND P.J. SANDLER

Abstract: Anterior crossbite is a commonly encountered problem that is traditionally managed with removable appliances. This paper demonstrates some of the advantages of using fixed appliances to correct these malocclusions. In this case, treatment was completed more rapidly than would have occurred with conventional techniques.

Dent Update 2002; 29: 299–302

Clinical Relevance: This case report demonstrates an expedient, simple and cost-effective alternative to the correction of anterior crossbite with a removable appliance.

Anterior crossbites are commonly encountered in the mixed dentition and are an indication for early orthodontic intervention. Although most general dental practitioners carry out only small amounts of orthodontic treatment, many will have received undergraduate training in the management of anterior crossbites and may be confident about tackling such malocclusions using removable appliances. It is important for practitioners to understand the limitations of removable appliances and to be aware of alternative treatment options.

AETIOLOGY

Crossbite is a discrepancy in the buccolingual relationship of the upper and lower teeth. Anterior crossbite of all

four incisors is rare in patients who do not have a skeletal Class III jaw relationship; however, crossbite of one or two maxillary incisor teeth in patients with normal facial proportions is commonly seen where there is lack of space for the permanent incisors. The permanent tooth buds develop lingually to the deciduous predecessors; a

shortage of space may force these teeth to remain palatal to the line of the arch and to erupt into crossbite. These teeth are sometimes lingually inclined and may be amenable to correction from the tipping forces that are provided by removable appliances. In other cases the incisor roots are also palatally displaced and removable appliance tipping forces will not produce full correction.

MANAGEMENT OF ANTERIOR CROSSBITE

It is useful to have guidelines as to which anterior crossbites are amenable to correction in the mixed dentition. Each case must be assessed on its merits and due consideration must be given to the presence or absence of a mandibular displacement on closing.

A crossbite should be corrected early when it is causing damage either to

	Removable appliance	Fixed appliance
Patient co-operation	Appliance not worn full-time Damage to appliance Underactivation by patient Overactivation by patient	Damage to appliance
Discomfort	Overactivation Difficulty in speaking or eating Gagging Poor retention of appliance	Usually minimal
Oral hygiene	Decalcification/caries Fungal infections Gingivitis Palatal hyperplasia	Decalcification/caries (<i>increased risk with fixed appliances</i>) Resorption (<i>minimal risk in this case due to short treatment time and tipping tooth movements</i>)
Tooth movement	Point contact allows only tipping and not bodily movement	Movement possible in all three planes

Table 1. Potential problems arising from the use of orthodontic appliances.

R.M. Skeggs, BDS, MFDS RCS, General Dental Practitioner, Derby, and P.J. Sandler, BDS, FDS RCPS, MSc, MOrth RCS, Consultant Orthodontist, Chesterfield Royal Infirmary, Derbyshire.



Figure 1. Robert at 8 years old at initial presentation for orthodontic management of his $\perp\perp$.



specific teeth within the dentition or to the occlusion itself. The aim is to move individual teeth away from a position in



Figure 2. Fixed appliance placed to move $\perp\perp$ over the bite.

which toothwear or periodontal damage may be occurring or to prevent establishment of the permanent dentition in a position in which the mandible is displaced. There must be enough space available to correct the crossbite; in some cases it may be necessary to extract deciduous canines to provide sufficient space into which displaced incisor teeth can be moved.

Due consideration must also be given to the position of the permanent canine and practitioners should be certain that no damage will occur to the unerupted canine as a result of movement of the displaced crown, and inevitably the displaced root, of lateral incisors.

A major factor determining the success of early crossbite correction is whether or not a positive overbite can be achieved. If a positive overbite can be established then the prognosis for maintaining the corrected crossbite is good: the result should be stable and no further retention should be required. If a positive overbite cannot be provided, a simple bonded retainer placed on the palatal surfaces of two upper incisors is normally sufficient to maintain the tooth in the corrected position until the occlusion becomes more established.

If the patient has either a central or lateral incisor in crossbite, but there is no mandibular displacement and no

damage is occurring to the teeth as a result of the aberrant relationship, there is probably no immediate indication for treatment. If the child requires a course of definitive orthodontic treatment later, it is a simple matter to include correction of the displaced incisor as part of that comprehensive orthodontic treatment. This will have the advantage of reducing the overall amount of treatment required.

Removable Appliances

In the young child, instanding incisors are often corrected using a removable appliance. Popular designs are described in undergraduate texts¹ and often incorporate an acrylic baseplate retained by Adams' clasps posteriorly and ideally some anterior retention. The active component may be provided by a screw or one of several fingerspring designs such as the double helix (Z-spring) or the T-spring. The appliance should be checked every 6–8 weeks and will ideally provide about 1 mm tooth movement per month. Posterior biteplanes are often used to facilitate



Figure 3. After only 10 days the position of $\perp\perp$ was correct and held by positive overbite.



Figure 4. View 12 months later: the $\underline{2}$ had rotated and was behind the bite.



crossbite correction but are considered unnecessary by some operators for pushing a single tooth over the bite, unless the overbite is particularly deep.²

Although use of these appliances produces good results, success relies totally upon the patient wearing them. Often patients wear the appliances on a part-time basis and may lose or damage them. In consequence, treatment can drag on for months and may produce disappointing results. Table 1 outlines some of the problems frequently encountered when using orthodontic appliances.

A more efficient solution to the incisor behind the bite is to use a fixed appliance. Placement of the appliance will take a little longer than for a removable appliance but the result is more predictable.

CASE STUDY

Robert was referred at 8 years of age for orthodontic management of his upper left central incisor ($\underline{1}$), which had erupted into crossbite (Figure 1).

A simple fixed appliance was bonded to the teeth using a round 0.16 nickel–titanium archwire (Figure 2). Glass-ionomer cement (Band-lok; Reliance Orthodontic Products, Itasca, IL, USA) was light cured to the ends of the

archwire to reduce trauma to the soft tissues. Glass-ionomer cement was also applied to the occlusal surfaces of the posterior teeth to provide a degree of bite opening.

Correction of the crossbite was rapid. After just 10 days the tooth had moved into a normal relationship and the fixed appliance was removed. No retainers were considered necessary as the overbite prevented the risk of relapse (Figure 3).

A year later, Robert was referred again as his upper left lateral incisor ($\underline{2}$) had now erupted into crossbite (Figure 4); this was managed in a similar manner using a fixed appliance (Figure 5). Again correction was rapidly achieved, taking only 2 weeks. The glass ionomer biteplanes were removed and a fixed retainer of passive twist flexwire and composite was, on this occasion, bonded to the teeth as it was felt that the overbite was not sufficiently deep to retain the result achieved (Figure 6).

Robert's developing occlusion continued to be assessed to monitor retention and to assess the need for future orthodontic treatment.

DISCUSSION

This case demonstrates some of the advantages of using a fixed appliance to

correct an anterior crossbite. The appliance was fitted in one appointment and required no laboratory facilities. A rectangular archwire was unnecessary, as there was no need to apply torque to the teeth.

In cases where there is a major discrepancy in the inclination of the upper incisors, it may be necessary to use a rectangular nickel–titanium wire, or even something more rigid such as a TMA wire to correct the inclinations of the incisor teeth. Although it is necessary for the patient to co-operate during placement, maintenance and removal of the fixed appliance, the amount of co-operation necessary during treatment is less than that required with a removable appliance. It is, of course, essential that the patient is able to maintain an adequate standard of oral hygiene, in view of the increased risks of decalcification and caries associated with fixed appliances.

In this case, correction was completed more rapidly than could have been achieved with a removable appliance.

Limitations of Removable Appliances

Practitioners should be aware of the limitations of using removable appliances for correcting crossbites. As



Figure 5. Second fixed appliance placed; glass-ionomer used to open bite.

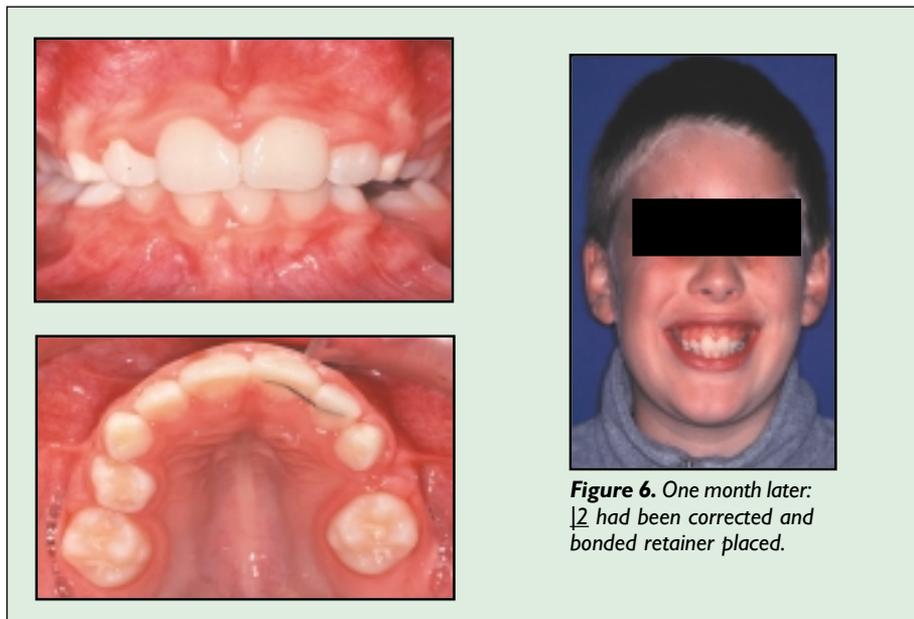


Figure 6. One month later: $\underline{2}$ had been corrected and bonded retainer placed.

the active component provides only a point contact, tooth movement is principally by tipping. For this reason, removable appliances are not effective for:

- Bodily moving teeth if space needs to be created for an instanding incisor.
- Torquing the incisor roots. If the incisor root is positioned palatally,

simply tipping the tooth will procline the tooth excessively. This can result in poor aesthetics and poor gingival contour, and may increase the chance of relapse.

- Extruding the incisors. The overbite is important in retaining the corrected incisor(s). If there is little or no overbite, it may be advantageous to extrude the incisors to achieve sufficient overbite to

improve long-term stability.

- Rotation of teeth. Single-point contact and the resultant tipping movements are much less effective at producing derotation of incisors than fixed appliances.

CONCLUSIONS

Most incisors in crossbite are managed with removable appliances. However, in view of the advantages outlined in this paper, following appropriate case assessment, practitioners may wish to consider using fixed appliances to manage some cases.

REFERENCES

1. Mitchell L. In: *An introduction to Orthodontics*. New York: Oxford University Press, 1999; p.159.
2. Proffit VWR. In: *Contemporary Orthodontics*. St. Louis: Mosby, 1993; p.416.

FURTHER READING

- Bishara SE. In: *Textbook of Orthodontics*. Philadelphia: WB Saunders, 2001; pp.290–298.
- Reay WJ, Stephens CD. Indications for the use of fixed and removable orthodontic appliances. *Dent Update* 1993; **20**: 25–32.
- Rose RJ, Webb WG, Wyness D. A review of orthodontic appliance problems in general dental practice. *Dent Update* 1997; **24**: 116–121.

BOOK REVIEW

Orthodontic Management of the Dentition with the Pre-adjusted Appliance. By John C. Bennett and Richard P. McLaughlin. Mosby, London & New York, 2002 (380 pp., £115). ISBN 0-7234-3265-1.

Although fixed appliances may be placed in around an hour, their effects are lifelong. In offering three-dimensional control of tooth positions and soft tissue drape they place great demands on treatment planning and execution. It is all too easy, for instance, to lose anchorage leaving an unstable occlusion and residual overjet. The goal of a stable dentition within an attractively proportioned face is hard won.

Orthodontic Management of the Dentition with the Pre-adjusted Appliance shows how to transform mild to moderate malocclusion into beautifully treated dentitions. The many diagrams and case reports help greatly. It is also a monument to finishing: the myriad ways to occlusal perfection through, for instance, electively tilted molar bands, bracket positioning and local wire bending to boost aesthetics and occlusal stability. Avoidable disappointments such as undertorqued incisors, or tooth-tissue discrepancy impairing buccal interdigitation are comprehensively addressed.

The authors have recently published a second book, *Systemised Orthodontic Treatment Mechanics*. To own both is ideal; if funds restrict then buy *Systemised*

and borrow *Orthodontic Management*.

The pre-adjusted appliance now boasts so many variants of angulation, torque and tip values that, whether you deploy the authors' own MBT (McLaughlin-Bennett-Trevisi) system or its rivals, such as Straightwire, you can be assured that the principles outlined here will yield stable dentitions to satisfy the most fastidious parent or clinician. In a world obsessed with evidence, John Bennett and Richard McLaughlin deliver a pleasing mix of the practical and academic. Whether you are scrabbling for that elusive reference or enjoy seeing how treatment unfolds, *Orthodontic Management* will please.

Christopher Hogg
Angle House Orthodontic Group,
Edgware