

Correction of Anterior Crossbite with Different Approaches: A Series of Three Cases

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Abstract

An abnormal labiolingual relationship between one or more maxillary and mandibular incisor teeth is called anterior crossbite. During mixed dentition anterior crossbite is not an uncommon finding. Early diagnosis will help the practitioner to treat minor irregularities seen in developing dentition with ease. The current paper presents three case series which describe the successful treatment of anterior crossbite (single tooth) in children with mixed dentition using removable as well as fixed appliances without any damage to tooth or periodontium.

Keywords: Anterior Crossbite, Removable Appliances, Catlan’s appliance, Z- Spring, 2*4 appliance.

Introduction

One of the major concerns of pediatric dentist is to guide the developing dentition of a child in line with the stage of orofacial growth and development.¹ Moyers defines a

simple anterior tooth crossbite as a dental malocclusion resulting from the abnormal axial inclination of maxillary anterior teeth.²

Anterior crossbite should be intercepted and treated at an early stage so as to prevent a minor orthodontic problem from progressing into a major dentofacial anomaly. An old orthodontic saying states “the best time to treat a crossbite is the first time it is seen”.³ Anterior crossbite could be the result of: labially positioned supernumerary tooth causing lingual deflection of the permanent incisor; trauma to the primary tooth causing displacement of the developing permanent tooth germ; an arch-length deficiency can cause a lingual deflection of permanent anterior teeth during eruption; habit of biting upper lip; repaired cleft lip.^{4,5}

Anterior dental crossbite requires early and immediate treatment to prevent anterior teeth mobility and fracture,

periodontal problems, and temporomandibular joint disturbances.⁵⁻⁸

A variety of approaches can be used to intercept anterior crossbite in mixed dentition. In the following article, three cases of anterior crossbite were treated with different treatment approaches i.e. one case was treated with Hawley's appliance with Z-spring and posterior bite plane, second case with catlan's appliance and third with the 2*4 appliance.

Case Report

Case No 1

A 9-year-old male patient came to the Department of pedodontics and preventive dentistry, SMBT Dental College, Sangamner with a chief complaint of irregularly placed upper front teeth due to over-retained deciduous teeth. The patient had no significant past medical or dental history. No abnormality was detected on extra oral examination. Firstly his both deciduous upper maxillary incisors are extracted. Intra oral examination revealed permanent maxillary right left central incisor in crossbite (Figure 1A). Space analysis showed adequate space available for the permanent dentition. Thus, the treatment plan was to correct the crossbite. Hawley's appliance incorporating "Z" spring was used in this case for the correction of both the teeth in crossbite with posterior bite plane so as to achieve a 2 mm incisal clearance (Figure 1B). The patient was instructed to wear the appliance full time. Activation was carried out in both helices simultaneously by opening the helices 2mm each time. The crossbite of central incisor was corrected in two activations within a span of two weeks, and that of the lateral incisor in six weeks with one activation each week (Figure 1C). No retention was provided as adequate overjet and overbite had been achieved.



Fig. No 1A : Preoperative maxillary Occlusal photograph.



Fig. No 1B: Preoperative maxillary Occlusal photograph after placing Howely's appliance



Fig. No 1C: Postoperative maxillary Occlusal photograph.

Case No 2

A 9-year-old female patient accompanied by her parents reported to the same department with a chief complaint of sensitivity in the upper right and left back teeth region since two days which aggravates on having food and relieved after few seconds. A complete clinical examination revealed the permanent maxillary left central incisor in crossbite (Figure 2A) along with dental caries in

16, 14, 26, 36, and 46. Following clinical and radiographic examinations, the decision was made to fabricate an inclined plane. (Figure 2B) The parents were informed about the malocclusion, and a written consent to proceed with the treatment was taken. The crossbite was corrected after the cementation of the Catlan's appliance within three weeks (Figure 2C). During the subsequent visit to the dentist, other restorative procedures were carried out. Recall examination after 6 months showed normal incisal relation without any relapse.



Fig. No 2A: Preoperative photograph showing anterior dental crossbite.



Fig. No 2B: Catlan's appliance (Lower Inclined Bite Plane) cemented.



Fig. No 2C : Post treatment incisor relation after 3 weeks.

Case No 3

A 8-year-old boy reported to same department, with a chief complaint of irregularly placed upper front teeth since 1 year and also parent was esthetically concerned, therefore wanted treatment for the same. The patient had no significant medical or dental history. No abnormality was detected on extraoral examination. Intraoral examination revealed Angle's Class I molar relation with permanent maxillary left central incisor in crossbite [Figure 3A] Space analysis was done, showed that the maxillary arch had 0.5 mm arch length discrepancy. Treatment planned was to create 0.5 mm space for the maxillary left central incisor and correct the misalignment. Treatment was started in the maxillary arch by bonding MBT brackets to the maxillary central incisors and molar bands with pre welded buccal tube to the maxillary first molars. The maxillary left central incisor was also bonded with MBT bracket, and a 0.016" round nitinol archwire was used for labial movement and alignment of the maxillary left central incisor. To raise the bite, glass ionomer cement (GIC) of 2 mm thickness was placed on the occlusal aspect of 36 and 46, so as to achieve a 2 mm incisal clearance. On recall of the patient after 1 week, marked tooth movement was noted in relation to 21. After 2 weeks, the crossbite was completely corrected. The GIC placed on 36 and 46 were removed using an ultrasonic scaler. The wire was then changed to 0.017 × 0.022" NiTi [Figure 3B] and retained for another 2 weeks followed by debonding [Figure 3C]. The patient was further recalled after 1 week for follow-up and further treatments and the GIC was removed in the Posterior Region.



Fig No 3A: Pre – Operative Intraoral Photograph showing crossbite



Fig No 3B: Placement of Brackets and Ni-ti arch wire.



Fig No 3C – Post –Operative after 1 week.

Discussion

Anterior crossbite can be defined as the lingual positioning of the maxillary anterior teeth in relationship to the mandibular anterior teeth.⁹ Anterior dental crossbite has an incidence of 4-5% and usually becomes evident during the early mixed dentition stage.^{10, 11} The ideal age for the correction of anterior dental crossbite is between 8 to 11 years during which the root is being formed, and the

tooth is in the active stage of eruption. The child's age not only plays an important role but also the motivation for treatment, how he or she perceives the problem.¹² Treatment, if delayed to a later stage may become more complicated.¹³ Relapse is prevented by the normal overjet/overbite relationship that is attained.¹⁴

The clinician should determine whether the crossbite is skeletal or dental from the profile analysis and intraoral findings, before beginning with appliance therapy. Lack of space for the maxillary incisors to erupt is the most common cause of anterior dental crossbite.¹⁵

Various treatment modalities for correction of anterior crossbite include tongue blade therapy, reverse stainless steel crown, inclined plane, removable appliance with finger spring, bonded resin-composite slopes and Bruckl appliance.^{6, 16, 17}

In a young child, the best method for tipping maxillary and mandibular anterior teeth out of crossbite is a removable appliance using fingersprings.¹⁸ Treatment with removable appliances will help in the maintenance of good oral hygiene.³ They reduce chairside time. However, the success of therapy depends on good patient cooperation. The tongue blade therapy is indicated in case of erupting crossbite and is successful only with patient cooperation, and there is no control on the amount and direction of force applied.⁵

The Catlan's appliance (Lower Inclined Bite Plane) works on the principle of Newton's third law of motion, the resin slope functions to tip an anterior tooth labially while the mandibular tooth is tipped slightly in the lingual direction¹⁹. This method is a safe, cost effective, rapid and easy alternative for the treatment of crossbite. It is cost effective because it does not involve the use of fixed orthodontic tooth movement procedures. As it is cemented on the incisors, the treatment outcome does not depend on patient cooperation, does not hamper the growth or cause

any discomfort to the patient, and treatment is completed in very few visits to the dentist²⁰. The drawbacks of this appliance are difficulty in speech, mastication and risk of anterior open-bite if the appliance is cemented for more than 6 weeks²¹. Therefore, weekly examination of the patient and an accurate decision to remove the appliance in case of prolonged treatment time are critical.

The main aim of early treatment of crossbite correction is to tip the affected teeth labially to a point where a stable overbite relationship exists. The achieved normal overjet or overbite relationship prevents relapse. There is light continuous force in fixed appliance to correct the cross bite.²² GIC was placed over the occlusal surface of 36 and 46 to open the incisal bite. The drawback of using GIC as bite block includes wearing away of the cement, chance of supra-eruption or intrusion of the molars. Lee four factors to consider before selecting a treatment approach²³; Adequate space in the dental arch to reposition the tooth; Sufficient overbite to hold the tooth in position following correction; An apical position of the tooth in crossbite that is the same as it would be in normal occlusion; A Class I occlusion. The 2 x 4 appliance is used in the clinical practice for treatment of rotation, crowding, or diastemas in the case of skeletal Class I, II and III patients. In this case, we used modified 2/4 appliance, since maxillary right and left lateral incisors were not erupted. Modified 2/4 appliance is a simple and effective method to correct anterior dental crossbite, particularly in the mixed dentition if all the permanent incisors have not erupted instead of conventional 2/4 appliance.

Conclusion

Diagnosing malocclusion at an early stage and at a correct age can achieve improved stability of the treatment, need not get postponed till the eruption of all the permanent teeth. The above-mentioned cases describe the acceptable alternative methods for correction of anterior dental

crossbite. Treatment of malocclusion at an early age can improve the growth and quality of life of children. Further studies are required to evaluate other treatment modalities.

References

1. Al-Sehaibany F, White G.A three dimensional clinical approach for anterior crossbite treatment in early mixed dentition using an Ultrablock appliance: case report. *J Clin Pediatr Dent.* 1998 Fall;23(1):1-7.
2. Moyers, R.E. *Handbook of Orthodontics*, 4th ed, Year Book Medical Publishers, Inc; Chicago, 1988, pg 418.
3. Bhalajhi SI. *Orthodontic Appliances-General Concepts: Orthodontics-The Art and Sciences*. 3rd ed. 2006 New Delhi; Arya (Medi) Publishing House: chapter 20, pg. 233, 271-276.
4. Mc Donald, *Dentistry for the Child and Adolescent*, 8th Ed., Elsevier, a division of Reed Elsevier India Pvt. Ltd., 2005, chap.27 pg. 651-653.
5. Lee BD. Correction of crossbite. *Dent Clin North Am.* 1978 Oct; 22(4):647-68.
6. Valentine F, Howitt JW. Implications of early anterior crossbite correction. *ASDC J Dent Child.* 1970 Sep-Oct; 37(5):420-7.
7. Estreia F, Almerich J, Gascon F. Interceptive correction of anterior crossbite. *J Clin Pediatr Dent.* 1991 Spring; 15(3):157-9.
8. Jacobs SG. Teeth in cross-bite: the role of removable appliances. *Aust Dent J.* 1989 Feb;34(1):20-8.
9. Tsai HH. Components of anterior crossbite in the primary dentition. *ASDC J Dent Child.* 2001 Jan-Feb;68(1):27-32, 10.
10. Major PW, Glover K. Treatment of anterior cross-bites in the early mixed dentition. *J Can Dent Assoc.* 1992 Jul;58(7):574-5, 578-9.
11. Hannuksela A, Vaananen A. Predisposing factors for malocclusion in 7-year-old children with special reference

- to atopic diseases. *Am J Orthod Dentofacial Orthop.* 1987 Oct;92(4):299-303.
12. Prakash P, Durgesh BH. Anterior Crossbite Correction in Early Mixed Dentition Period Using Catlan's Appliance: A Case Report. *ISRN Dent.* 2011; 2011: 298931.
13. Tse CS. Correction of single-tooth anterior crossbite. *J Clin Orthod.* 1997 Mar;31(3):188.
14. Croll TP. Fixed inclined plane correction of anterior cross bite of the primary dentition. *J Pedod.* 1984 Fall;9(1):84-94.
15. Pinkham. *Pediatric Dentistry infancy through adolescence.* Saunders, 4th edition, 2005, chapter 35- treatment planning and management of orthodontic problems. pg 642-643.
16. Bayraka S, Tunca ES. Treatment of Anterior Dental Crossbite Using Bonded Resin-Composite Slopes: Case Reports. *Eur J Dent.* Oct 2008; 2: 303–306.
17. Olsen CB. Anterior crossbite correction in uncooperative or disabled children. Case reports. *Aust Dent J.* 1996 Oct;41(5):304-9.
18. Profit WR. *Contemporary orthodontics.* Mosby, 4th edition, 2007, chapter 12- treatment of nonskeletal problems in preadolescent children. Pg 440
19. T. P. Croll and W. H. Lieberman, "Bonded compomer slope for anterior tooth crossbite correction," *Pediatric Dentistry*, vol. 21, no. 4, pp. 293–294, 1999.
20. R. M. Skeggs and P. J. Sandler, "Rapid correction of anterior crossbite using a fixed appliance: a case report," *Dental Update*, vol. 29, no. 6, pp. 299–302, 2002.
21. T. M. Graber, *Orthodontics: Principles and Practice*, W. B. Saunders, Philadelphia, Pa, USA, 3rd edition, 1988.
22. Asher RS, Kuster CG, Erickson L. Anterior dental cross bite using a simple fixed appliance, case report. *Pediatr Dent.* 1986; 8:53-7.
23. Lee BD. Correction of crossbite. *Dent Clin North Am.* 1978; 22:647-68.