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"Watch them Young – Treat them Grow": Management of Developing Anterior Cross Bite in Mixed Dentition Period Using Versatile 2x4 Appliance

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

The primary care of the Paediatric dentist is guidance of the child's developing dentition, in accordance with the stage of orofacial growth and development . Anterior dental crossbite results from the lingual position of the maxillary anterior teeth in relationship with mandibular anterior teeth. In any type of crossbite correction, the practitioner must be able to delineate whether crossbite is of dental origin or skeletal origin . Dental Crossbite involves the localized tipping of a tooth or teeth, does not involve the basal bone . In case of simple anterior dental crossbite, the patient presents a normal skeletal pattern with abnormalities presenting in the axial inclination of the affected teeth. According to Profitt, first adequate space needs to be opened to bring the displaced tooth or teeth across the occlusion into its proper position for anterior dental crossbite correction. Certain

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malocclusions should be corrected during the mixed dentition period which aids in the normal growth of jaws and surrounding structures. This article describes successful management of anterior segmental cross bite case treated using 2 x 4 appliance. The 2 x 4 appliance is a partially fixed orthodontic appliance that is used in children in a mixed dentition period to correct simple malocclusions associated with permanent anterior teeth.

Keywords: 2 x 4 appliance; interceptive orthodontics; anterior crossbite; mixed dentition; children; malocclusion; decreased overjet; reduced overbite.

1. INTRODUCTION

"Crossbite is one of the most common dental conditions seen in the mixed dentition period with prevalence rate of 4-5%" [1,2,3]. "Factors favouring anterior crossbite includes palatal eruption path of the maxillary anterior incisors; repaired cleft lip; trauma to the primary incisor resulting in lingual/ palatal displacement of the permanent tooth germ; supernumerary anterior teeth; over-retained necrotic or pulpless deciduous tooth or root; odontomas; crowding in the incisor region; arch length inadequacy; upper lip biting habit" [4,5,2,1,3,6,7].

"The sequelae of anterior dental crossbite includes abnormal enamel abrasion of the mandibular incisors, dental compensation of mandibular incisors leading to thinning of labial alveolar plate and gingival recession" [8,9,10,4].

"Early interception of anterior dental crossbite prevents anterior teeth mobility and fracture, periodontal pathosis and temporomandibular joint disturbances" [9,4,7,11].

"The problems of anterior crossbite in permanent dentition shows progression in severity, so that early intervention aim at stimulating well balanced growth and occlusal development is necessary" [12,13, 14].

"The important role plays not only the age of the child but also the motivation for treatment, how he or she perceives the problem. There are differences in gender as well – girls are keener for treatment than boys" [15].

"Various techniques have been used for its correction, such as transforce appliance, tongue blade therapy, composite inclined planes, reversed stainless steel crowns, removable acrylic appliances with lingual springs and fixed appliances" [16,17]. "The purpose of these appliances should not only be aimed to correct anterior dental crossbite, but additionally it should be economical, causing no damage to the associated soft tissues, should also be effortlessly placed, removed and easily tolerated by the patient" [18,19].

"Considering all the aspects, three most used appliances to correct developing anterior crossbite in early mixed dentition period are fixed, removable and myofunctional appliances" [4,5,16].

"The partially fixed appliance is indicated when more tooth movement is required to correct the crowded and rotated teeth. It is also indicated in patients who exhibit minimal overbite requiring extrusion of the upper or lower anteriors to achieve adequate overbite at the end of the treatment" [20,21].

The Present study describes management of anterior segmental crossbite in mixed dentition phase using 2x4 appliance.

2. CASE DESCRIPTION

A 9 year-old boy was referred to the Department of Pedodontics regarding irregularly placed teeth with spacing in upper and lower front teeth region leading to unaesthetic appearance and bullying amongst his peer groups due to irregular teeth. He presented with a class 3 incisor relationship on a skeletal Class I base with an average maxillary mandibular planes angle (Fig. 1). He was in the early mixed dentition phase, both the upper and lower arches were spaced with reduced overjet and negative overbite (Fig. 2). Patient also had dental caries in relation to 84 which was restored.

Pre-operative photographs and impressions were taken and model analysis was done. Mixed dentition analysis inferred, excess space in the mandibular arch which can be utilized for alignment of 31,32,41,42. A 2x4 appliance with bondable buccal tubes on first permanent molars and brackets on the incisors along with bite raising composite was planned for simultaneous retraction and alignment of lower anteriors and

proclination of upper anteriors to achieve optimal overjet and overbite (Fig. 3). Initial aligning has been started with 0.014 nickel titanium wire. The archwire sequence was 0.014 nickel titanium,0.016 nickel titanium followed by closure of spaces using e-chain (Fig. 4). Active treatment time involved five visits over an 6-month period. After achieving minimum overjet and overbite debonding of the appliance has been done and a fixed bonded retainer has been given (Fig. 5).

Fig. 1. Pre operative intra oral photograph showing class 3 incisor relation

Fig. 2. Showing spaced dentition in relation to 31,32,,33,34

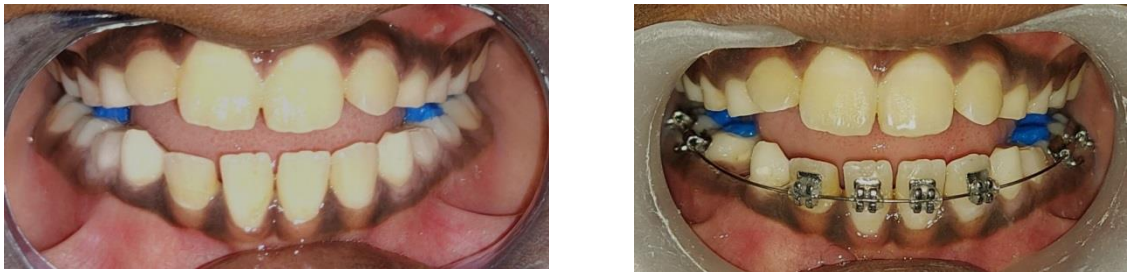

Fig. 3. Bite raising done using composite and bonding of 2x4 appliance

Fig. 4. Closure of spaces using E-chain in mandibular arch

Fig. 5. Post operative after 6 months showing closure of spaces and attainment of positive overjet and minimal over bite

3. DISCUSSION

"The most important objective of a Paediatric dentist is to maintain or improve arch integrity to allow permanent teeth to erupt and prevent the development of malocclusion. Anterior dental crossbite is considered as primarily aesthetic and functional concern to children, parents which is rarely self-correcting and requires early interception" [18].

"However, early orthodontic intervention is needed for developing Class III patients with moderate to severe anterior crossbite and deep bite to reduce its complexity in full blown permanent dentition" [22].

"Early interception of developing anterior crossbite results in better correction. Treatment may become more complicated, if the treatment is delayed to a later developmental stage" [23,24].

"Eight to eleven years is the ideal age to treat developing anterior tooth crossbite, as it is the period of root formation and the tooth is in the active stage of eruption" [25].

"Interceptive orthodontics should be more of a passive guidance procedure rather than an active procedure. Anterior dental crossbite is habitual or due to ectopic eruption, single tooth or segmental, which eventually results in skeletal discrepancy resulting from functional forward shift leading to anterior closure of mandible" [3,26]. "During the early mixed dentition stage, the incidence rate of anterior dental crossbite is 4-5%" [2,3].

"It is a critical role for a Paediatric dentist to decide whether it is skeletal or dental, profilometric analysis and intra oral findings are required for management of developing anterior crossbite (Fixed, Removable, Myofunctional appliance therapy)" [27,28].

"Alternative treatment modalities for correcting anterior dental crossbite includes - Tongue blade therapy, reversed stainless steel crown, lower anterior inclined plane (Catlan's Appliance), removable appliance with finger spring, bonded resin composite slopes and Bruckl appliance" [4,5,6].

"Lee BD suggested three basic factors for the case selection and appliance design for the success of the treatment-

1.adequate space in the arch to reposition the tooth,
2.sufficient overbite to hold the tooth in position following correction
3.class I molar relation" [9].

McNamara et.al stated that "anterior crossbites in the early mixed dentition are believed to be

transferred from the primary to the permanent dentition and can have long-term effects on the growth and development of the teeth and jaws. Valentine and Howitt stated that anterior crossbite may lead to abnormal enamel abrasion or proclination of the mandibular incisors, which in turn leads to thinning of the labial alveolar plate and gingival recession" [27].

4. CONCLUSION

The main advantage of early treatment of anterior crossbite is the opportunity to influence the process of growth in the upper jaw with quite simple and not expensive appliance as well as to avoid in many cases orthognatic surgery in future. It is possible to correct several dentoalveolar anomalies if you start to treat early. Therefore, it is possible to prevent development of severe anomalies and shorten the orthodontic treatment time in permanent dentition [4].

The main emphasis needs to be placed on the diagnosis and evaluation of the malocclusion. This is a competence of a dentist who then refer the patient to the orthodontic specialist for future treatment.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Profitt WR, Fields HW, Sarve DM. Contemporary orthodontics, Mosby, St. Louis, Mo, USA, 3rd edition; 1999.
2. Major PW, Glover K. Treatment of anterior cross-bites in the early mixed dentition. J Can Dent Assoc. 1992;58(7): 574-79.
3. 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;92(4):299-03.
4. Valentine F, Howitt JW. Implications of early anterior crossbite correction. J Dent Child. 1970;37(5):420-27.
5. Bayrak S, Tunc ES. Treatment of anterior dental crossbite using bonded resin-composite slopes: Case reports. Eur J Dent. 2008;2:303-07.
6. Olsen CB. Anterior crossbite correction in uncooperative or disabled children. Case Reports. Aust Dent J. 1996;41(5):304-09.
7. Estreia F, Almerich J, Gascon F. Interceptive correction of anterior crossbite. J Clin Pediatr Dent. 1991;15(3):157-59.
8. Graber TM. Orthodontics: Principles and practice, w. b. saunders, Philadelphia, Pa, USA, 3rd edition; 1988.
9. Lee BD. Correction of crossbite. Dent Clin North Am. 1978;22(4):647-68.
10. Mcevoy SA. Rapid correction of a simple one-tooth anterior cross bite due to an over-retained primary incisor: Clinical report. Pediatr Dent. 1983;5(4):280-82.
11. Jacobs SG. Teeth in cross-bite: The role of removable appliances. Aust Dent J. 1989;34(1):20-28.
12. Al-Sehaibany F, White GA. Three dimensional clinical approach for anterior crossbite treatment in early mixed dentition using an ultrablock appliance: Case report. J Clin Pediatr Dent. 1998;23(1):1-7.
13. Jirgensone I, Liepa A, Abeltins A. Anterior crossbite correction in primary and mixed dentition with removable inclined plane (Bruckl appliance). Stomatologija. 2008; 10(4):140-44.
14. Tausche E, Luck O, Harzer W. Prevalence of malocclusions in the early mixed dentition and orthodontic treatment need. Eur J Orthod. 2004;26:237-44.
15. Kiyak AH. Patients' and parents' expectations from early treatment. Am J Orthod Dentofacial Orthop 2006;129: S50-54.
16. Clark WJ. Arch development with transforce lingual appliances. World J Orthod. 2005;6(1):9-16.
17. Vadiakas G, Viazis AD. Anterior cross bite correction in the early deciduous dentition. Am J Orthod Dentofacial Orthop. 1992; 102:160-62.
18. Park JH, Kim JW. Anterior cross bite correction with a series of clear removable appliances. A Case Report. J Esthet Rest Dent. 2009;21:149-59.

19. Sari S, Gopalp H, Aras S. Correction of anterior dental cross bite with composite as an inclined plane. Int J Paediatr Dent. 2001;11:201-08.
20. SI Balaji. Management of crossbite. In: Orthodontics The art and science 5th ed. New Delhi: Arya Medi. 2012; 552-55.
21. Asher RS, Kuster CG, Erikson L. Anterior dental crossbite correction using a simple fixed appliance. A case report. Ped Dent. 1986;8(1):54-55.
22. Kiyak HA. Patient's and parent's expectations from early treatment. Am J Orthod Dentofacial Orthop. 2006;129:S50-54.
23. Kocadereli I. Early treatment of posterior and anterior crossbite in a child with bilaterally constricted maxilla: Report of case. J Dent Child. 1998;65(1):41-46.
24. Tse CS. Correction of single tooth anterior crossbite. J Clin Orthod. 1997;31(3):188-90.
25. Prakash P, Durgesh BH. Anterior crossbite correction in early mixed dentition period using catlan's appliance: A case report. ISRN Dent. 2011;298931.
26. JoySon M, JaIganeSh I, ShaRanya R, Vignesh KC. Estimation of total time duration and comfort equation of three different appliances used to manage the condition of single tooth developing anterior crossbite in children. J Clin Diagn Res. 2018;12(13):ZC05-9.
27. Pinkham JR. Pediatric dentistry: Infancy through adolescence. 4th ed. New Delhi. Saunders. 2005;642-43.
28. Bindayel NA. Simple removable appliances to correct anterior and posterior crossbite in mixed dentition: Case report. Saudi Dent J. 2012; 24(2):105-13.

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