



Single Anterior Tooth Crossbite Correction in Mixed Dentition using Versatile 2x4 Appliance Along with Posterior Bite Plane: A Case Report

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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 Study

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ABSTRACT

The period of mixed dentition is considered to be one of the most appropriate ages for getting an orthodontic treatment. Most parents have a misconception that orthodontic treatment should only be started after all of the permanent teeth have fully erupted. Early mixed dentition patients with anterior crossbites and ectopic incisors are treated versatile 2x4 appliance along with posterior bite plane. This appliance has many benefits over alternative methods, including complete control over anterior tooth positioning, excellent patient acceptance, no patient adjustment needed, and the

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ability to accurately and quickly position teeth. The present case report refers who reported to the department with complains irregularly placed teeth which was managed with 2 X4 appliance.

Keywords: Crossbite; interceptive orthodontics; mixed dentition; 2X4 appliance.

1. INTRODUCTION

Mixed dentition is characterized when both the primary and the permanent dentition is present in the oral cavity with primary teeth shedding and leading to eruption of permanent teeth. This transition requires a focus on the differences between malocclusions that require correction and those that correct themselves. "In the transition period, the most commonly seen malocclusions are the anterior and posterior crossbites, crowding, rotations, midline diastema, spacing, and other malocclusions . A single tooth or a group of teeth in the arch can be responsible to develop one of these malocclusions" [1].

"Abnormal relationships of a tooth or teeth to the opposing teeth, is defined as crossbite, in which normal buccolingual/labiolingual relationships are reversed". Crossbites can be skeletal or dental, can be seen in anterior, posterior, or both anterior and posterior teeth. It is called as anterior crossbite, when there is "a malocclusion in which one or more of the maxillary anterior teeth occlude lingually to the mandibular incisors". "Anteriorly located single tooth crossbite of dental origin is the most common malocclusion a child encounters during the child's occlusion's development" [2,3]. Usually, anterior dental crossbite becomes evident in the early stages of the dentition's development. A number of factors, including lingually erupting maxillary anterior incisors, supernumerary teeth, retained deciduous tooth or root, crowding, insufficient arch length, and upper lip biting habits, cleft lip these are causes of an anterior crossbite [4].

"Interceptive orthodontic treatment plays an important role in reducing the severity of a developing malocclusion. Anterior cross bites should be detected and treated as soon as possible as they are a self-perpetuating condition that is, if left untreated, could develop into skeletal malocclusion which will eventually require an extensive orthodontic treatment along with surgical treatments" [5].

"There are several ways to manage a developing or developed anterior dental crossbite. The

suggested plan of action for treating an emerging or established anterior crossbite is 2X4 a fixed appliance. The 2X4 appliance is a fixed appliance that positions the anterior teeth by placing bands on the first permanent molars, brackets will be bonded to the erupted maxillary incisors, and continuous archwires is placed around the arch" [6].

This case report focuses on intercepting the anterior cross bite during mixed dentition stage with the help of 2X4 appliance.

2. CASE REPORT

A 11-year-old male patient came to the department of Pedodontic and Preventive Dentistry, with the chief complain of mal-aligned teeth. On history taking, there was no previous history of any dental treatment, and his medical history was non-contributory. On intraoral examination, the patient was in mixed dentition stage with the first permanent molars in a Class I relationship on both the sides. The maxillary left central incisor was palatally placed in relation to the mandibular left central incisors resulting in an anterior cross bite. [Figs. 1,2,3].

3. 2X4 APPLIANCE

After discussing the treatment modalities, with the child and his parents, 2X4 appliance treatment was considered for the correction of the anterior cross bite. First, cementation of the orthodontic molar bands with buccal tubes was done on permanent maxillary first molars on both sides. On the labial aspects of the four maxillary permanent incisors, metal brackets MBT with a 0.022" slot were bonded. A nickel-titanium (Ni-Ti) 0.012" round archwire was introduced into the bracket slots and into the molar tube on both sides [Figs. 4,5,6]. The wire was stabilised using ligature wire for 1 month. Composite (Blue bite) build up was done on maxillary permanent molars on both sides in order to achieve a 2 mm incisal clearance. The 0.012" round Ni-Ti archwire was replaced by 0.014" round Ni-Ti archwire and retained for another 1 month [Fig. 7]. After correction of the crossbite, the composite build up was removed from the occlusal surface of 36 and 46 using ultrasonic

scaler. Post operatively, full mouth ultrasonic scaling was done followed by fluoride application. No retainer was required after the correction of cross bite as it is self retentive. The total active orthodontic treatment time was 2 months.



Fig. 1. Pre-operatively anterior single tooth cross bite seen in 21



Fig. 2. Pre-op occlusion view(right)



Fig. 3. Pre-op occlusion view(left)



Fig. 4. Immediate Post -op front view



Fig. 5. Immediate Post -op right side occlusion view



Fig. 6. Immediate Post -op left side occlusion view



Fig. 7. During one month follow up of cross bite correction seen in relation to 21

4. DISCUSSION

“Interceptive procedures should be planned in the mixed dentition period for successful treatment outcomes. Anterior crossbite rarely corrects itself on its own, due to the decreased incisal clearance. Therefore, consideration of the primary approach can restore the proper muscle balance and develop a well-organized occlusal relationship” [7,8,9]. There are numerous ways to manage a developing or a developed anterior dental crossbite. Treatment options include labial and lingual archwires, lower inclined planes, crowns made of stainless steel or composite material, and Hawley's retainer with double cantilever springs [4].

“Using a fixed appliance is another option where treatment can be initiated as soon as the

permanent molars and incisors have erupted, with minimal to no discomfort for the patient other than when bands and brackets are being placed. A fixed appliance also produces active, controlled tooth movement, and because it uses more force than removable appliances, treatment time is comparatively shorter” [10].

“2x4 appliance, a sectional fixed appliance, allows for three-dimensional control in the correction of misaligned anterior teeth and results in a more effective and efficient positioning of teeth” [11]. In addition, one must be aware of the conditions that “should” or “should not” be attended to, at the stage of mixed dentition. The reason being, there are a lot of self-correcting malocclusions present at this stage, which will be fixed after the transition period. The self-correcting malocclusion “Ugly

duckling stage," which is the case in this instance, was well maintained. When one or more teeth are rotated or positioned incorrectly, sectional fixed treatment helps to correct minor malocclusions early. (McKnight, 1965; Lee, 1978) [12,13].

"Dentist should be careful in selecting patients for fixed appliance therapy. 2x4 appliance is one type of fixed orthodontic appliance that can be used in different clinical situations with only minor alterations in the appliance design" (Graber, 1972; Benham, 1975) [14].

5. DISADVANTAGES 2 × 4 APPLIANCE: [1]

- Using a 2 × 4 appliance during the early mixed dentition stage may not be possible since the placement of the molar band could be a problem if the permanent molar has not fully erupted because of short clinical crown height.
- Placement of the band also can cause discomfort, because of which many children may refuse further treatment.
- Since the brackets are only bonded to the permanent incisors, there will be a long span of a flexible 0.014" round Ni-Ti arch wire extending from the molar bands to the incisors.
- The dangling wire can be a problem to the young patients especially during eating and brushing, as the wire dangles can easily come out from the molar tube.
- 2 × 4 appliance causes plaque retention around the bands and brackets.

6. CONCLUSION

One of the key to achieve a successful interceptive orthodontic treatment results lies in the hands of both the parents as well as the pedodontist. Identifying and diagnosing the malocclusion at an early stage can help in achieving stability in the treatment results. A 2 x 4 appliance is a versatile, easy to use and an effective appliance which can intercept simple malocclusions at an early stage within a short time period compared to the traditional treatment.

CONSENT

Informed consent was taken from the parent before starting the treatment.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Gawali P, Jadhav G, Shigli A, Vaidya P. 2X4 Appliance: Effective treatment modality for anterior crossbite. *Annals of International Medical and Dental Research*. 2019;5(5):1.
2. Jalis Fatima, Parul Jain. A witty hand of orthodontic treatment- Fixed partial appliance. *Journal of Applied Dental and Medical Sciences*. 2015;1:3.
3. Prakash P, Durgesh BH. Anterior Crossbite Correction in Early Mixed Dentition Period Using Catlan's Appliance: A Case Report. *ISRN Dent*. 2011; 2011: 298931
4. Sinha A, Mohanty S, Acharya S. Single anterior crossbite correction in mixed dentition using z'spring along with posterior bite plane: a case report. *Indian Journal of Forensic Medicine & Toxicology*. 2020;14(4):8637-8640.
5. Mckeown HF, Sandler J. The two by four appliance: a versatile appliance. *Dent Update*. 2001;28:496-500.
6. White L. Early orthodontic intervention. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1998;113(1):24-28.
7. Vadiakas G, Viazis AD. Anterior crossbite correction in the early deciduous dentition. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1992;102(2):160-162.
8. White L. Early orthodontic intervention. *Am J Orthod Dentofac Orthop*. 1998;113:24-28.
9. Yang EY, Kiyak HA. Orthodontic treatment timing: A survey of orthodontists: *Am J Orthod Dentofac Orthop*. 1998;113:96-103.
10. Shyamala Naidu, Anand Suresh. The applications of 2 x 4 appliance during mixed dentition treatment. *Acta Scientific Dental Sciences*. 2018;2(11):49-51.
11. Sockalingam SNMP, Khan KAM, Kuppasamy E. Interceptive correction of anterior crossbite using short-span wire-fixed orthodontic appliance: a report of

- three cases. Case Rep Dent. 2018; 2018:4323945.
12. McKnight J. The responsibility of the pedodontist in diagnosis and correction of minor irregularities of occlusion. J Dent Child. 1965;32:57-61.
13. Lee BD. Correction of crossbite. Dent Clin North Am. 1978;22:647-668.
14. Graber TM. Orthodontics: Principles and Practice, 3rd ed. Philadelphia; WB Saunders Co. 1972;840-842.

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