



2 X 4 APPLIANCE- EFFECTIVE TREATMENTS FOR ANTERIOR CROSSBITE- A REPORT OF 2 CASES

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ABSTRACT

The 2X 4 appliance is a versatile, comfortable and easy to use fixed orthodontic appliance. It comprises of bands on first permanent molars, brackets on the maxillary incisors and continuous arch wire. Two cases using this appliance are presented. The 2X 4 appliance offers many advantages over removable appliances as it provides complete control of anterior tooth position, it is well tolerated by children and allows rapid and accurate positioning of the teeth.

Key words: Interceptive orthodontic, 2 X 4 appliance, Mixed dentition, Malocclusion.

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INTRODUCTION

Transition from primary teeth to permanent teeth is called mixed dentition stage. Many self correcting malocclusion occurs in this stage due to this transition [1]. Most common malocclusion during this stage are the anterior and posterior crossbite, crowding, rotations, midline diastema, spacing etc [2]. These malocclusions can occur involving a single tooth or a group of teeth in the arch.

Anterior crossbite is one of the most commonly encountered malocclusion in the mixed dentition period and are an indication for early orthodontic intervention [3]. Anterior crossbite is defined as an abnormal reversed relationship of a tooth or teeth to the opposing teeth in the labiolingual direction [4]. Interception and treatment of anterior cross bites should be performed at an early stage since it is a self-perpetuating condition and if early treatment is not done, it has the potential of growing into skeletal malocclusion and might require major orthodontic treatment combined with surgical procedures at a later stage [1].

Interceptive treatment is the core treatment in reducing the severity of a developing malocclusion. Interceptive orthodontic treatment at an early stage can not only boost the young child's self-esteem but also avoid the need of undergoing severe orthodontic treatment in the future. Most of the techniques for such corrections involve a removable appliance which requires good cooperation between the dentist and the patient for the success [2]. Different treatment methods that has been in use for correction of cross bite are Tongue blade therapy, Hawley retainer with auxiliary springs, lower inclined plane, stainless steel or composite crowns, labial and lingual archwires [2]. The problems with removable appliances are the lack of patient co-operation for wearing and adjusting the appliance and the treatment will not work if this co-operation is not forthcoming [3]. This cooperation is sometimes difficult to obtain in pediatric patients [2].

The Two by four appliance is a versatile, convenience, easy to use and tolerable appliance. The design of 2 X 4 appliance comprises of band placement on

the first permanent molars having soldered stainless steel tube which support the arch wire, brackets were bonded to the erupted maxillary incisors and continuous arch wires to provide and maintain good arch form[1,5].

The 2X 4 technique provides effective control of force, magnitude and vector over the anterior tooth movement in all three dimension (bodily or translational movements, tipping, torque of roots and rotation) and it also maintains the arch shape adequately [5]. The appliance allows a foreseeable outcomes in a short span of time for complex occlusal disorders such cross bites, ectopic or impacted upper permanent central incisors, anterior crowding with misaligned teeth (mild rotations, midline diastemas, abnormal spacing, improper axial angulations)[5]. Thus 2X 4 appliance can be given in mixed dentition and can be placed easily and removed, affordable, comfortable and well tolerated and minimal child's cooperation is required[5]. Hence, the present case report series have shown the use of 2X4 appliance for the correction of anterior crossbite in mixed dentition stage.

Case reports

Case 1- A 11 year old male patient reported to the department of Pediatric and Preventive Dentistry, K D Dental and Hospital, Mathura with a chief complain of malaligned teeth. There was no previous history of dental treatment, and his medical history was noncontributory. Intraoral examination revealed the patient was in mixed dentition stage with the first permanent molars in a Class I relationship. The maxillary right central incisor was palatally placed resulting in an anterior cross bite [1 Fig (A)].

After discussing the treatment modalities, 2X4 appliance treatment was considered for the correction of anterior cross bite. Informed consent was taken from the patient before starting the treatment. The treatment was initiated by cementing orthodontic molar bands with buccal tubes on permanent maxillary first molars on both sides. Metal brackets MBT with a 0.022" slot were bonded on the labial aspects of the four maxillary permanent incisors. A nickel-titanium (Ni-Ti) 0.012" round archwire was placed into the bracket slots and then into the molar tube on both sides[1 Fig (B)]. The wire was stabilised in its position using O rings for 1 month. Composite build up was done on mandibular permanent molars on both sides to disocclude the occlusion to achieve a 2 mm incisal

clearance. The 0.012" round Ni-Ti archwire was changed to 0.014" round Ni-Ti archwire and retained for further 1 month[1 Fig C ,D]. 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[1 Fig (E)].

Case 2- A 10 year old male patient reported to the department of Pediatric and Preventive Dentistry, K D Dental and Hospital, Mathura with a chief complain of malaligned teeth which was unaesthetic to the patients. Intraoral examination revealed the patient was in mixed dentition stage with the first permanent molars in a Class I relationship. The maxillary right central incisor and maxillary left lateral incisor were in crossbite and mesiolabial rotation of maxillary left central incisor was seen. 2X 4 fixed orthodontic treatment was planned for correction of the anterior cross bite[2 Fig (A)]. Informed consent was taken from the patient before starting the treatment.

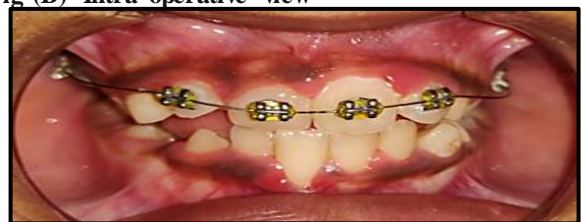
Treatment was started by cementing orthodontic molar bands with buccal tubes on permanent maxillary first molars on both sides. Metal brackets MBT with a 0.022" slot were bonded on the labial aspects of the four maxillary permanent incisors. A 0.012" round nickel-titanium (Ni-Ti) archwire was placed into the bracket slots and then into the molar tube on both sides[2 Fig (B)]. The wire was stabilised in its position using O ring for 1 month. To raise the bite composite build up of 2 mm thickness was done on the occlusal aspect of mandibular permanent molars (36 and 46) to achieve a 2 mm incisal clearance. The 0.012" round Ni-Ti archwire was changed to the 0.014" round Ni-Ti archwire and retained for another 1 month before debonding of the brackets[2 Fig (C)]. After 2 months, complete correction of anterior crossbite and an ideal occlusion was obtained followed by debonding of the brackets, removal of the molar bands and clearing off the composite build up placed on the occlusal surfaces of 36 and 46 using an ultrasonic scaler. Post operatively, full mouth ultrasonic scaling was done followed by fluoride application by Acidulated Phosphate Gel (APF gel) in both upper and lower arch. Total active orthodontic time was 2 months[2 Fig (D)].

CASE 1

1 Fig (A)- Pre- operative image.



1 Fig (B)- Intra operative view



1 Fig (C)- Intra operative view.



1 Fig (D)- Intra operative view.



1 Fig (E)- Post-operative view

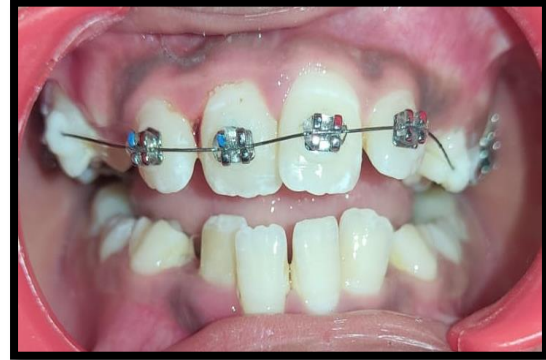


CASE 2

2 Fig (A)- Pre operative image.



2 Fig (B)- Intra operative view.



2 Fig (C)- Intra operative view.



2 Fig (D)- Post operative image



Discussion

Anterior crossbite is one of the most common malocclusion seen in children during the early mixed dentition stage.⁶ Anterior cross bites should be corrected at an early stage because if not treated early, it has the

potential of growing into malocclusion which can be skeletal in nature and might require major orthodontic treatment combined with surgical procedures.⁷ However, early treatment of such malocclusion may have certain obstacles such as poor patient compliance and refusal of

treatment. Nonetheless, early treatment can prevent some of the major inimical effects of anterior crossbite such as enamel wear, attachment loss, tooth mobility, and jaw deviation.⁸

During the mixed dentition period, the most common method of treatment is the use of removable appliances. Even though, removable appliances are easy to wear and are more comfort, major drawbacks includes requiring of more appointments as compared to fixed treatment, there is less control of tooth movements, unwanted tooth movements leading to improper activation and most importantly, it requires immense patient cooperation.¹ In contrast to this, fixed appliance treatment can be initiated as soon as the permanent molars and incisors have erupted, minimal patient discomfort, reduces the need for patient cooperation, produces active and controlled tooth movement in all 3 planes of spaces and the treatment duration is comparatively faster compared to the removable appliances.⁹

The idea of using sectional appliances is not new. Twin-wire arch was introduced by Johnson in the year 1930, compromising of incisor and molar bands and small

diameter twin wires sheathed in buccal tubings [3]. In this article, we have highlighted 2 X 4 fixed orthodontic appliance method. In the present described cases, the 2 X 4 fixed orthodontic appliance was used to bring forward or de-rotate the malpositioned teeth during the initial stages of treatment. These modalities allowed patients to accustom to orthodontic treatment. The usage of these appliances has no interference in day to day activities of the patients such as mastication, speech, oral comfort. There are also no major issues related to appliance dislodgement, treatment compliance and loss of appliance since they are fixed appliance.

Conclusion

The 2 X 4 appliance described in the article is a versatile, easy to use and well tolerated by all patients. A series of case reports has been presented identifying how versatile the 2X 4 appliance is and how it can be used to treat malocclusion in mixed dentition.

Conflict of Interest-

No conflicts of interest

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