Single Anterior Crossbite Correction in Mixed Dentition Using Z'spring Along with Posterior Bite Plane: A Case Report

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Abstract

Anterior cross bite is defined as "palatal positioning of the maxillary anterior teeth relative to the mandibular anterior teeth".Various treatment options available are removable & fixed appliances. This is a case report on treating a case of single anterior tooth crossbite during the mixed dentition using the "Hawley's appliance with posterior bite plane & Z'spring". The active treatment time was 3 months in total & the treatment outcomes were followed up consequently for the next 4 months successfully.

Keywords: *Anterior Tooth, Dentoalveolar Crossbite, Mixed Dentition, Malocclusion.*

Introduction

Crossbite is well defined as, "abnormal relationships of a tooth or teeth to the opposing teeth, in which normal buccolingual/labiolingual relationships are reversed".[1] Crossbites may be of the dental origin or the skeletal origin involving anterior teeth, or posterior teeth or both.[2] Anterior crossbite is defined as,"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 commonly come across malocclusion in the course of the development of occlusion in kids.[3,4] In the case of dental crossbite the patient shows the deviations in the axial inclination of the involved tooth or teeth but with normal existing skeletal form. The management of anterior crossbite should be considered during deciduous & early mixed dentition irrespective of its dentoalveolar or skeletal basis.[5] Anterior dental crossbite generally becomes obvious during the early developing dentition. The anterior crossbite may result from various reasons like lingual erupting maxillary anterior incisors; cleft lip[6]; supernumerary teeth anteriorly; an over-retained deciduous tooth/root; crowding[7,8]; inadequacy in arch length; upper lip biting habit.[9-12] This developing abnormality necessitates immediate treatment to avoid anterior teeth fracture & mobility, periodontal inflammation & TMJ problem.[12-17] There are many method to treat the developing or developed anterior dental crossbite. The treatment method cited for the developing or developed anterior dental crossbite are such as using tongue blade therapy, lower inclined plane, crowns (either stainless steel or composite build-up), Hawley's retainer with double cantilever springs, labial and lingual archwires. Hence, a variety of approaches can be used to intercept anterior crossbite during the developing dentition period. This case report presents a simple & economical method to treat anterior dental crossbite using Hawley's appliance with posterior bite plane & double cantilever spring.

Case Report: An 11-year-old female patient came to the "Department of Pediatric and Preventive Dentistry", Institute of Dental Sciences, Bhubaneswar with the chief complaint of abnormal positioning of one upper front tooth with corresponding lower tooth. There was no relevant past medical & dental history found. Extraoral examination revealed a slightly convex profile

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with potentially competent lips. On clinical examination it was found that 21 was in crossbite with 31 slightly proclined 11 & an angle's class I molar relation bilaterally. After careful intraoral examination, it was decided to treat the case with "Hawley's appliance with posterior bite plane to achieve a 2 mm incisal clearance and double cantilever spring (23 gauge wire) to push the palatally placed upper incisor labially".

The Treatment Objectives: To achieve the normal overbite & overjet, by aligning the inclination of the anterior tooth which further, improves the patient's facial & dental profile. The success & prognosis of this treatment is immensely dependent on children's cooperation & parental guidance.

Procedure: Immediate treatment: This includes educating patients & parents about the use of appliance planned to be given for the crossbite rectification. It also included thorough oral prophylaxis.

Definitive Treatment: Alginate impression was made for both the arches and immediately poured with dental stone. Hawley's appliance with posterior bite plane and double cantilever springto 21 was made for rectifying the crossbite. This appliance is known to deliver slow-lightcontinuous force.

The removable appliance was inserted in the patient's mouth and the patient was trained to insert & take out the appliance on her own under parental guidance. The patient was recalled after 24 hours to check the fitting of the appliance (Figure 1, 2). She was recalled after every week for the activation of double cantilever spring which was accomplished by opening each of two helices 2mm. She was instructed to wear it full time except during eating and the night while sleeping. In the 6th week, crossbite was found to be corrected with 21(Figure 3). After 2 months, the posterior bite plane was removed & Hawley's appliance with z spring sustained for another 2months to establish a normal overjet. Later exfoliating 53, 63 were extracted as a balancing extraction simultaneously to give an adequate space for the crossbite treatment to avoid anterior crowding and provide adequate space for anterior incisors alignment. At the end of the first 3 months of active treatment, the crossbite was successfully corrected. The use of Hawley's appliance was continued to achieve adequate overjet and overbite for another 2 months. The treatment outcome was followed up for further next two months.

Figure 1. Preoperative frontal view showing crossbite to maxillary left central incisor.

Figure 2. Intra-oral view with removable appliance.

Figure 3. Post-operative frontal view.

Discussion

Interceptive Approach: It incorporates all method initiated to decrease the complexity of malocclusion to progress normal occlusion in the future. The aim of using removable or fixed appliance primarily for the prevention purpose is to attain:

1. Good alignment of the permanent dentition.
2. To achieve harmony between dentition and aesthetic.
3. Stability between dental, muscular & skeletal components.
4. Dental arches with anoptimal intercuspation,

Interceptive procedures should be widely used in mixed dentition period to correct the developing abnormalities. Anterior crossbiterarely corrects by itself due to locking of the upper incisor behind the lower incisor & later it progresses to severe malalignment of teeth, therefore consideration of primary approach can re-establish the right muscle balance & a well-organized occlusal development.[18,19,20] Appliances used for rectification of 'anterior' crossbite are: "tongue blade, inclined plane, composite plane, reverse stainless steel crown, Hawley's appliance with 'z' spring and screws embedded in acrylic".[5]

Tongue blade therapy: It is suggested for a single tooth crossbitecase provided that incisors are still erupting stage. It is positioned at an angle between the teeth. After which the patient is directed to bite tightly for five seconds. This has to be redone twenty-five times in a day. In case after two days no changes observed then it is stopped. The main drawback is that it demands patient full co-operation.

Inclined plane: It is recommended when multiple teeth are to be treated. It is formed of acrylic & causes a 'forward sliding motion' on closure of upper teeth. Its usage is limited to four weeks because it may result in the supra-eruption of the posteriorly located teeth, opening the bite anteriorly.

Composite Plane: An inclined plane is made up of composite on the lower incisors.

Reverse stainless steel crown: It is also used in the case of a "single tooth" crossbite. This crown is used for the upper incisor which forces the upper tooth away that is towards the lip as the child bites down on the lower teeth. It takes two to four weeks for the correction.

Maxillary appliances with 'z' springs & posterior bite plane: It can be a choice when multiple teeth are in crossbite. The posterior bite plane used, put the anteriorly located teeth out of occlusion, allowing the incisors to escape the bite to provide incisal clearance and the 'z'spring used for the labialization of tooth.

Screws embedded in acrylic: Medium, mini or micro screws can be used that are activated daily to bring about correction of crossbite.

In the above case report the economical & acceptable method of choice for the crossbite correction was using a removable appliance with a posterior bite plane for incisor clearance & z spring for labialization was used. The removable orthodontic appliance used has three major advantages:[21,5] i) Reducing chair time; ii) They can be removed easily & iii) They are easy to clean thus, keeps in maintaining good oral hygiene.

Prakash Pet al in their study in 2011 reported that 8 to 11 years is an ideal time for anterior dental crossbite correction since it's the duration of root formation & the active stage of eruption of the tooth. Hence, a child's age plays an important role. But the motivation for treatment, how he or she co-operates during treatment is also being very important.[4]

Conclusion

It is essential to realize the need for early diagnosis and rectification.[22] During the early correction of simple and minor malocclusions, which is a part of interceptive orthodontic treatment, the anterior cross-bite was corrected more rapidly & it is achieved by removable appliances or fixed appliances. The primary treatment in such cases just not only restores aesthetics anteriorly but may also lessen the complexity & course of successive required treatment.[20] Hence, it may help to prevent the prospect of any adverse effects upon the growth and development of the child.[23]

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