Journal of Pharmaceutical Research International

Volume 35, Issue 20, Page 47-51, 2023; Article no.JPRI.103186
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Management of Anterior Single Tooth Crossbite Using Removable Posterior Teeth Bite Plane Along With Z-Spring: A Case Report

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/JPRI/2023/v35i207406

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/103186

Case Study

Received: 22/05/2023
Accepted: 26/07/2023
Published: 02/08/2023

ABSTRACT

Anterior crossbite is defined as a malocclusion characterized by the anterior maxillary teeth lingual position compared to mandibular anterior teeth. The prevalence of anterior crossbite that has been reported in the mixed dentition stage varies between 1.6 percent and 7.9 percent. Anterior crossbite cases should be treated by emergency intervention in the early period to prevent the consequences of malaligned teeth and their effect on the normal overall growth and development of the child. Patient compliance in such type of treatment intervention is of utmost importance. This case report presents the correction of single tooth crossbite with the removable posterior bite plane along with Z-spring. Various other treatment modalities have been also proposed to correct an anterior dental crossbite, such as tongue blades, reversed stainless steel crowns, fixed acrylic planes, bonded resin-composite slopes, and removable acrylic appliances incorporating finger springs. This treatment modality is possible in the early stages of developing malocclusion. Children with untreated anterior crossbite could develop complications such as

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gingiva recession, TMJ dysfunction, and worsening of mandibular displacement. As self-correction is rare in these alterations, early interception is recommended to allow normal occlusion and facial development.

Keywords: Single tooth crossbite; posterior bite plane; Z-spring; removable orthodontic appliance.

1. INTRODUCTION

"Anterior crossbite is defined as a malocclusion which is characterized by the anterior maxillary teeth lingual position compared to mandibular anterior teeth" [1]. "Anterior dental crossbite shows an incidence of about 4-5%. It is observed in the early mixed dentition period and caused by the abnormal eruption of permanent incisors" [2]. "Early orthodontic treatment in either primary or mixed dentition is advantageous to allow for normal occlusion and skeletal development before the establishment of the permanent dentition. Spontaneous correction of crossbites is extremely unusual, therefore, early interceptive interventions are required. Certain negative outcomes related to the anterior crossbite include gingival recession, loss of alveolar bone support, and mobility of the lower incisors, along with potential adverse growth influences on the anterior portion of the maxilla" [3,4,5]. "As per the origin, it can be differentiated into two types i.e. skeletal and dental crossbite. Skeletal crossbite denotes a concave skeletal and soft tissue profile that usually requires extensive interventions to be managed whereas the Dental (or dentoalveolar) anterior crossbite is more of a localized problem which can be easily managed. Crossbite may result from the over-retention of deciduous teeth, irregular eruption pattern, or simple malposition of permanent teeth" [6,7]. The literature reveals a lot of treatment modalities for crossbite like Catlan's appliance, tongue blade therapy [2], removable orthodontic appliance incorporating spring bilateral occlusal build-ups for spontaneous correction of anterior crossbite, fixed orthodontic treatment [6], reverse stainless steel crown, custom formed resin bonded composite inclined slope [8], expansion screw, lip bumper, quad helix and W-arch appliances [9,10].

2. CASE REPORT

A 7-year-old boy visited with the chief complaint of malaligned front teeth in the upper jaw. On extra-oral examination, it was observed that the child has proper facial symmetry and straight profile. On intra-oral examination, the child has a single tooth anterior crossbite with an upper right central incisor. It was in the stage of eruption. Central incisors and lateral incisors were checked for occlusion. The child had mixed dentition. Angle's class I molar relation was observed on both sides. After a complete examination of the child, upper and lower alginate impressions were recorded. After cast models were made, the treatment planned was a fabrication of removable posterior teeth bite plane along with a Z-spring. Components of the removable appliance consist of a Labial bow, Adam's clasp, and Z-spring. After stabilizing these components with the help of modeling wax and the acrylic plate was fabricated using the sprinkle-on technique. The appliance was finished and polished with the help of polishing paste and burs. The appliance was delivered to the patient and Z-spring was activated by opening the coil. The patient was recalled after every week. They were instructed to maintain adequate oral hygiene. It was only allowed to remove the appliance only during brushing and eating food. In a period of 2 weeks, the tooth came in edge-to-edge contact. After 4^{th} week, labialization of the central incisor was observed and occlusion was achieved. Till this time duration, the lateral incisor was also erupted. The patient was delighted with the results.

3. DISCUSSION

Anterior dental crossbites are rare condition that possesses major esthetic and functional concern to children as well as parents which seldom corrects itself. The ideal age for treatment of anterior crossbite is between 8 years and 11 years when the root is being formed and the tooth is in the active stage of eruption [11]. "Many orthopedic/orthodontic interceptive treatment modalities have been proposed for achieving the class III and the anterior crossbite correction, including the facemask associated with the rapid palatal expander, the chin cup, the Frankel appliance (FR-3), the bionator, the reverse Twin-block, the removable mandibular retractor, the double-piece corrector, and the bone anchorage appliances associated to class III elastics.

PRE-OPERATIVE IMAGES

Fig. 1. Frontal view showing 11, 41 in crossbite

Fig. 2. Right lateral view showing occlusion

Fig. 3. Left lateral view showing occlusion

Fig. 4. Hawley's appliance incorporating Z spring and posterior bite plane

POST-OPERATIVE IMAGES

Fig. 5. Frontal view after 1 month follow up

Fig. 6. Right view in occlusion after 3 months follow up

Fig. 7. Left view in occlusion after 3 months follow up

Among these options, the reverse-pull headgear is proven effective for correcting a retrognathic maxilla by many authors" [12]. The patient's motivation for treatment of anterior teeth crossbite depends on how they perceive the problem and determine the best course of action. Early intervention is recommended in such patients to prevent the condition from worsening and to achieve the best possible results for the patient's oral health and well-being [13]. The child's age plays an important role along with the motivation for treatment. There are differences in gender as well for compliance as it is observed that girls are keener for treatment as compared to boys. The removable appliances are economical and biocompatible with soft tissues that help in maintaining good oral hygiene, but the success of therapy completely depends on good patient cooperation [14]. The period of mixed dentition offers the greatest opportunity for occlusal guidance and interception of malocclusion at the initial stage. If delayed to a later stage of maturity, treatment becomes more complicated with compromised results [15]. The patient and parents (or guardian) should be informed that the child's bite will feel discomfort for a while, but soon the child will adjust to it [8]. This case report presents a simple treatment option rendered at the early stages of malocclusion but at the same time, patient compliance plays a very important role for the best treatment outcome.

4. CONCLUSION

The above case represents the early diagnosis and treatment of anterior single-tooth crossbite showing promising results. The compliance of the child, in this case, proved excellent. The patient-maintained hygiene as well on his own. The advantages of doing early correction are less time duration, less follow-up, and reasonable expenses. As the age advances, further growth and development take place which might require more advanced treatment options and increased time duration. Early orthodontic correction using removable appliance proves with better results when diagnosed and the treatment option is chosen wisely.

PATIENT'S CONSENT

Consent was obtained from parents prior to the treatment.

ETHICAL APPROVAL

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

COMPETING INTERESTS

Author has declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/103186