Management of anterior single tooth crossbite using removable posterior teeth bite plane along with Z-spring: a case report

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 per cent and 7.9 per cent. Anterior crossbite cases should be treated by emergency intervention in the early period to prevent the consequences of malaligned teeth and its effect on normal overall growth and development of the child. Patient's compliance in such type of treatment intervention is utmost important. 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 anterior dental crossbite, such as tongue blades, reversed stainless steel crowns, fixed acrylic planes, bonded resincomposite slopes and removable acrylic appliances incorporating finger springs. This treatment modality is possible in early stages of developing malocclusion. Children with untreated anterior crossbite could develop complications such as 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

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 incidence of about 4-5%. It is basically observed in the early mixed dentition period and is 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 on the maxilla.[3] 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.[11] The literature reveals 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[11], reverse stainless steel crown, custom formed resin bonded composite inclined slope[12], expansion screw, lip bumper, quad helix and W-arch appliances[13].

Case report

A 7 year old boy visited with the chief complaint of malaligned front teeth in upper jaw. On extra-oral examination it was observed that child has proper facial symmetry and straight profile. On intra-oral examination child has single tooth anterior crossbite with upper right central incisor. It was in the stage of eruption. Central incisors and lateral insciors were checked for occlusion. The child had mixed dentition. Angle's class I molar relation was observed on both sides. After complete examination of child upper and lower alginate impressions were recorded. After cast models were made, the treatment planned was fabrication of removable posterior teeth bite plane along with Z-spring. Components of the removable appliance consist of Labial bow, Adam's clasp and Z-spring. After stabilizing these components with the help of modeling wax and acrylic plate was fabricated using sprinkle on technique. 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 coil. 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 4th week, labialization of the central incisor was observed and occlusion was achieved. Till this time duration the lateral incisor was also erupted. Patient was delighted with the results.

PRE-OPERATIVE IMAGES

Frontal view showing 11, 41 in crossbite

Right lateral view showing occlusion

Left lateral view showing occlusion

Hawley's appliance incorporating Z spring and posterior bite plane

POST-OPERATIVE IMAGES

Frontal view after 1 month follow up

Right view in occlusion after 3 months follow up

Left view in occlusion after 3 months follow up

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.[6] Many orthopaedic/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. Among these options, the reverse-pull headgear is proven effective for correcting a retrognathic maxilla by many authors.[7] 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.[8] The child's age plays an important role along with the motivation for treatment. There are differences in gender as well for the 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 helps in maintaining good oral hygiene, but the success of therapy completely depends on good patient cooperation.[9] The period of mixed dentition offers the greatest opportunity for occlusal guidance and interception of malocclusion at initial stage. If delayed to a later stage of maturity, treatment becomes more complicated with compromised results.[10] The patient and parents (or guardian) should be informed that the child's bite will feel discomfort for awhile, but soon the child will adjust to it.[12] This case report presents a simple treatment option rendered at early stages of malocclusion but at the same time patient's compliance plays a very important role for the best treatment outcome.

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. 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, the further growth and development takes place which might require more advanced treatment options and increased time duration. Early orthodontic correction using removable appliance prove with better results when diagnosed and treatment option is chosen wisely.

Conflicts of interests: None

Patient's consent: Consent was obtained from parents prior to the treatment.

References

1. Cosgun A, Altan H. Treatment of Anterior Dental Crossbite with Different Methods in the Early Mixed Dentition Period: Report of Two Cases. J Pediatr Dent 2020;6(2):61-64.
2. Fadzlinda Baharin. "Management of Anterior Crossbite in Mixed Dentition Using Lower Inclined Bite Plane: A Case Report." IOSR Journal of Dental and Medical Sciences (IOSRJDMS), vol. 18, no. 10, 2019, 54-57
3. Wendes Dias Mendes, Luciane Macedo de Menezes, Fábio Romano, Mírian Aiko Nakame Matsumoto, Maria Bernadete Sasso Stuani. Correction of an anterior and posterior crossbite

case with a modified McNamara appliance: A case report. Contemp Pediatr Dent 2021:2(1):64-71

4. Chung Wai Mok and Ricky WK Wong. Self correction of anterior crossbite: a case report. Cases journal. 2009
5. Sujata Kumari, Subrata Saha, Subir Sarkar. A case report- Simple approach to correct anterior crossbite in mixed dentition. Volume 33 no. 3. November 2017.
6. Ulusoy AT, Bodrumlu EH. Management of anterior dental crossbite with removable appliances. Contemp Clin Dent 2013;4:223-6.
7. Marianna Pellegrino, Maria Laura Cuzzocrea, Walter Rao, Gioacchino Pellegrino, and Sergio Paduano. Myofunctional Treatment of Anterior Crossbite in a Growing Patient. Case Report. Case Reports in Dentistry Volume 2020, Article ID 8899184, 8 pages.
8. Ayca Tuba Ulusoy, Ebru Hazar Bodrumlu. Management of anterior dental crossbite with removable appliances. Contemporary Clinical Dentistry | Apr-Jun 2013 | Vol 4 | Issue 2.
9. Sule Bayrak, Emine Sen Tuc. Treatment of Anterior Dental Crossbite Using Bonded Resin-Composite Slopes: Case Reports. European Journal of Dentistry. October 2008 - Vol.2.
10. Nikhila Amudala, Kalisipudi Sandeep, Satyam Martha, Anoop Athyala, Mohammad Abdul Sadik, Mupparapu Anudeep, Sravan kumar Mittal. Exploring Management Techniques for Crossbite Correction: A Case Series Demonstrating Successful Treatment Strategies. Journal of Medical and Dental Science Research Volume 10~ Issue 4 (2023) pp: 68-74.
11. G. Vasilakos et al. Early anterior crossbite correction through posterior bite opening: a 3D superimposition prospective cohort study. European Journal of Orthodontics, 2018, 364–371.
12. Theodore P. Croll, William H. Lieberman. Bonded compomer slope for anterior tooth crossbite correction. American Academy of Pediatric Dentistry. Pediatric Dentistry – 21:4, 1999.
13. Robert E. Binder. Correction of Posterior Crossbites: Diagnosis and Treatment. Pediatric Dentistry – 26:3, 2004.
14. Bhardwaj P, Verma SK, Rastogi K, et al. An efficient method for correction of anterior crossbite without using bite plates. CASE REPORT. BMJ Case Rep 2013.

15. Susan A. Mcevoy. Rapid correction of a simple one-tooth anterior cross bite due to an over-retained primary incisor: clinical report. Pediatric dentistry 1983 by The American Academy of Pedodontics/vol 5, No. 4.