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(CASE REPORT)

Timely intervention, lasting results: Managing dental anterior crossbite with a removable appliance

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Abstract

Introduction: Anterior crossbite, a common malocclusion in early mixed dentition, is characterized by one or more lower incisors positioned anterior to the upper incisors. Early identification and management are essential to prevent progression to more severe malocclusion and associated complications.

Description of Case: A 7-year-old female patient presented with a dental anterior crossbite involving the upper right permanent incisor. Clinical examination revealed a 1 mm reversed overjet and sufficient space for correction. A removable orthodontic appliance of Hawley's retainer with Z spring was utilized to treat crossbite after obtaining parental consent. The appliance was activated weekly, and the patient was instructed on proper use and oral hygiene. Positive overjet was achieved within four weeks, with complete alignment observed after an additional six weeks, despite a brief period of non-compliance.

Discussion: Early interceptive treatment of anterior dental crossbite is crucial to restore normal occlusion and prevent more complex problems. Removable orthodontic appliances, such as the Hawley's retainer with Z spring, are effective in cases with adequate space and active tooth eruption. These appliances offer advantages including ease of fabrication, maintenance of oral hygiene, and cost-effectiveness. However, patient compliance remains a key factor influencing treatment duration and success.

Conclusion: Timely intervention using removable appliances with Z spring is an effective and practical approach for correcting dental anterior crossbite in young patients. Appliance selection should be tailored to individual patient factors, emphasizing the importance of early diagnosis and patient cooperation for optimal outcomes

Keywords: Anterior crossbite; Removable orthodontic appliance; Interceptive orthodontic; Human and health

1. Introduction

The developing dentition and occlusion play a crucial role in the well-being of infants, children, and adolescents. The American Academy of Pediatric Dentistry emphasizes the importance of managing the developing dentition and occlusion, which involves identifying, diagnosing, and appropriately treating dentofacial abnormalities [1,2]. Malocclusion refers to the misalignment between the dental arches or within the arches in any plane and any anomalies in the tooth's position. Malocclusion is a common oral condition, especially among children [2,3].

Anterior crossbite is a malocclusion defined by one or more lower incisors positioned more anteriorly than upper incisor. Anterior crossbite can be divided into skeletal and dental. When anterior crossbite arises due to a skeletal discrepancy (maxillary retrognathia and mandibular prognathism), it is classified as a skeletal crossbite. On the other

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hand, if the crossbite results from the upper incisor being displaced palatally and is often associated with the labioversion of the lower incisor, it is considered a dental crossbite [4,5]. Anterior dental crossbite accounts for 4%-5% of the population, and other reports stated that anterior dental crossbite prevalence ranging from 1.6% to 8%, mainly in the early mixed dentition phase [5–7].

Possible causes of dental anterior crossbite involve trauma to the preceding primary tooth leading to the permanent teeth being pushed inward, ectopic position of the permanent tooth germ, supernumerary teeth, a habit of biting the upper lip, over-retained of deciduous teeth or their roots, odontoma, anomalies in tooth shape and size, and arch length inadequacy [8–10]. Early management of anterior crossbite is recommended to prevent more complicated or more severe malocclusion and treatment at a later stage [6].

Various treatment options, ranging from simple to complex methods, are available to treat anterior crossbite; removable appliances and other fixed appliances can be used for treating anterior crossbite. The most suitable treatment option for anterior crossbite depends on the etiology of the crossbite, the patient's age and compliance, eruption status of the tooth, space availability, and treatment costs [10]. Several appliances, including Hawley's Z spring, tongue blade, and Inclined bite plane (Catlan's) appliance, are often used for treating dental anterior crossbite [6,8,11]. In the present case, a removable orthodontic appliance with a Z spring was used to correct the crossbite.

2. Description of Case

A 7-year-old healthy female patient, accompanied by her mother, was referred to the Department of Pediatric Dentistry at Airlangga Dental Hospital with the chief complaint of her upper right permanent incisor positioned behind the lower incisors, which sometimes caused discomfort when biting food. The patient had no family history of class III malocclusion. There was a history of a persistent upper right central primary incisor, which had been extracted before. Extraoral examination revealed a straight facial profile and no TMJ problems.

Intraoral examination showed a dental anterior crossbite of tooth #11 and a class I molar relationship (Figure 1). It was measured that the patient had a 1 mm reversed overjet and 2 mm overbite on tooth #11, and the freeway space was 3 mm. Furthermore, the maxillary and mandibular lateral incisors had not erupted yet. From clinical examination and history-taking, no parafunctional habit was observed in the patient. Sufficient mesiodistal space width was available for tooth #11 to move labially.

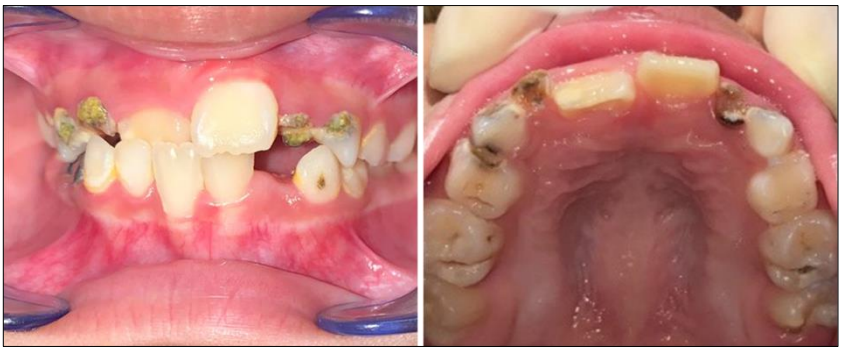

Figure 1 Intraoral examination showed dental anterior crossbite of tooth #11

The treatment objective for the patient was to correct the anterior crossbite, to ameliorate the overjet to normal, and to align the patient's anterior teeth, which may enhance the patient's facial and dental aesthetics and prevent more severe malocclusion. 0

A removable orthodontic appliance consisting of Z Spring, Adam's clasp, and Hawley retainer was constructed to correct the crossbite after the parents consented (figure 2). The Z spring was activated by slowly pulling the active part labially, and it should be ensured that the Z spring arm was already in contact and parallel to the palatal surface of the desired tooth upon insertion. The patient and the parents were trained to insert and remove the appliance independently under parental guidance. Furthermore, instructions on maintaining proper oral hygiene and the cleanliness of the appliance were also given to both the patient and the parents. The patient and the parents were also instructed to wear the appliance continuously, except when eating and practicing oral hygiene. The patient was recalled every 7 days to activate the Z spring.

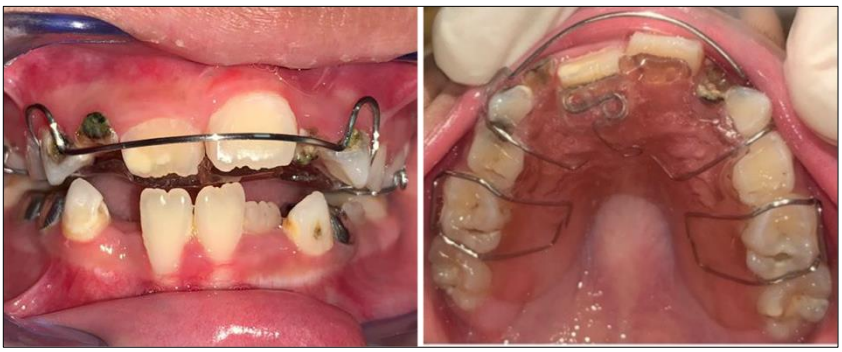

Figure 2 Inserted removable orthodontic appliance

After four weeks of using the appliance, a positive overjet had been achieved on tooth #11. However, patient compliance declined afterward; the patient did not show up for the next four weeks, and when the patient came back, activation of Z spring was performed, and alignment of the incisor was seen corrected after the next two weeks (Figure 3). The patient was still instructed on the appliance's utilization for the retention phase, although the desired position of the tooth was already achieved. It was intended to maintain the stable overjet and overbite of the incisor.

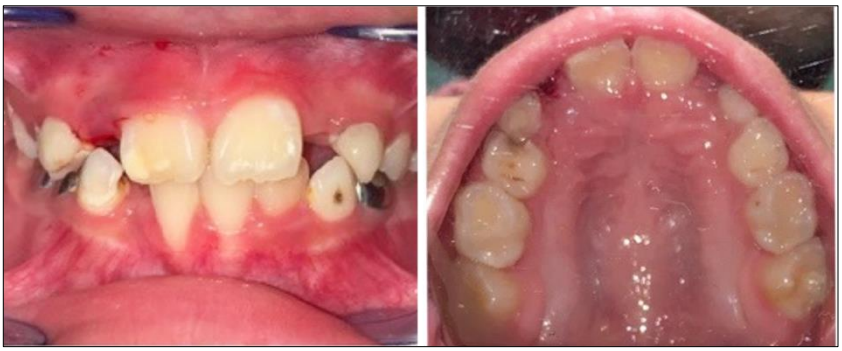

Figure 3 Intraoral condition Post-treatment

3. Discussion

Anterior crossbite is a common condition in children during the early mixed dentition period, most of which comes from dental origin. Interceptive treatment to correct an anterior crossbite may help eliminate the severity of the existing problem and prevent further malocclusion [10–12]. It is recommended to treat anterior dental crossbite when they are identified to promote normal dental and skeletal development. Delayed treatment can lead to serious complications, such as loss of arch dimensions, asymmetric midlines, traumatic occlusion with stripping of gingival tissue on the labial aspect of a lower tooth, and even untoward growth patterns if functional shift is involved [12,13].

Treatment methods of correcting dental anterior crossbite should be considered based on these several factors, such as the incisor positioning and available space to direct the movement of the tooth forward, stage of eruption of the displaced tooth; if the tooth is in active eruption, the treatment may use simple leveraging techniques, and the degree of overbite [13,14].

Anterior crossbite correction can be achieved using several removable or fixed appliances such as inclined bite plane, tongue blade, Hawley retainer with Z spring and screws, and reverse crown [15,16]. Each of these appliances comes with its advantages and disadvantages.

In the present case, a removable orthodontic appliance (Hawley retainer with Z spring) was utilized to treat the anterior crossbite. The reasons for choosing this appliance were based on the patient-specific factors, including age, occlusal analysis, and skeletal development. The patient's age was in early mixed dentition, and the tooth was in active eruption. Based on those factors, a removable appliance was a suitable treatment option for crossbite in the early mixed dentition phase [14]. Z-springs or palatal springs were chosen as they provided the best choice for this case since the right lateral incisor of both the upper and lower jaw had not erupted yet. Z spring arm was placed on the palatal of teeth #11, making

the pressure from the palatal direct the tooth to move forward labially. Enough freeway space was available in this patient, so the need for bite opening by incorporating occlusal bite planes can be eliminated [13].

The removable appliance was fabricated in a laboratory, so chairside time was significantly reduced. Moreover, the design of this appliance allowed the patient to clean it easily, hence good oral hygiene could be achieved. More importantly, the removable appliance is cost-effective and easy to manage [14,17]. However, patients' and parents' lack of compliance can be a hurdle practitioners might face. As in this case, the patient was not compliant regarding the recall visit. Lack of patient's compliance may lead to longer treatment duration [18].

In this case, the treatment period for correcting the reverse overjet was four weeks, and another six weeks were needed to align the tooth. Once the desired adjustment was achieved, the use of Hawley appliance was continued to establish adequate overjet and overbite [16]. Successful anterior crossbite correction is achieved by establishing normal overjet and overbite, and ensuring the incisors are aligned in their normal relationship [19].

4. Conclusion

Early treatment of an anterior crossbite highlights the importance of timely intervention to prevent more complex malocclusions. The practitioner can effectively treat dental anterior crossbite with the right appliance based on the patient's specific factors, such as age, skeletal, and occlusion analysis. A removable appliance with a Z spring is one of the appropriate treatment options for treating dental anterior crossbite.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this document.

Statement of informed consent

Informed consent was obtained from patient included in the study.

References

[1] American Academy of Pediatric Dentistry. Management of the Developing Dentition and Occlusion in Pediatric Dentistry. In: The Reference Manual of Pediatric dentistry. Chicago: American Academy of Pediatric Dentistry; 2024. p. 475–93.

[2] Saket P, Arumugam S, Archana SP, Chonat A, Vasanthakumari A, Dhivya S. Awareness and Attitude of Parents regarding Malocclusion and Early Interception of Oral Habits-associated Dentofacial Deformity in Children. World Journal of Dentistry. 2022 Apr 11;13(3):266–70.

[3] Pellegrino M, Caruso S, Cantile T, Pellegrino G, Ferrazzano GF. Early treatment of anterior crossbite with eruption guidance appliance: A case report. Int J Environ Res Public Health. 2020 May 2;17(10).

[4] Woon SC, Thiruvenkatachari B. Early orthodontic treatment for Class III malocclusion: A systematic review and meta-analysis. Vol. 151, American Journal of Orthodontics and Dentofacial Orthopedics. Mosby Inc.; 2017. p. 28–52.

[5] Lo Giudice A, Polizzi A. Pediatric Treatment of Anterior-Upper-Single Dental Crossbite Using a Versatile Sagittal Screw System: A Case Series. Pediatr Rep. 2025 Feb 1;17(1).

[6] Tiwari N, Tiwari S, Sharma D. Management of Anterior Cross Bite in Mixed Dentition Using Catlan's Appliance. Acta Scientific Dental Sciences. 2020;4(2):106–9.

[7] Vishnu G, R R. Comparative Clinical Outcomes in the Treatment of Anterior Crossbite Using Three Different Appliances: A Case Series. Cureus. 2024 Sep 5;

[8] Amudala N, Sandeep K, Martha S, Athyala A, Sadik MA, Anudeep M, et al. Exploring Management Techniques for Crossbite Correction: A Case Series Demonstrating Successful Treatment Strategies. Journal of Medical and Dental Science Research. 2023;10(4):68–74.

[9] Mai W, Xiao L, Chen S, Chen S, Li A, Zhang T, et al. Prevalence and contributing factors of malocclusion in Zhuang children aged 7–8 years in southern China. Front Pediatr. 2024;12(January):1–8.

[10] Sockalingam SNMP, Khan KAM, Kuppusamy E. Interceptive Correction of Anterior Crossbite Using Short-Span Wire-Fixed Orthodontic Appliance: A Report of Three Cases. Case Rep Dent. 2018;2018.

[11] Amirah Saraswati Pronorahardjo, Prawati Nuraini, Putri Qomaria Andarini, Meidy Damayanti, Siti Nurlestari, Firli Cahaya Khairani. Inclined bite plane for managing anterior crossbite: A case report. World Journal of Advanced Research and Reviews. 2024 May 30;22(2):1655–7.

[12] Oropeza LM, López AF, Sanchez RO. Correction of Anterior Crossbite, Using Removable Appliances in Mixed Dentition: 5-Year Follow-Up. Oral Health and Dental science. 2023 Dec 30;7(5).

[13] Dean JA. McDonald and Avery's DENTISTRY for the CHILD and ADOLESCENT. 11th ed. Jones J, Sanders B, Vinson L, Yepes JF, editors. Missouri: Elsevier; 2022.

[14] Almarhoumi A, Alwafi MM. Early Interceptive Correction for Anterior Crossbite Using a Removable Appliance: A Pediatric Case Study. Cureus. 2024 Mar 13;

[15] Kotadya J, Fernandes S, Bafna Y, Soni S, Patel J. Anterior Cross Bite Correction with Three Different Approaches : A Series of Three Cases. Journal of Medical Science And Clinical Research. 2019;7(1):176–81.

[16] 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 [Internet]. 2020;14(4):8637. Available from: www.Docstoc.

[17] Kaul S, Kansal V, Rawal S. Different Techniques for Correcting an Anterior Crossbite: A Case Series. Acta Scientific Dental Scienecs. 2023 Feb 1;7(2):134–8.

[18] Khalaf K, Mando M. Removable appliances to correct anterior crossbites in the mixed dentition: a systematic review. Vol. 78, Acta Odontologica Scandinavica. Taylor and Francis Ltd; 2020. p. 118–25.

[19] Mustapha NMN, Ashari A. Simplified Fixed Technique for Correction of Anterior Crossbite: A Case Series. Archives of Orofacial Sciences. 2021;16(1):77–85.