

Management of anterior single tooth crossbite in mixed dentition: A Case Report

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Abstract: *Single tooth anterior dental crossbite is the commonly encountered malocclusion during the development of occlusion in children. Anterior dental crossbite requires early and immediate treatment to prevent anterior teeth mobility and fracture, periodontal problems, and temporomandibular joint disturbances. The current paper presents the case of an 8 year-old female which describe the successful treatment of anterior crossbite (single tooth) in children with mixed dentition using removable appliance and rigorous oral hygiene instruction. The final outcome was a correction of the cross-bite in 4 weeks without any relapse for 18 months. At the same time, spontaneous improvement of periodontal environment was observed .*

Keywords : *anterior, single crossbite, mixed , dentition.*

Date of Submission: 09-08-2019

Date of Acceptance: 23-08-2019

I. Introduction

Anterior crossbite is a major esthetic and functional concern to the parents during the developmental stage of a child. It's defined as a malocclusion resulting from the lingual positioning of the maxillary anterior teeth in relationship to the mandibular anterior teeth [1].

Anterior crossbite has a reported prevalence of 2.2% and 36% and usually becomes evident during the early mixed dentition phase [2, 3].

The anterior crossbite may result from a labially positioned supernumerary tooth causing lingual deflection of the permanent incisor; trauma to the primary tooth causing displacement of the developing permanent tooth germ; an arch-length deficiency; habit of biting upper lip; repaired cleft lip [4, 5].

Anterior crossbite may lead to abnormal enamel abrasion of the lower incisors, thinning of labial alveolar plate, and/or gingival recession [5, 6- 8]. So, anterior dental crossbite requires early and immediate treatment [9]. The early mixed dentition stage provides an ideal platform to reverse the bite by a variety of approaches.

This case report aims to provide general and pediatric dentists with a simple technique to manage single anterior crossbite in the mixed dentition. Illustrations of treatment progress and appliance design are included for further clinical guidance.

II. Case Report

The parents of an 8 year-old female consulted the pediatric and preventive dentistry- department of the dental clinic of Ibn Sina university hospital of Rabat with the chief complaint of sensitivity in the lower right teeth region since two days which aggravates on having cold food and relieved after few seconds. The patient had no significant medical or dental history or known drug allergy.

No abnormality was detected on extraoral examination. Intraoral examination revealed a bad oral hygiene with general plaque accumulation, presence of inflammation and a localized retraction of gingival margin on the labial surface of the mandibular right central incisor (41). This tooth presented a slight mobility. Bilaterally Angle's class I molar relation was observed.

In the absence of lower labial frenal pull, anterior crossbite in relation to maxillary right central incisor [Figure 1] would be considered as risk factor of recession.

Thereby, the treatment plan was to correct the cross-bite. Hawley's appliance incorporating "recurved finger spring" on (11) was used [Figure 2]. The patient was instructed to wear the appliance full time. Two activations were done in the helices by opening them 2mm each time. Correction was accomplished in 4 weeks [Figure 3]. Furthermore, professional oral hygiene supervision was reinforced every month.

Recall examination after 18 months showed normal incisal relation without any relapse. Spontaneous improvement of periodontal environment such as decrease of inflammation and normal mobility on (41) were observed [Figure 4].

III. Discussion

Malocclusion, especially in the anterior teeth, can compromise a child's psychosocial well-being [10]. For children at the growth and development period, solving problems with minor interventions affects their social life positively.

Anterior crossbite is defined as the malocclusion that results in maxillary anterior teeth being positioned behind of mandibular anterior teeth [1]. Its prevalence in different countries around the world varies between 2.2% and 36% [2, 3].

An old orthodontic saying states "the best time to treat a crossbite is the first time it is seen" [9]. Therefore, anterior crossbite treatment is a highly conservative approach for pediatric patients when it is diagnosed correctly and treated appropriately. Early diagnosis and treatment of anterior crossbite cases are recommended to prevent tooth wear, anterior tooth fractures, gum problems, and temporomandibular joint disorders and to achieve a better functional occlusion and esthetics [11, 12].

The ideal age for the correction of anterior dental crossbite is between 8 to 11 years during which the root is being formed, and the tooth is in the active stage of eruption. The child's age not only plays an important role but also the motivation for treatment [13]. There are differences in gender as well – girls are more keen for treatment than boys [14].

There are different treatment approaches for the correction of anterior dental crossbite which can be used in early mixed dentition period. These include tongue blade therapy [15], reverse stainless steel crown [16], composite inclined plane [17], fixed orthodontic treatments [18], Catlan's appliance (Lower Inclined Bite Plane) [13] and removable appliances [19- 21].

Although it has been reported that factors such as child's age, number of teeth to be repositioned, status of occlusion and motivation of child and parents should be considered in deciding which of these methods to be used, clinicians occasionally experience dilemmas in choosing the method [14].

It has been reported for the tongue blade therapy that it may be used in the early period of tooth eruption. But, it has been reported that there is no precise control of the amount and direction of force applied [7, 15]. This method was not used for our patient because it was in the late period of tooth eruption.

Reverse stainless steel crown was not chosen for our patient due to following disadvantages: the difficulty of application of the crown onto the teeth with crossbite; the long duration spent on dental unit and the unaesthetic appearance generally not preferred by patients and their parents [22].

Composite inclined plane is costly, may affect patient's psychology negatively, may also lead to gum problems, as well as tooth structure loss while removing from teeth at the end of the treatment [17].

Wiedel and Bondemark [23] reported that anterior crossbite affecting one or more incisors can be successfully corrected by either fixed or removable appliances with similar long-term stability. In addition, this treatment is costly, have risk of causing gum problems, dental caries and is preferred in patients who cannot show suitable compliance to the treatment.

The drawbacks of Catlan's appliance are difficulty in speech, mastication and risk of anterior open-bite if the appliance is cemented for more than 6 weeks [4]. Therefore, weekly examination of the patient and an accurate decision to remove the appliance in case of prolonged treatment time are critical [13].

Removable appliances such as active acrylic appliance with bite plane [19], Bruckl appliance [20] and removable appliance with finger spring or screw [21]. The first one is required when overbite reduction is necessary or when removal of an occlusal interference is required to allow tooth movement. Clinically, the second can be used in cases when upper incisors are in crossbite with more than one half of vertical overbite and there are 3 or all 4 frontal teeth in crossbite.

In our case, our therapeutic choice was directed towards removable appliance with finger spring since there was sufficient space for labialisation of incisors, vertical overbite was less than 1/2 from the length of the crown and because the crossbite was of dental origin. A posterior bite plane was inserted to allow the crossbite correction [20].

This removable appliance is economical, harmless to soft tissues, it maintains a good oral hygiene, reduce the chair side time, not bulky as removable appliance with screw. But, the success of therapy depends on good patient cooperation [1].

In our patient the removable appliance with finger spring was tolerated. Thus the bite was reversed in a short period of four weeks without any damage to the tooth or the periodontium. Furthermore, it was reported that the production of organic matrix in the periodontal ligament, mitotic activities and soluble collagen levels of cells and osteoblastic and osteoclastic activities are increased as patients are younger [24, 25].

IV. Conclusion

The abovementioned case describes the acceptable alternative method for correction of anterior dental crossbite instead of complicated fixed treatment modalities in mixed dentition period. The result fulfill the patient and her parents expectations and our functional, esthetic perspectives.

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Figure 1: Pre-operative frontal view showing crossbite in relation to maxillary right central incisor.



Figure 2: Intra oral view with removable appliance incorporating finger spring.



Figure 3: Post operative frontal view after 4 weeks.



Figure 4: 18 months later



Meryem Lamrani Alaoui. "Management of anterior single tooth crossbite in mixed dentition: A Case Report." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 8, 2019, pp 11-14.