

Management of anterior dental crossbite with removable appliances

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Abstract

This case report describes the treatment of an 8-year-old girl with anterior dental crossbite using a series of removable appliances to bring the teeth into a normal position. Clinical presentation and intervention: A removable acrylic appliance with a bite plate incorporating a screw was used to correct the anterior dental crossbite and align the incisors. The subsequent eruption of the maxillary left lateral incisor on the palatal side was treated with a second acrylic plate incorporating a labiolingual spring. After an 8-month period, the anterior crossbite involving multiple incisors was corrected.

Keywords: Case report, crossbite, removable appliances

Introduction

Anterior crossbite is the term used to define an occlusal problem involving palatal positioning of the maxillary anterior teeth relative to the mandibular anterior teeth. Anterior crossbites can be either dental or skeletal in origin, whereas, anterior dental crossbites originate from the abnormal axial inclination of the maxillary anterior teeth. Anterior skeletal crossbites are most often associated with a skeletal problem, such as mandibular prognathism and midface deficiency.^[1] Differential diagnosis of dental versus skeletal anterior crossbite is essential in determining clinical treatment. This can be achieved by attempting to guide the mandible into a centric relation and evaluating the molar and incisor relationship: If the molars are in a Class I relationship and the incisors in an edge-to-edge relationship, a dental correction can be undertaken.^[2]

Anterior dental crossbite has a reported incidence of 4-5% and is usually the result of a palatal malposition of the maxillary incisors^[3] resulting from a lingual eruption path. Other etiological factors include trauma to the primary maxillary incisors resulting in lingual displacement of the

permanent tooth buds; presence of supernumerary anterior teeth; crowding in the incisor region; a habit of biting the upper lip; an over-retained, necrotic or pulpless deciduous tooth or root; delayed exfoliation of the primary incisors; and odontomas.^[2-5]

The main goal in treating anterior dental crossbite is to tip the affected maxillary tooth or teeth labially to a point where a stable overbite relationship prevents relapse. Treatment may involve lingual movement of a mandibular tooth, labial movement of a maxillary tooth, or both.^[2] Various techniques have been used to achieve this goal, such as tongue blades, composite inclined planes, reversed stainless steel crowns, removable acrylic appliances with lingual springs and fixed appliances.^[6,7] In addition to being inexpensive and not causing damage to associated soft-tissue, given the young ages of patients, removable appliances should also be easy to place and remove, comfortable and easily tolerated.^[2,8] This article documents a case in which an anterior dental crossbite was successfully corrected using two consecutive removable acrylic appliances.

Case Report

Clinical presentation and intervention

An 8-year-old Turkish girl was referred to the pediatric dentistry clinic with the chief complaint of an unaesthetic appearance of the maxillary central incisors, which were located behind the lower anterior teeth. Her medical and dental history was non-contributory, and the patient did not have a family history of Class-III malocclusion. The permanent maxillary right and left central incisors were both in crossbite [Figure 1], and maxillary lateral incisors had not yet fully erupted. The patient was in early-mixed dentition and had a Class-I molar relationship on both sides, with a 2 mm overjet and 100% overbite. The maxillary dental midline was coincident with the facial midline; however, the mandibular dental midline deviated approximately 2 mm to the left. Mild spacing was present in the maxillary arch, and there was sufficient mesiodistal distance to achieve labial

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movement of the maxillary central incisors. A panoramic radiograph showed no evidence of bone or dental pathology [Figure 2a] and lateral cephalometric radiographic view showed no evidence of basal problem between mandibular and maxillary arches [Figure 2b].

The treatment objectives for the patient were to correct the anterior crossbite, to establish normal overbite and overjet, to align the anterior teeth for ideal inclination and to improve the patient's facial and dental esthetics. The

child was motivated to maintain good oral hygiene. To align the maxillary anterior teeth and correct the crossbite, a removable acrylic appliance with a posterior bite-opening platform was used [Figure 3a and b]. A screw incorporated in the appliance platform was activated 0.25 mm every 4 days for 16 weeks. After 2 months, the maxillary and mandibular incisors displayed an edge-to-edge bite relationship, and the crossbite was corrected in an additional 2 months [Figure 4]. The posterior bite-opening platform was then removed, and screw activation continued every 7 days for another 2 months in order to establish a normal overjet. During the course of treatment (at 6 months), the permanent maxillary lateral incisors erupted, with the left lateral tooth in crossbite [Figure 5]. Accordingly, a new acrylic plate with a labiolingual spring was prepared, and the spring was activated every month for 2 months until this crossbite was resolved. At the end of 8 months of active treatment, the crossbite of all maxillary incisors was successfully corrected, and no



Figure 1: Pre-treatment intraoral photograph



Figure 2b: Pre-treatment cephalometric radiograph

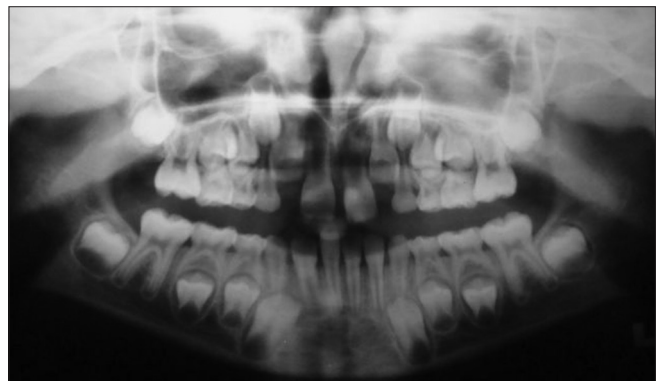


Figure 2a: Pre-treatment panoramic radiograph

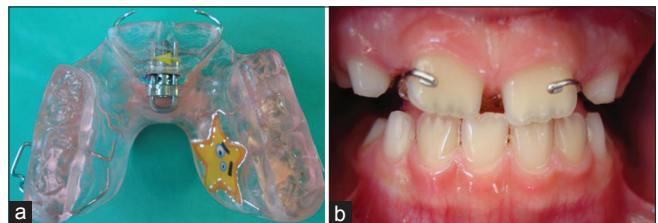


Figure 3: (a) Removable acrylic appliance. (b) Clinical view of the appliance



Figure 4: Intraoral photograph after 2 months



Figure 5: Intraoral photograph after 6 months

problems were observed during 6 months of follow-up clinically and radiographically [Figure 6a-c].

Discussion

One of the main goals of pediatric dentistry is to maintain or improve arch integrity to allow for the eruption of permanent teeth and prevent the development of a more complicated malocclusion. Anterior dental crossbite is a rare condition that is of major esthetic and functional concern to children and parents and that seldom corrects itself.^[2] However, developing Class III patients with moderate to severe anterior crossbite and deep bite may need early intervention. The ideal age to treat anterior crossbite is between 8 years and 11 years, the period when the root is being formed and the tooth is in the active stage of eruption.^[7] Anterior dental crossbite is a habitual established crossbite of anterior teeth, without any skeletal discrepancy, resulting from functional forward shift of the mandible on closure. When the mandible is guided into a normal centric relation, a normal overjet or an edge-to-edge position of incisors can be obtained. If correction is delayed to a later stage of maturity, it may lead to a skeletal malocclusion and require more complex treatment.

Different techniques have been used to correct anterior dental crossbite, including tongue blades, composite inclined planes, reversed stainless steel crowns, removable acrylic appliances with lingual springs and fixed appliances.^[2,6-8] In addition to the age of the child, treatment decisions should also take into account the number of teeth requiring repositioning, the degree of overbite, the total number of teeth involved and the motivation of the child and the parents for treatment.^[7,9]

The most basic form of treatment for anterior crossbite is the tongue blade, which the patient is instructed to bite on during leisure hours. The biting force is applied to the lingual aspect of the involved maxillary tooth to move the tooth forward, with the incisal edges of the mandibular teeth acting as a fulcrum to absorb the reciprocal lingual forces. However, this technique is rarely sufficient when more than one tooth is involved.^[10]

Crossbite may also be corrected using a reversed, pre-fabricated stainless steel crown. The chief disadvantage with this treatment is the difficulty adapting a preformed crown to fit the tooth in crossbite. Furthermore, because of its unaesthetic appearance, this form of treatment is often rejected by children and their relatives.^[11]

A composite inclined bite-plane is another effective treatment method that is simple and non-invasive, making it the first choice of treatment in some cases. However, a composite plane cannot be used in cases where the anterior crossbite exceeds 1/3 the crown length.^[8] Moreover, the cement used with this type of appliance may cause gingivitis.^[9] In the present case, the use of a composite inclined plane was inappropriate, as the anterior crossbite exceeded 1/3 of the crown length.

Removable orthodontic appliances represent another safe, easy and esthetically acceptable alternative for the treatment of anterior crossbite^[12] that has three major advantages: (1) The appliances are fabricated in the laboratory rather than directly in the patient's mouth, thereby reducing chair time; (2) They can be removed on socially sensitive occasions (when visible wires on the facial part of the teeth would be undesirable); and (3) They are easily cleaned, providing good oral hygiene. The amount of desired movement of the teeth can be controlled by the screw and also the base plate remains rigid despite being cut into two parts of acrylic appliances, thereby, it's management is easy and less tendency to dislodge.^[13] For these reasons, the case reported here were treated using removable acrylic appliances. The first appliance was fitted with a screw to achieve labial movement of multiple teeth, whereas the second appliance used a labiolingual spring to tip a single maxillary lateral incisor. The patient did not report any discomfort during the course of treatment. Treatment resulted in successful correction of the malocclusion and an esthetic smile.

Based on the results presented here, a removable appliance with a screw may be considered the first choice of treatment to correct anterior dental crossbite of more than one incisor, whereas a removable appliance with a labiolingual spring may

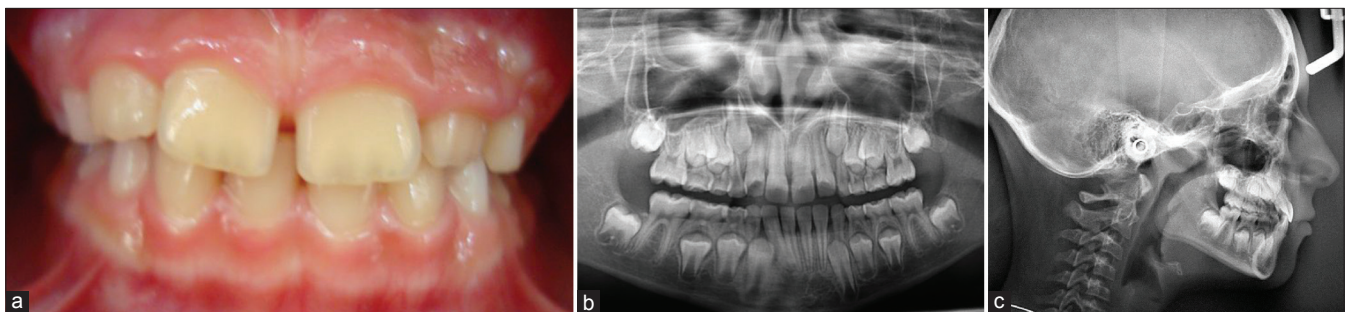


Figure 6: (a) Intraoral photograph after the treatment. (b) Post-treatment panoramic radiograph. (c) Post-treatment cephalometric radiograph

be considered the first choice of treatment for correction of crossbite of one incisor tooth.

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