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Case Series

Early Intervention in the Correction of Anterior Dental Crossbite: A Report of Three Cases using Removable and Fixed Appliances

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Abstract

Anterior crossbite is a malocclusion that occurs when the upper front teeth bite inside the lower front teeth. The early mixed dentition period is a critical stage in the development of the occlusion and is considered the best time for the correction of anterior crossbite. The present case series describes the treatment of anterior crossbite in three children using three different methods: a removable appliance and fixed appliances. The paper highlights the importance of early intervention in the treatment of anterior crossbite to prevent future complications. This report aims to provide an understanding of the importance of early intervention and the options of treatment available for the correction of anterior crossbite.

Keywords: Crossbite; Hawley's Appliance; Early Orthodontic Intervention; Anterior Sectional Twin Bracket Appliance

Introduction

An anterior crossbite is a type of malocclusion in which the lower anterior teeth are positioned labially in relation to the upper anterior teeth or in other words upper anterior teeth are in a lingual position in relation to the lower anterior teeth . Anterior crossbite is most commonly witnessed during the early mixed dentition period [1-3]. The cause of anterior crossbite can be attributed to various factors such as trauma to primary incisors, delayed exfoliation of primary incisors, the presence of supernumerary teeth, odontomas, crowding in the incisor region, and insufficient arch length [4-6]. If left untreated, anterior crossbite during the early mixed dentition period can have long-term adverse effects on the development and growth of teeth and jaws [6,7]. These effects include abrasion of the hard tissues of the tooth particularly abrasion of lower anteriors, aesthetic problems, and asymmetries [8]. Additionally, the mandibular incisor's protrusion may lead to thinning of the labial alveolar crest and gingival recession [8].

Mixed dentition period, the stage of transition from primary to permanent teeth, presents a unique challenge for children with malocclusion. Often, treatment is delayed until all permanent teeth have erupted or only removable appliances are used, resulting in limited tooth movement [9]. However, interceptive procedures during this crucial time can simplify and even eliminate the need for later treatment, ensuring normal development of teeth and jaws [10]. The mixed dentition period is particularly important for correcting anterior cross bites and decreasing the severity of an increasing malocclusion [11]. Despite debate surrounding the appropriate timing for orthodontic treatment, the most significant advantage of early interception is the ability to correct the majority of malocclusion non-surgically and without extraction of permanent teeth [12].

Case I

An 8-year-old girl reported to the department of Pedodontics and preventive dentistry, with the chief complaint of locked upper front teeth. On clinical examination it was found that 9 was in cross bite with 24 (Figure 1). After careful examination, it was decided to treat the case with Hawley's appliance with posterior bite plane and a double cantilever spring. The patient received instruction on how to use the appliance, which was provided to correct the cross bite. Alginate impression was made for both the arches and immediately poured with dental stone. Hawley's appliance with posterior bite plane and double cantilever spring were made for the correction of cross-bite in relation to 9 (Figure 2). Appliance was inserted in patient's mouth and she was trained how to independently insert and remove the appliance under the guidance of her parents. Patient was recalled after a week for initial activation of double cantilever spring. At the end of 2 weeks and 4 days, cross bite was found to be corrected (Figure 3).

Figure 1: Case I Preoperative photograph.

Figure 2: Case I Hawley's appliance with posterior bite plane and double cantilever spring.

Figure 3: Case I Postoperative.

Case II

An 8-year-old boy reported to the department of Pedodontics and preventive dentistry, with the chief of irregularly placed upper front teeth. On clinical examination it was found that 9 was in cross bite with 24 (Figure 4). Initially Hawley's appliance with posterior bite plane and a double cantilever spring was planned for the correction of crossbite. However, the child refused to use the removable orthodontic appliance. As a result, an alternative approach was chosen and the Anterior Sectional Twin Bracket Appliance (ASTBA) was utilized.

Figure 4: Case II Preoperative photograph.

Technique

- Brackets were bonded (0.22" slot, preadjusted edgewise) on maxillary central incisors.
- 0.014" nickel titanium (NiTi) wire was selected and cut symmetrically by 10 mm from the midline marking (Figure 5). The wire was placed into the brackets and stabilized using ligature ties.
- Glass Ionomer Cement of 2mm thickness was placed on the occlusal surface of the mandibular permanent first molars and bite-opening was performed in a balanced way with a distance of 2 mm between the incisal edges of the incisors sufficient enough for disocclusion.

Figure 5: Case II 0.014" nickel titanium (NiTi) wire.

Patient was given instruction regarding care of appliance and oral hygiene. Partial correction was seen at her first follow-up visit. The wire was then changed to 0.017 × 0.022" NiTi and G was extracted as it was grade III mobile (Figure 6). After 2 weeks, the crossbite was completely corrected. The GIC placed on 17 and 32 were removed using an ultrasonic scaler and brackets were debonded (Figure 7).

Figure 6: Case II 0.017 × 0.022" NiTi archwire.

Figure 7: Case II Postoperative.

Case III

An 8-year-old boy reported to the department of Pedodontics and preventive dentistry, with the chief of irregularly placed upper front teeth. On clinical examination it was found that 8 was in cross bite with 25 (Figure 8). To reduce the time frame of the treatment plan a 2X4 appliance therapy was considered instead of removable orthodontic appliance. Treatment was started in the maxillary arch by bonding MBT brackets with a 0.022″ slot on the labial aspects of the four maxillary permanent incisors. A nickel-titanium (Ni-Ti) 0.012″ round archwire was placed into the bracket slots and then into the molar tube on both sides (Figure 9,10). The wire was stabilised in its position using elastic ties for 1 week. To raise the bite, glass ionomer cement (GIC) of 2 mm thickness was placed on the occlusal aspect of 17 and 32, so as to achieve a 2 mm incisal clearance. Partial correction was seen at his first follow-up visit. The wire was then changed to 0.014″ round Ni-Ti archwire and retained for further another 1 week. On recall of the patient after 2 weeks, the crossbite was completely corrected. The GIC placed on 17 and 32 were removed using an ultrasonic scaler and brackets were debonded (Figure 11).

Figure 8: Case III Preoperative photograph.

Figure 9 and 10: Case III 0.012" nickel titanium (NiTi) wire.

Figure 11: Case III Postoperative.

Discussion

Anterior cross bite is a condition in which one or more maxillary anterior teeth are in lingual relation to the mandibular teeth. It's important to address this issue early, as it can worsen over time and potentially lead to more severe dental and skeletal problems that may require extensive surgical and orthodontic treatment. Success of the treatment is primarily dependent on the dentist's knowledge, experience, and skills. However, without patient compliance and the cooperation of parents, achieving the desired results is unlikely. Inadequate patient compliance can negatively impact the treatment plan and mechanics, prolong treatment time, and lead to an unsuccessful outcome [13-16].

An important factor to consider in orthodontic treatment is whether to use a removable or a fixed appliance. Removable appliances are easy to wear, but they have some downsides. These include the need for multiple appointments, less control over tooth movement, and the potential for unwanted movement if not activated properly. Additionally, patient cooperation is crucial for the success of treatment with removable appliances [17]. In contrast, fixed appliances can be initiated as soon as the permanent molars and incisors have erupted. They are associated with minimal discomfort, except when placing the bands and brackets. The tooth movement is active and controlled, and the treatment duration is shorter and patient compliance was found better when compared to removable appliances [18].

Conclusion

Interceptive orthodontic treatment aims to recognize and eliminate potential irregularities and malpositions in the developing dento-facial complex. The treatment should be carried out as early as possible with the aim of permitting normal growth, and improving facial attractiveness and psychosocial well being of children. Early intervention also allows for the use of less invasive treatment methods, can prevent further complications and can lead to a more successful outcome. Furthermore, the treatment method should be determined by considering the cooperation, personal characteristics, wishes, and needs of the patient.

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