

การจัดการฟันหน้าสบคร่อมด้วยเครื่องมือถอดได้ที่มีแผ่นกัดฟันหลังอย่างง่าย: รายงานผู้ป่วย

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กลุ่มงานทันตกรรม โรงพยาบาลพระนารายณ์มหาราช ลพบุรี ประเทศไทย

Abstract: Management of Anterior Dental Crossbite with a Simple Removable Lower Posterior Bite Plane: A case report

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This case report described a successful treatment of an 8-year-old boy with an anterior dental crossbite, poor oral hygiene, and no prior dental experience, using a simple removable lower posterior bite plane to guide the teeth into a normal position. After 4 months, the anterior crossbite was corrected. The mixed dentition period provides an excellent opportunity for occlusal guidance and malocclusion interception. Treatment may become more complicated if it was postponed to a later developmental stage. It was critical to managing children's fear and behavior in the dental chair, as well as their parents' attitudes and knowledge of oral healthcare before beginning the treatment. At times, a child's perception of not cooperating or accepting treatment may be exaggerated. The challenge of treatment is that good cooperation, adjusting children's behavior, and keeping up with their parents' education all contribute to treatment success. A thorough clinical assessment and accurate diagnosis are required to plan appropriate treatment strategies and appliance design.

Keywords: Anterior dental crossbite, mixed dentition, removable posterior bite plane

บทคัดย่อ

รายงานผู้ป่วยอธิบายถึงความสำเร็จในการรักษาฟันหน้าสบคร่อม (anterior dental crossbite) ของเด็กชายอายุ 8 ขวบ ที่มีสุขภาพช่องปากไม่ดีและไม่เคยมีประสบการณ์ด้านทันตกรรมมาก่อน โดยใช้เครื่องมือถอดได้ที่มีแผ่นกัดฟันหลังอย่างง่ายเพื่อช่วยให้ฟันขึ้นมาจากในตำแหน่งปกติ สามารถแก้ไขฟันหน้าสบคร่อมได้ภายหลังจากใส่เครื่องมือ 4 เดือน การแก้ไขการสบฟันผิดปกติแบบฟันหน้าสบคร่อมในช่วงฟันชุดผสมโดยการขึ้นแนวการขึ้นของฟันสู่ระนาบกัดสบตามธรรมชาติจะมีโอกาสประสบความสำเร็จมากขึ้นและเพื่อเป็นการแก้ไขเบื้องต้น ถ้าปล่อยให้ฟันมีพัฒนาการเป็นชุดฟันแท้การรักษาอาจจะยุ่งยากซับซ้อนมากขึ้น สิ่งสำคัญที่จะต้องจัดการก่อนจะเริ่มให้การรักษาคือ ความกลัวและพฤติกรรมของเด็กขณะให้การรักษา รวมทั้งทัศนคติและความรู้เกี่ยวกับการดูแลสุขภาพช่องปากของผู้ปกครอง เพราะในบางครั้งการที่จะประเมินว่าเด็กไม่ให้ความร่วมมือหรือไม่ยอมรับการรักษาในครั้งแรกที่พบจะยังไม่สามารถสรุปได้ ซึ่งเป็นความท้าทายของการรักษาที่จะต้องปรับพฤติกรรม ความร่วมมือที่ดีของเด็กและการเอาใจใส่ของผู้ปกครองล้วนมีส่วนช่วยให้การรักษาประสบความสำเร็จ รวมถึง

การประเมินทางคลินิกอย่างละเอียดและการวินิจฉัยที่ถูกต้องจะช่วยให้ได้แผนการรักษาและสามารถเลือกใช้เครื่องมือที่เหมาะสม

Keywords: ฟันหน้าสบคร่อม, ฟันชุดผสม, เครื่องมือแผ่นกัดฟันหลังชนิดถอดได้

Introduction

Anterior crossbite is a malocclusion in which one or more maxillary anterior teeth occlude lingually to the mandibular incisors in centric relation.¹ Incidences of anterior crossbite are reported in the literature worldwide, ranging from 0.5 to 11.9 percent, depending on the age of children, ethnic group, and method of registration.²⁻³ Rapeepattana et al.⁴ reported that in Thailand, the malocclusion group of dominant orthodontic problems were anterior crossbite, deep bite, and caries, the top three percentages for the first rank aspect, according to a study in a group of Thai children aged 8-9 years. Anterior crossbite could be from dental, skeletal, or

functional causes. Differentiating dental and skeletal origins of anterior crossbite is critical in determining clinical treatment. Anterior dental crossbites are caused by an abnormal axial inclination of the maxillary anterior teeth, whereas anterior skeletal crossbites are usually associated with a skeletal issue, such as mandibular prognathism or midface deficiency.⁵ A functional anterior crossbite is also defined as one caused by the presence of premature occlusal contacts, which cause the mandible to shift anteriorly away from the normal path of closure, resulting in a pseudo-class III malocclusion.⁶

Clinically, anterior dental crossbite are most commonly seen during the early mixed dentition period and are caused by the abnormal eruption of permanent incisors. This malocclusion can be caused by a shift in the position of the permanent tooth germ as a result of trauma to the primary incisors, delayed exfoliation of the primary incisors, supernumerary incisors, odontomas, crowding in the incisor region, and insufficient arch length.⁷⁻⁸ Furthermore, it has the potential to harm the long-term tooth and jaw development and growth,⁹ can abrade the tooth's hard tissues,⁸ also, mandibular incisor proclination can result in labial alveolar crest thinning and gingival recession.¹⁰ For the early interceptive treatment of anterior crossbites, several treatment options, such as removable and/or fixed appliances that act directly on the malpositioned teeth, have been recommended.¹¹ It is strongly advised to correct an anterior dental crossbite in the deciduous or early mixed dentition to ensure normal occlusion and jaw development. Furthermore, anterior crossbite is linked to higher levels of dissatisfaction with one's appearance and may have a negative impact on children's oral health-related quality of life.¹² Oral health is important for overall well-being because it affects children's feeding, smiling, speaking, and socializing. Facial appearance also affects a child's self-esteem and emotional well-being, as well as social interaction and their quality of life.¹³

Therefore, this case report demonstrated a successful interceptive orthodontic treatment to manage

anterior dental crossbite in early mixed dentition, using a simple lower posterior bite plane in the mandibular arch. This procedure's success and prognosis were heavily reliant on patient cooperation and parental supervision.

Case Report

An 8-year-old boy was referred to our clinic with the chief complaint of unsightly maxillary central incisors located behind the lower anterior teeth. His medical history was noncontributory, but he did have a family history of Class-III malocclusion (his father and older sister). Extraorally, he had a balanced face with a pleasant profile. The patient has poor oral health and has never had a dental procedure before. The permanent maxillary right and left central incisors were both in crossbite, and the maxillary lateral incisors had not yet fully erupted. The patient had early-mixed dentition and a Class I molar relationship on both sides, with a 2.0 mm overjet and overbite of 3.0 mm on the right side and 1.0 mm on the left. The maxillary and mandibular dental midlines were coincident with the facial midline. Median spacing was presented in the maxillary arch approximately 1.5 mm, and there was a sufficient mesiodistal distance to achieve the labial movement of the maxillary central incisors (Fig. 1). A panoramic radiograph showed no evidence of bone or dental pathology and normally developing permanent successor tooth germ. A lateral cephalometric radiographic view showed no evidence of basal problems between mandibular and maxillary arches (Fig. 2-3).

The preliminary examination and evaluation of the patient and their parents were expected to be difficult. However, once the children's behavior and their parents' attitudes had been adjusted, their knowledge of oral health care had improved. The issue is that the treatment will be successful if it starts early with the patient's collaboration, and their good oral health. Early intervention to promote balanced growth and occlusal development is recommended because anterior crossbite worsens with age in the permanent dentition.



Figure 1. Pretreatment facial (1A-4A) and intraoral (1B-5B) photographs

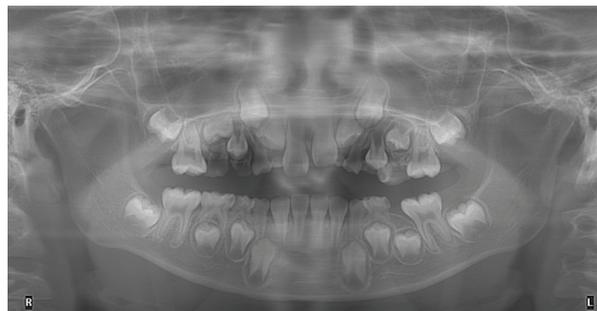


Figure 2. Pretreatment panoramic radiograph



Figure 3. Pretreatment cephalometric radiograph

Treatment objectives

Based on diagnostic records, the treatment objectives were as follows: (1) to correct the anterior dental crossbite with a simple lower posterior bite plane

in the mandibular arch and establish normal overbite and overjet, (2) to improve oral hygiene, and (3) to improve the patient's facial and dental esthetics.

Treatment alternatives

The primary goal of anterior dental crossbite treatment is to labially tip the affected maxillary tooth or teeth, so that a stable overbite relationship prevents relapse. Lingual movement of a mandibular tooth, labial movement of a maxillary tooth, or both may be used in the treatment. The primary treatment appliances for anterior dental crossbite are inserting the maxillary arch and the mandibular arch, which may or may not provide force to the teeth. To determine whether an appliance should be placed in the maxillary or mandibular arch, we must first determine its effect. Tongue blades, composite inclined planes, reversed stainless steel crowns, removable acrylic appliances with lingual springs, and fixed appliances have all been used to treat anterior dental crossbites. However, to correct anterior dental crossbite during the mixed dentition period, we must also consider the direction and amount of growth in the patient's craniofacial structure.

Patients who have never received a dental procedure before may reject pain-inducing appliances and have difficulty in eating. As a result, the patient may refuse the appliances that provide force to the teeth and make it impossible to bite the teeth. It is advantageous to remove them so that he can easily maintain his oral health. Orthodontists consider wearing appliances on the mandibular arch to slow down and adjust the mandibular arch's growth direction. Along with the maxillary arch, several deciduous teeth must be extracted, which takes

time for the wound to heal and the appliance to be inserted.

After data collection, anterior dental crossbite involves localized tipping of both maxillary teeth, as the anterior crossbite exceeded 1/3 of the crown length,¹⁴ and does not involve basal bone, demonstrating a normal anterior-posterior skeletal relationship with a smooth path of mandibular closure into an Angle Class I relationship, and coincident centric occlusion and centric relation.¹⁵ If we can remove the impediments to the natural teeth rising in tandem with the patient's growth, we can correct the anterior dental crossbite. As a result, we chose a mandibular posterior bite plane that is removable. Removable orthodontic appliances are another option for treating anterior crossbite that is safe, simple, and aesthetically pleasing.¹⁶ They have three major advantages: (1) they are fabricated in the laboratory rather than directly in the patient's mouth, 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. For these reasons, the patient was treated with removable acrylic appliances.

Treatment Progress

The treatment goals were discussed with the patient and his parent, and informed consent was obtained. The following treatment sequences were included in the treatment plan.



Figure 4. Facial (1C-4C) and intraoral (1D-2D) photographs 2 months after treatment

Immediate treatment: This phase included the education of the patient about the use of an appliance intended to be given for the correction of crossbite.

Intermediate treatment: This phase included extensive oral prophylaxis as well as extraction with 55, 54, 52, 62, 64, 65. The child was encouraged to practice good oral hygiene.

Definitive treatment: Alginate impression was made for both the arches and immediately poured with dental stone. Hawley's appliance with a posterior bite plane in the mandibular arch was made for the correction of crossbite. Appliance in the mandibular arch was placed on the occlusal surface of the mandibular primary and first molars, and bite-opening was done in a balanced manner with a distance of 2 mm between the incisal edges

of the incisors. Articulating paper was used to create the occlusal arrangement. Abnormal contact between the maxillary central incisors and mandibular incisors was eliminated after bite-opening. The appliance was inserted in the patient's mouth and he was trained to insert and remove it on his own under parental guidance. At all times, including during meals, the appliance must be worn. The patient was recalled after 24 hours to check the fit of the appliance. The maxillary central incisors were expected to be in the correct position, along with the tongue and lip's balanced pressure. 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 (Fig. 4). The posterior bite-opening platform was then removed gradually.



Figure 5. Post-treatment facial (1E-4E) and intraoral (1F-5F) photographs

Treatment results

At the end of 4 months of active treatment, the crossbite of all maxillary incisors was successfully corrected, and no problems were observed during 4 months of follow-up clinically and radiographically. The anterior relationship was stable, and the maxillary central incisors continued to align spontaneously. Furthermore, the maxillary diastema decreased spontaneously. The post-treatment facial photographs revealed a smile line and both upper maxillary teeth, which enhanced

the beauty of the face. The maxillary central incisors should have been in the correct position (Fig. 5), and no problems were observed during 4 months of follow-up clinically and radiographically (Fig. 6-7). The functional and esthetic outcomes were completely satisfactory to both the patient and his parent. Aside from successful treatment, it is critical to monitor the development of permanent teeth due to the problem of finding the lack of space for the mandibular left second premolar.



Figure 6. Post-treatment panoramic radiograph



Figure 7. Post-treatment cephalometric radiograph

Discussion

Because the patient was afraid of the dental procedure and had never done it before, the pretreatment photographs revealed poor oral hygiene. It is critical to managing children's fear and behavior in the dental chair, as well as their parents' attitudes and knowledge of oral health care before beginning treatment. At times, a child's perception of not cooperating or accepting treatment may be exaggerated. Following behavioral modification and parental correction education. The patient and his parent were extremely cooperative, improved their oral health, and explained the need for and significance of this treatment.¹⁷ The patient was eager to put the tool to use. During the active treatment and retention periods, the inflammation was followed by an improvement in oral hygiene. As a result, maintaining good oral hygiene before, during, and after any dental treatment should be prioritized. Before beginning any treatment, a consultation with a pediatric dentist is required if children are not cooperative or behave badly for reasons beyond the orthodontist's control.

A variety of techniques can be used to treat anterior dental crossbites. The goal is to normalize the developing dentition in accordance with the stage of oral-facial growth and development.¹⁸ Because this type

of malocclusion does not correct itself, anterior crossbite correction in early mixed dentition is strongly advised.¹⁹ Early intervention to promote balanced growth and occlusal development is recommended because anterior crossbite worsens with age in permanent dentition. Treatment may become more complicated if it is delayed until a later stage of maturity.²⁰ To achieve the desired results, different appliances are used by different people during orthodontic treatment, depending on their problems and needs. A treatment method requiring children to use appliances was preferred in this case, taking into account the children's cooperation, personal characteristics, wishes, and needs. The posterior bite plane was used to balance the bite-opening. In other words, the impediment to the teeth achieving their ideal position was removed, and treatment was administered. Although this method extended the patient's time wearing the appliance, successful results were obtained with short-term treatment. More importantly, patients can clean their instruments and maintain good oral health.

The fact that the tooth in the crossbite was in the eruption phase was the most important factor in the treatment's success. Teeth that have not fully erupted find it very easy to find their ideal position.¹⁶ If the obstruction that causes a crowded eruption of the

teeth during the eruption phase is removed, the tooth will spontaneously come to its position. The ideal age for treating anterior crossbite is between the ages of 8 and 11 years when the root is forming and the tooth is in the active stage of eruption.² Thus, in this case, an 8-year-old boy has early mixed dentition with lingual inclination of maxillary central incisors. There was also enough mesiodistal space for the maxillary central incisors to move labially. All of these factors fit the successful selection criteria described above.

The primary focus should be on the diagnosis and evaluation of the malocclusion. As a result, when using this Hawley's appliance with a posterior bite plane in the mandibular arch, patients must be carefully selected. The crossbite must be simple dental in nature, with no skeletal component; the facial profile and occlusion must be Class I. There should also be enough space in the arch for the crossbite to be corrected. In addition to the child's age, treatment decisions should consider the number of teeth that need to be repositioned, the degree of an overbite, the total number of teeth involved, and the child's and parents' motivation for treatment.²¹ The physician's knowledge, experience, and skills are

the most important factors that ensure orthodontic treatment success; however, the desired results cannot be achieved unless the treatment is accompanied by patient compliance and parents' practical cooperation. A problem with patient compliance may have a negative impact on the ideal treatment plan and mechanics, causing the treatment to last longer, or even causing the treatment to fail.²²

Conclusion

Because of good cooperation, adjusting children's behavior and keeping up with their parents' education, the treatment will be successful. Thorough clinical assessment and accurate diagnosis must be performed to plan proper treatment strategies and design the appliance.

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Conflicts of interest

The authors declare no conflict of interest in the present manuscript.

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