

Management of Anterior Crossbite in Mixed Dentition Using Lower Inclined Bite Plane: A Case Report

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Abstract: Anterior crossbite is a malocclusion involving palatal positioning of the maxillary anterior teeth in relation to the mandibular anterior teeth. Children with untreated anterior crossbite could develop complications such as gingiva recession, TMJ dysfunction and worsening of mandibular displacement. There are different treatment modalities for correction of anterior crossbite in children. The decision on which approach to be used depends on the aetiology of the crossbite, treatment objectives and behaviour of the child. This paper presents a case of a 6-year old child with anterior crossbite involving multiple teeth. A fixed lower inclined bite plane (Catlan's appliance) was used to correct the crossbite. Positive bite was successfully achieved in a short period of time without unwanted effects.

Keywords: anterior crossbite, children, malocclusion, interceptive orthodontic

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I. Introduction

Anterior crossbite can be defined as an abnormal relationship between opposing teeth in a buccopalatal or labiopalatal direction [1]. It exists when one or more of the maxillary incisors occlude lingual to the mandibular incisors with the posterior teeth in occlusion. The prevalence of anterior crossbite in children ranges from 4% - 26% [2-6]. The aetiology of anterior crossbite could be classified to skeletal factors and dental factors. Crowding is one of the dental factors that could cause a tooth to erupt in a crossbite condition. Anterior crossbite which known to develop from dental factors is termed as simple anterior crossbite, and it is further described by Lee [7] as;

1. The molars and premolars are in Class 1 relationship
2. The crossbite involves one or two teeth
3. The profile of the patient is generally normal and the same when the mandible is at rest
4. The teeth are occluded and the tooth or teeth involved in the crossbite exhibit only an abnormal lingual axial inclination usually in the presence of a causative factor.

Anterior crossbites should be treated early to avoid periodontal damage, fenestration of the lower labial plate due to incisor displacement, tooth wear due to abnormal contact or mandibular displacement and the potential for temporomandibular joint (TMJ) dysfunction [8]. The correction of anterior crossbite can be carried out by various treatment modalities. An upper removable appliance is a common approach to correct this type of malocclusion [9]. The Z-spring incorporated in the appliance works by tipping the misaligned incisor to its normal position. Different other treatment approaches reported in the literature to correct anterior crossbite includes tongue blade therapy [10], reverse stainless steel crown [11], composite slope [12] and fixed appliance [13,14].

This case report describes the correction of an anterior crossbite involving multiple teeth using lower inclined bite plane (Catlan's appliance) in a child patient. It is an effective approach and requires minimal cooperation from the patient.

II. Case Report

A 6-year-old male patient accompanied by his parent presented to the dental clinic with mobility of mandibular left central incisor. He had a repaired surgery for atrial septal defect (ASD) two years ago and is under yearly follow up with his cardiologist. Dental history revealed he had oral rehabilitation under general anaesthesia four months ago where badly decayed primary teeth including the upper left first permanent molar were extracted. On examination, an anterior crossbite was observed involving both maxillary central incisors and right lateral incisor. The mandibular left central incisor had Grade 1 mobility with mild labial gingival recession. There was no pocketing associated with the tooth. He had a Class 1 skeletal pattern

After discussion with an orthodontist, the decision was made to correct the anterior crossbite as Phase 1 orthodontic treatment which aimed to procline the maxillary incisors and establish a positive bite. The potential

of crowding was evident in this patient and will be managed as Phase 2 orthodontic treatment. Condition was explained to the parent and consent was obtained.

Steps in fabricating the lower inclined bite plane.

- 1) Alginate impression of upper and lower arch for working model
- 2) Bite registration with wax
- 3) Design of the lower inclined bite plane [14]
- 4) Try-in the appliance
- 5) Adjust and trim the acrylic slope, if necessary
- 6) Cementation of the appliance using zinc oxide eugenol cement
- 7) Remove excess of cement near the gingiva

After insertion of the appliance, the patient was reassured of the unusual bite and was advised to consume soft diet for several days while he adjusted to the appliance. Oral hygiene instruction was reinforced, especially brushing at the margin of the appliance and near the gingiva. A weekly appointment was scheduled for the patient. During follow-up visits, there was no complaint of pain or discomfort and the gingiva health was at the satisfactory level. Trimming of the appliance was done as necessary to make sure the only contact point was at the incisor region when patient was biting. Proclination of the maxillary incisors were observed during the third-week visit. The appliance was removed using the ultrasonic scaler initially, followed by crown remover plier. Once removed, the surfaces of the teeth were cleaned, and topical fluoride was applied. A positive bite was achieved for all the incisors with adequate retention. The patient was reviewed after a month and no relapsed of the bite was observed.

III. Discussion

Anterior crossbite is a relatively common malocclusion found in children. It warrants early intervention to stimulate well-balanced growth and occlusal development [4]. Uncorrected anterior crossbite could possibly cause TMJ dysfunction and worsening of mandibular displacement. Presence of gingiva recession secondary to periodontal damage in anterior crossbite is an emergency clinical situation in which treatment is indicated. Lee [7] has outlined a few factors to be considered to improve the success of the treatment outcome. First, the anterior crossbite is Class 1 malocclusion. Second, adequate space is needed for repositioning of the teeth. Third, enough overbite should be achieved after correction for adequate retention. Fourth, normal apical position of the teeth involved in the crossbite.

The lower inclined bite plane (Catlan's appliance) was used to correct the anterior crossbite in this patient due to several reasons. Firstly, he had a limited number of teeth in the arch. Multiple decayed teeth were extracted, including the primary molars and the first permanent molar during an oral rehabilitation under general anaesthesia. A removable appliance could not be used to correct anterior crossbite in this patient because the first permanent molars and the primary molars are supposedly used to hold Adam's cribs which act as a retentive form of the appliance. Secondly, the patient exhibited an unfavourable attitude towards dental treatment possibly due to past traumatic dental experience. However, immediate intervention was indicated to correct the crossbite because the patient had developed complications such as gingival recession and tooth mobility. Due to his uncooperative behaviour, a fixed appliance would have a greater chance to a positive treatment outcome. Thirdly, there were multiple teeth involved with different axial inclination, these would improve the stability of an inclined bite plane to stay in place and to withstand the occlusal forces [14].

The Catlan's appliance is an effective approach to correct anterior crossbite [15]. The 45degree resin slope works by proclining the maxillary anterior teeth labially while the mandibular anterior teeth are tipped slightly in the lingual direction. Because it is cemented (fixed) to the mandibular incisors, the outcome of the treatment does not depend on the patient's cooperation. In this case, the desired position of the incisors was achieved within three weeks. Similar to other orthodontic appliances, the drawback of this appliance is plaque retention, which could lead to gingivitis. For that reason, good oral hygiene before commencement of treatment is at utmost importance. This patient was reviewed every week to monitor the gingival health, owing to his significant medical background. Other alternative treatment modalities that can be used are twin bracket appliance [12,13] and direct composite resin slope [11,16]

IV. Conclusion

Anterior crossbite is a malocclusion that needs to be corrected early to establish a well-balanced occlusal development. A lower inclined bite plane (Catlan's appliance) is evident as an effective treatment approach to correct anterior crossbite in children as it requires minimal cooperation from the patient. The desired outcome is achieved in a short time and without complication.

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V. Figures



Figure 1. Anterior crossbite involving multiple teeth with gingival recession on mandibular left central incisor



Figure 2. The lower inclined bite plane was cemented to the mandibular teeth



Figure 3. Positive bite was noticed after 3 weeks of treatment



Figure 4. The corrected bite was maintained during one-month review

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