

Fixed inclined plan as alternative for treatment of previous dental crossbite: case report

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ABSTRACT

Objective: the aim of this case report was to show the effectiveness of the treatment of Anterior Dental Crossbite (ADC) with the fixed inclined plane. One of the main criteria for the indication of its use is the tooth should not be fully inclined, and when well indicated it presents excellent results. **Case Report:** a patient presenting ADC of tooth 11, made use of Fixed Inclined Plans (FIP) with every two-week follow-up and after 30 days the success of ADC correction was achieved in a relatively fast time. After 2-year follow-up, the treatment stability was verified. This option of treatment presents relatively fast results, appropriate to the patient's development phase, due to the absence of the need for cooperation, as well as with low cost, since it is a single dental element. **Conclusion:** early diagnosis associated with correct planning ensured successful treatment. Thirty days after the use of the device, the correction of the crossbite was already visible.

Keywords: Malocclusion; Orthodontic Appliances; Overbite.

Introduction

The concept of occlusion goes beyond the dental relationship itself. It is the relationship of static and dynamic functioning present between the occlusal surfaces and the members of the entire stomatognathic system that may change during the eruption phases. Among occlusion issues, the anterior dental crossbite (ADC) is emphasized by its negative interference in the dentofacial development, directly affecting aesthetics and function.^{1,2} In face of that, ADC is considered by the World Health Organization (WHO) the third most common public dental health problem.²

The etiology of ADC may present a wide differentiation in the periodicity and variations in different age groups, correlated to multifactorial coefficients, such as: deleterious habits, ectopic eruption, supernumerary teeth, trauma, prolonged retention of the deciduous tooth, presence of cysts or tumors, hereditary abnormalities (which may result in inconsistency in the maxillo-mandibular complex, due to either mandibular hyperdevelopment, or maxillary underdevelopment, or even from the combination of both factors), among others factors that may force the erupted permanent incisors to remain in lingual position.²⁻⁸

This condition is commonly observed in the deciduous and mixed dentition phases, and studies state that ADC has a prevalence ranging from 2.1% to 18.5% in children aged 7 to 12 years. Although in Brazil the occurrence ranges from 3.3% to 13.1%, the WHO states there is no actions alluding to the prevention and/or treatment of malocclusions, due probably to the lack of financial resources and the prioritization of preventive and therapeutic actions about caries,

since this is the most common oral disease.^{1,3,6,8}

ACD can be functional, skeletal or dental. Functional ADC is considered when there is a premature touch during centric occlusion, leading the child to adhere to a more comfortable and relaxed posture, deviating the lower jaw mandibular posture, with protrusive position, and if it is not corrected early enough, it might cause disturbance in growth and development, causing facial changes in a long-term period.^{1,3,7} Skeletal ACD occur due to an asymmetry of maxillomandibular growth (maxillary protrusion and mandibular retrusion).¹⁻⁵ Dental ADC is characterized by wrong buccolingual positioning between the upper and lower incisors, ie, when the upper incisors are linguallly in relation to the lower incisors, in centric or usual position.^{1-5,8}

Dental ADC treatment has numerous variables, such as the number of teeth affected, since the greater the number of teeth involved, the greater the involvement in an unfavorable pattern of development;² eruption phase; the degree of severity; the quality of the occlusion; and the patient's cooperation. There are different treatment options such as compensatory dental wear, reverse traction masks, palatal arch with incisor buccal springs, functional devices, modified progenic arch appliances and Fixed Inclined Planes (FIP).^{1,2,6}

Among the many possibilities for approaching ADC, the FIP allows for constant force when compared to removable devices. In addition to providing a three-dimensional view of the tooth to be moved, it is stimulated during chewing and swallowing movements when the affected teeth touch the appliance.^{1,3,5,7,9} The aim of this study was to show the effectiveness of treatment with this type of device by reporting a case.

Case Report

Patient female, six years and 11 months old, attended the children's dentistry clinic, complaining: "I have one tooth further back than the other." The intraoral examination showed regular oral hygiene, good dental health, diastema between teeth #11 and #21, with a different positioning of the tooth #11 compared to tooth #12 in the vertical direction of the arch (Figure 1A).

When evaluated in maximum intercuspation position, the overjet was negative by -2mm with 30% overbite on tooth #11 and positive overjet of 2mm with 50% overbite on tooth #21. Although all teeth have ideal overjet, tooth #11 presented negative overjet, being in a situation of dental crossbite and was in the transient mixed dentition phase (Figure 1B). There were no alterations in the anteroposterior relationships and interocclusal contacts were all considered correct (Figure 1C and 1D), however, there was a noticeable difference between the incisors in the arch with a crossbite (Figure 1C), and the incisor displaced to the palate (Figure 1E).

The device chosen for the correction of the ADC was FIP, because the patient presented several indications as follows: presence of diastemas between the crossed element and a negative overbite of less than 30%² relatively fast results; the development phase of the patient that is appropriate for this

device due to the lack of cooperation; low cost, since it is a single dental element.

For FIP construction, superior and inferior models were acquired, followed by the steps: sufficient amounts of monomer and polymer were mixed and during the time of plastic phase, the lower canine, central and lateral incisors were isolated with Vaseline. With the prepared acrylic resin, it was directed to the 6 anterior teeth and finger-adjusted, being accommodated and molded, finishing without lingual excess, causing an inclination of approximately 45° in the region of the tooth #11. The moment the acrylic became firmer, it was removed from the patient's model so that it would not get stuck in the model's teeth. After complete polymerization, it was finished and polished with mandrel and sanding strip, adjusting the inclination of the device.

The FIP was cemented with glass ionomer cement (GIC) due to its anticaryogenic actions and properties. The patient received oral hygiene instructions and was advised to return for a recementation in case of displacement of the device.

Follow-up was performed every 15 days to evaluate oral hygiene and treatment progress. The patient's parents were warned that she could feel discomfort during the first days of adaptation of the device. Fifteen days after insertion of the device, the effectiveness of the treatment was already visible (Figure 2).



Figure 1. Figure 1A: Left side view without changes in anteroposterior relationships and interocclusal contacts with noticeable anterior crossbite, and a difference in the vertical position of the tooth in the arch; Figure 1B: Frontal view, negative overjet of tooth #11, dental crossbite during mixed dentition; Figure 1C: Right side view without changes in anteroposterior relationships and interocclusal contacts; Figure 1D: Frontal view showing diastema between teeth #11 and #21 with patient in occlusion and Figure 1E: Occlusal view revealing misalignment of tooth #11 displaced to palate.



Figure 2. Figure 2A: Left side view with device installed; Figure 2B: Frontal view with the device installed; Figure 2C: Right side view with device installed and Figure 2D: Frontal view with the device installed.

At the next appointment, completing 30 days of use of the device, the ADC no longer existed, the FIP was removed, and the occlusion itself was responsible for maintenance of the final result. The intraoral examination revealed that, despite an elevation of #11 compared to #21, the characteristics showed normal overbite and overjet, thus achieving a successful treatment (Figure 3A).

In comparison with the initial clinical examination, in which tooth #11 (Figure 3B) presented a different position from the tooth #21 in the arch (Figure 3A), the transformation of the patient's profile using the FIP was expressive, presenting a satisfactory and relevant result in a short period of time.

After two years of follow-up, success was proved by tooth stability. Currently, the patient presents adequate characteristics of overbite and overjet in teeth #11 and #21, showing optimal position of tooth #11 in the arch. The patient is followed up every 6 months, awaiting the end of dentition development to assess a possible need for a second phase of orthodontic treatment (Figure 3).

Treatment progress becomes evident when compare clinical status on initial phase (Figure 4A and 4B), right after the treatment (Figure 4C and 4D), and 2 years follow-up (Figure 4E and 4F), highlighting the initial displacement of tooth #11 in the arch and 30 days after treatment the same tooth in the ideal position and direction in the arch.

Discussion

Anterior crossbite is an occlusal change that is present not only in the deciduous dentition. Therefore, it is extremely important for the dentist to understand and analyze the profile of each patient, in order to intervene in the prevention of dysfunctions and intercept ADC.^{2,3,5}

During the evolution of occlusion until the formation and establishment of permanent dentition, several events occur positively and negatively, resulting in several types of occlusion.¹⁰ Thus, diagnostic methods include clinical, radiographic, intraoral, extraoral photographs, and study models.²

Another important consideration is that the final decision for treatment with FIP was based on studies in the literature,^{2,6} despite of several therapeutic and device options, such as spring-loaded and spring-free removable appliances, and modified progeny. The determinant factor for choosing the FIP was all the indications that fitted in this case, as detailed in the case report.²

According to Santos *et al*,⁸ the literature shows an estimated time for FIP removal of approximately 21 days, as it is considered the ideal time for uncrossing. In this report, the time of use of the device was 30 days, due to patient appointments. Exactly 30 days after the FIP cementation, the bite was uncrossed, allowing removal of the device.

Figueiredo *et al*¹ states that for each tooth to be uncrossed,



Figure 3. Figure 3A: Final Frontal view; Figure 3B: Initial Frontal view; Figure 3C: Left side view after 2 years of follow-up; Figure 3D: Frontal view after 2 years of follow-up; Figure 3E: Right side view after 2 years of follow-up and Figure 3F: Occlusal view after 2 years of follow-up.

two teeth will be used as a support in the lower arch. However, in the present case, six teeth were used as support to increase the form of retention, and by professional choice.

Despite the disadvantages cited in the literature, such as the discomfort and pain in the incisors in the first days of use, difficulty in speech, aesthetic issues, possibility of dental intrusion and increased biofilm accumulation around the lower edges, which may cause gingivitis, decalcification, and when cemented, difficulties for removal of the device.⁵ On the other hand, FIP has significant advantages, with good results in a short period of time, besides the affordable and easy cost-benefit without the need for patient cooperation.²

Conclusion

ADC is an occlusal change that can manifest throughout the development of deciduous, mixed, and permanent dentition. Therefore, it is extremely important to follow up throughout the developmental stage of the dentition so that the diagnosis and treatment are performed as soon as the manifestation of the problem occurs, with the purpose of intervening in the malocclusion in its first moments. The objective was successfully achieved, in a short period of time, by treating properly diagnosed malocclusion, choosing the use of the FIP device, which presented as an efficient, simple and quick option.

frontal photograph after 2 years of follow-up.



Figure. Figure 4A Initial right-side photograph; Figure 4B: Initial frontal photograph; Figure 4C: Right side photograph with 30 days of treatment; Figure 4D: Frontal photograph with 30 days of treatment; Figure 4E: Final right-side photograph after 2 years of follow-up and Figure 4F: Final frontal photograph after 2 years of follow-up.

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