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CASE REPORT

Treatment alternatives for anterior crossbite in the primary dentition: Report of two cases

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ABSTRACT

Anterior crossbite (ACB) in primary dentition is a malocclusion that is easily recognized by the general population and is a frequent reason for consultation. Once its etiology has been established, it must be treated in a timely manner to avoid alterations in the growth and functioning of the craniofacial complex. This malocclusion may have a dentoalveolar, functional, skeletal component or a combination. This article presents the importance of differential diagnosis in patients with ACB in primary dentition and shows treatment alternatives that are very well accepted by patients and have satisfactory therapeutic results.

CLINICAL RELEVANCE

The importance of correcting anterior crossbite from the primary dentition should be emphasized, as failure to do so can have serious consequences on the growth of the craniofacial complex; it is important to establish a differential diagnosis that will allow the appropriate treatment to be carried out.

INTRODUCTION

According to the World Health Organization (WHO), after dental caries and periodontal disease, malocclusions are considered to be a public health problem since they occupy third place in prevalence.[1]

Among the most frequent malocclusions that can be found in the primary dentition are: dental crowding, anterior open bite, increased horizontal overbite, deep bite, posterior crossbite and anterior crossbite (ACBM).[2-4]

Anterior crossbite (ACB) is an anomaly of occlusion in the anterior-posterior plane where the lower teeth are in front of the upper teeth. It is one of the most common occlusal alterations in patients in the primary dentition.5 This condition should be treated in early stages of development seeking among other treatment objectives: correcting the overjet and restricting mandibular growth, reorienting and stimulating maxillary development, avoiding traumatic occlusal forces on teeth and periodontium, improving lip posture, facial appearance and avoiding abnormal muscle patterns that affect maxillary growth and disturb the TMJ. [5]

This malocclusion can have a dentoalveolar, functional or skeletal component or a combination of them. When it has a dentoalveolar component, it can be produced by delayed eruption or alteration of the eruption pattern of the upper incisors; proinclination of lower incisors, odontomas and/or supernumerary teeth. In functional anterior crossbite, the mandible is positioned in an anterior position with respect to the maxilla, generally due to the presence of multiple premature contacts that favor anterior mandibular displacement (pseudo class III). When this malocclusion is skeletal, a discrepancy is observed in the size of the mandible and/or the maxilla, as we can find large mandibles or small maxillae and a combination of these, also affecting the position and relationship of both maxillae.

In ACM with a skeletal component it is recognized that the patient has a class III malocclusion and a genetic and racial component is accepted, since, if we talk about the worldwide prevalence of class III malocclusion, it varies according to geographical location, being higher for the Chinese and Japanese population (12%-13%) and lower for Americans, Europeans and Africans (0.6-1.2%).[5]

In Colombia, a 2001 study by Thilander et al. found a prevalence of ACM of 5.8% in a population of 4724 children between 5 and 17 years of age, and a prevalence of class III in the same population of 3.7%.[7]
To make the differential diagnosis in patients with ACM, the family clinical history, the patient's profile, the magnitude of the negative overjet, the magnitude of the overbite, the involvement of the canine relationship and how pronounced the mesial step is should be taken into account. Cephalometrically we can observe the maxillary and mandibular length, witts measurements and ANB angle among others.[4]

With the presentation of these cases, we intend to expose the importance of the differential diagnosis in patients with ACM in primary dentition since this will be of great importance for the Pediatric Dentist to orient his therapeutic strategy successfully; likewise, we reiterate the importance of intervening the malocclusion once it is detected and the patient and his family are motivated to do so.

CLINICAL CASE REPORTS

Case 1:

Corresponds to a 3-year-old girl who consults for having an “upside down bite” (Figure 1). The clinical history does not reveal any important data and the clinical examination shows an anterior crossbite from canine to canine (Figure 2). After analyzing the pertinent diagnostic aids, it is concluded that we have an ACM of dentoalveolar origin.

Figure 1. Extraoral photographs.

Figure 2. Intraoral photographs.

With the consent of the family it is decided to place an inclined plane or lower anterior bite plane. The anterior inclined plane is a device used to correct the inclination of one or more anterior teeth, it has an inclination of 45º, it favors the change of posture and contributes to change the inclination of the occlusal plane with respect to the camper plane. It is a fixed device that is easy to accept by the patient and allows quick recovery of daily activities.

Before cementing, isolation was performed by applying Vaseline on all dental surfaces and self-curing glass ionomer was used for cementation. Occlusion and the presence of possible interferences were checked with articulating paper. Diet and oral hygiene recommendations were given and the patient was scheduled for a control appointment after 8 days and then every 3 weeks (Figure 3). At each control appointment, the anterior plane was worn and once the contacts were achieved in the molar area, it was removed.

The inclined plane was in position for 10 weeks. After its removal (Figure 4) the patient was left to rest and after 20 days a functional orthopedic appliance was made as a containment and to continue with the treatment. The appliance chosen was a Klammt Open Elastic Activator with an Eshler or modified progeny arch and a lower corrugated bar away from the teeth to contain and hold the tongue in position.

Figure 3. Extraoral view of the inclined plane after cementation.

Figure 4. Intraoral view after removal of the inclined plane.

Follow-up has been done for 2 years and the correction of the MCA, the stability of the results obtained and evident improvement in the facial and soft tissue characteristics have been evidenced (Figure 5 and 6).

Figure 5. Extraoral photographs after treatment with inclined plane at 2 years of follow-up.

Figure 6. Intraoral photographs after treatment with inclined plane at 2-year follow-up.

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Case 2:

A girl who arrives for consultation at 4 years and 6 months of age, her parents are concerned about the child's bite, as they refer to family history since her grandfather and a maternal aunt had the same condition.

Clinical analyses were performed and the necessary diagnostic aids were requested, such as panoramic and profile radiographs, intraoral and extraoral photos and study models; after analyzing the information collected it was concluded that the patient had an ACM with a skeletal component and a marked tendency to Class III malocclusion (Figure 7 and 8).

Figure 7. Extraoral photographs.

Figure 8. Intraoral photographs.

It was agreed to perform mechanical orthopedic treatment with extraoral force and it was decided to place a protraction facial mask (Figure 9) and intraorally a hirax screw embedded in an acrylic splint with hooks to anchor the mask (Figure 10).

Figure 9. Extraoral photograph with protraction mask and intermaxillary elastics ¼ ounce, 350 grams.

Figure 10. Extraoral photograph with acrylic splint type Mcnamara modified by Raymond.

The hirax was made in a Mcnamara-type acrylic splint but with a posterior inclination as described by Raymond, i.e. higher in the anterior part in the canine region and lower in the molar region (Figure 11).[12]

Figure 11. Intraoral photograph with Raymond modified Mcnamara type acrylic splint.

The hirax in splint was cemented with glass ionomer and extraoral elastics of ¼ and 350 grams of force were used to anchor the mask, the elastics were changed daily and the screw was activated twice a week; the use of the mask was recommended after school activities and for sleeping; instructions were also given for the oral hygiene of the girl. Every three weeks the posterior region of the splint was worn to favor the change of the occlusal plane with respect to the camper plane and the evolution of the treatment was reviewed.

The patient was treated with the protraction facial mask for a period of six months after which the splint was removed and prophylaxis was performed. One month after the end of this phase, functional appliances were placed: Modified Klammt Open Elastic Activator (Figure 12).

Figure 12. Intraoral photograph after 6 months of treatment, Klammt elastic open activator with progeny arch is observed.

At 1 year follow-up, there is evidence of anterior crossbite correction, stabilization of the occlusal plane and improvement in facial characteristics (Figure 13 and 14).

Figure 13. Extraoral photographs after treatment, at 1 year follow-up.

Figure 14. Intraoral photographs after treatment, at 1 year follow-up.

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DISCUSSION

The cases presented here show us the importance of treating occlusal alterations in a timely manner, in both cases the treatment objectives were met, and it is shown that we have several successful alternatives for the treatment of anterior crossbite in the primary dentition. ACM is not corrected spontaneously and in most cases it worsens from the primary dentition to the permanent dentition because it significantly restricts the growth of the upper jaw and favors crowding at the same time since there is no anterior guide and there is no mechanism to control mandibular growth. It is important to highlight that it has been demonstrated that in a harmonic, functional and stable occlusion the occlusal plane should be parallel to the camper plane;[26] in mesioclusions with or without crossbite the occlusal plane converges with the camper plane in the anterior part, this anterior convergence alters the functionality and the minimum vertical dimension (Figure 15 and 16).[13]

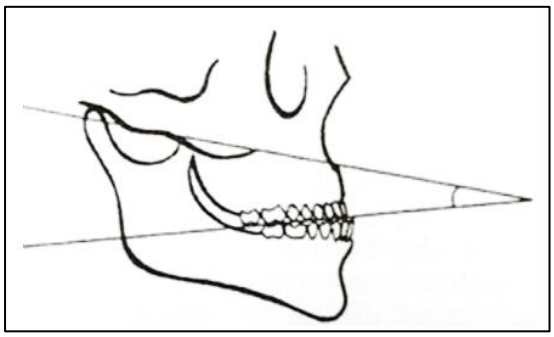

Figure 15. Taken from: Planas E. Neuro-Occlusal Rehabilitation (RNO) 2nd edition. Amolca. 2008. Image of the camper plane and convergent occlusal plane in anterior, in anterior crossbite.

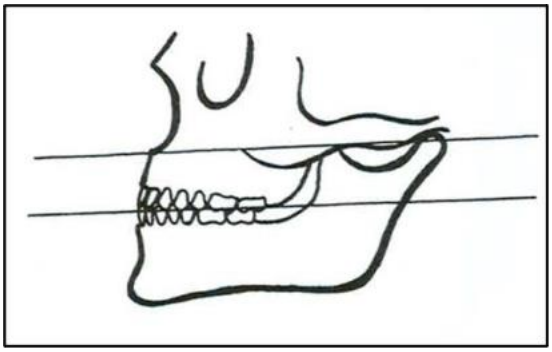

Figure 16. Taken from: Planas E. Neuro-Occlusal Rehabilitation (RNO) 2nd edition. Amolca. 2008. Image of parallel camper plane and occlusal plane.

The goals of timely treatment of ACM include achieving overjet correction, restricting mandibular growth, stimulating maxillary development, restoring temporomandibular joint physiology and parallelizing the occlusal plane and camper plane, which in this Class III malocclusion are convergent anteriorly, and ideally should be parallel.[5-13]

Among the treatment options for ACM are functional orthopedic appliances, selective wear5 and/or direct planar tracks,[13] pediatric esthetic crowns,[15] extraoral mechanical orthopedics, inclined planes,[18] among others. In order to choose the

appropriate treatment, the treatment objectives, the specific characteristics of each appliance and the preference of the treating clinician should be considered.

Previous research has demonstrated the effectiveness of the anterior inclined bite plane when patients are properly chosen, since it produces a therapeutic change of posture and favors the recovery of adequate neural excitation.[1] It has been proven that once the ACM is corrected, functionality is recovered and the dental arches can express their growth potential. There are also important reports in the literature that demonstrate the efficacy of the protraction face mask as a timely treatment option for Class III malocclusions in the growing patient, as it can restrict and redirect mandibular growth while stimulating forward and downward maxillary growth.[1]

CONCLUSIONS

Malocclusions should be treated once they are diagnosed as the better the individual's response to treatment. MCA is an occlusal disorder that is easily detected by parents and family members and responds favorably to treatment starting in the primary dentition. To achieve successful results, it is essential to establish an adequate diagnosis and to have the collaboration of the whole family group, including the patient. Early treatment of anterior crossbite recovers the necessary functionality to correct growth deviations and allows an adequate development of the patient's dentition.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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