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Treatment of complete crossbite in mixed dentition: case report with 12 years of follow-up

Tratamento de mordida cruzada total em dentição mista: Relato de caso com 12 anos de acompanhamento

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ABSTRACT

The present work reports a case of complete crossbite in the beginning of mixed dentition, and aimed to demonstrate the importance of treating malocclusion, as early as possible, to restore the function of the stomatognathic system, in addition to minimizing future surgical interventions. The patient was diagnosed as Class III due to a retruded maxilla and well-positioned mandible, with evidence of harmonious facial growth. Rapid maxillary expansion of the jaw was performed with a Haas-type circuit breaker, followed using a reverse traction mask. After installing the circuit breaker,

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activation was carried out for 13 days, at which time the circuit was interrupted and the reverse traction mask was installed, which was used for 8 months, when the treatment was completed. The stability of the crossbite treatment was observed during a follow-up consultation 10 months later. The patient did not return to the dental clinic, being located and examined again 12 years later, when he reported that no orthodontic or orthopedic treatment had been carried out during that period. The stability of the treatment was observed, despite the second permanent molars being slightly crossed. This report confirms the importance of the treatment proposed to correct crossbite in childhood, mainly because such treatment prevented the need for orthognathic surgery. The etiological relationship between systemic illnesses, oral breathing, and harmful oral habits in the development of the malocclusion subject of this study was also evident.

Indexing terms: Angle Class III. Case report. Extraoral traction appliance. Malocclusion. Maxillary expansion.

RESUMO

O presente trabalho relata um caso de mordida cruzada total no início da dentição mista, que teve como objetivo demonstrar a importância do tratamento desta má-oclusão, o mais cedo possível, para o restabelecimento das funções do aparelho estomatognático, além de minimizar futuras intervenções cirúrgicas. O paciente foi diagnosticado como Classe III, devido à maxila retruída e mandíbula bem posicionada, com evidências de crescimento facial harmônico. Foi realizado a expansão rápida da maxila com disjuntor do tipo Haas, seguido do uso da máscara de tração reversa. Após a instalação do disjuntor, foi realizado à ativação por 13 dias, momento em que foi interrompida a disjunção e instalado a máscara de tração reversa, sendo esta usada durante 8 meses, quando foi finalizado o tratamento. Uma nova consulta foi realizada após 10 meses, quando foi observado a estabilidade do tratamento da mordida cruzada. O paciente não retornou mais ao consultório, sendo localizado e examinado novamente somente após 12 anos, quando relatou que nenhum tratamento ortodôntico ou ortopédico tinha sido realizado neste período. Se observou a estabilidade do tratamento, apesar dos segundo molares permanentes estarem levemente cruzados. Este relato confirma a importância do tratamento das mordidas cruzadas na infância, principalmente por ter evitado a necessidade da realização de cirurgia ortognática. Também ficou evidente a relação etiológica das enfermidades sistêmicas, da respiração oral e dos hábitos bucais deletérios no desenvolvimento da má-oclusão estudada.

Termos de indexação: Classe III de Angle. Relatos de caso. Aparelhos de tração extrabucal. Má Oclusão. Expansão maxilar.

INTRODUCTION

Complete crossbite is characterized by the inverse relationship between the upper and lower arches, where the entire maxilla is positioned lingually to the mandible [1]. This is one of the malocclusions that most negatively affects facial aesthetics. Patients with this disorder have a high potential to develop psychosocial problems [2,3]. This reality highlights the need for immediate therapeutic approaches, as these patients often have low self-esteem [4]. Among the possible causes of crossbites are heredity, developmental defects of unknown origin, systemic diseases, nasopharyngeal conditions, oral breathing, harmful oral habits, occlusal interferences, endocrine disorders, and malnutrition [5-8].

The diagnosis of this malocclusion should be based on facial analysis, cephalometric studies, dental positions, and hereditary analysis [4]. The treatment should be performed by specialized professionals and can be challenging, as early correction in childhood is essential to prevent the worsening of facial asymmetries and potential consequences for the patient's craniofacial development [1]. The treatment of complete crossbite allows for more favorable growth redirection, correcting not only dental relations but

also the relationship between the skeletal bases, aiming to restore the functions of the stomatognathic system and minimize future surgical interventions [4,9-10]. Several authors advocate treating crossbite during the deciduous dentition phase or early mixed dentition to regularize the development of the dental arches and establish a normal occlusion [11-13].

Therefore, the objective of this case report is to demonstrate the importance of treating complete crossbite as early as possible, to prevent potential complications in the patient's craniofacial development.

CASE REPORT

The patient, a seven-year-and-four-month-old Caucasian male, accompanied by his parents, attended his first dental consultation with a pediatric dentistry specialist. The main complaint was the perception that something was wrong with the child's bite.

During the anamnesis, it was reported that the mother had taken acetylsalicylic acid throughout the pregnancy due to a previous miscarriage associated with Antiphospholipid Syndrome. The mother emphasized that the patient had always had serious health problems, being diagnosed with bronchitis, bronchiolitis, reflux, and asthma, which required medical treatment from an early age with corticosteroids and bronchodilators. The mother also reported that she was unable to breastfeed, and bottle feeding was introduced in the first days of life. The patient presented a disturbed sleep pattern and oral breathing since birth. Dissatisfied with the results of the treatment provided by the pediatrician who regularly attended to her son during the first seven years of his life, the mother sought the opinion of a pulmonologist, who initiated treatment with a locally acting anti-inflammatory drug, which led to an improvement in the patient's overall condition. It was also reported that at no time during the pediatrician's treatment was a dental evaluation recommended.

In the intraoral clinical examination, it was observed that the patient was in the early mixed dentition phase and that, in centric relation, all upper teeth were positioned lingually to the lower teeth (figure 1A). The first permanent lower molars were erupting and showed signs suggestive of Molar Incisor Hypomineralization (MIH). The maxilla was narrow, and the palate was high-arched (figure 1B).

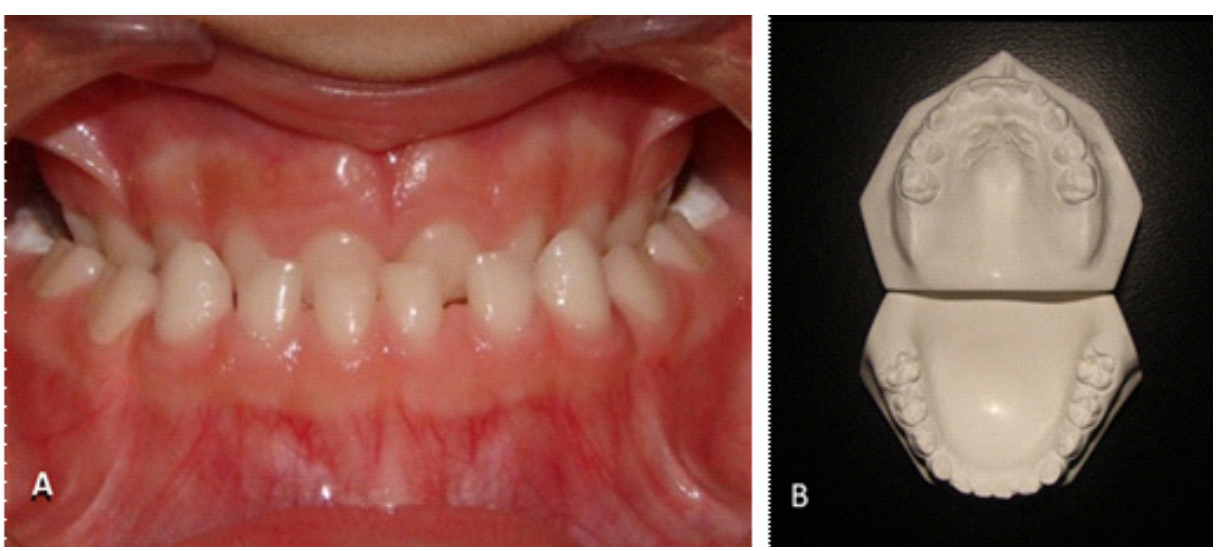

Figure 1. A- Initial photo, showing the "Total Crossbite". B- Maxilla atretic and palate ogival, observed in the plaster model.

Orthodontic documentation was requested. Facial analysis revealed a mesocephalic patient (figure 2A) with slight asymmetry and deviations of the upper and lower midline to the right (Figure 2B). Additionally, the patient had a harmonious profile with a facial convexity angle within the normal range (172º)- (norm 165º to 175º), indicating a straight profile (figure 2C).

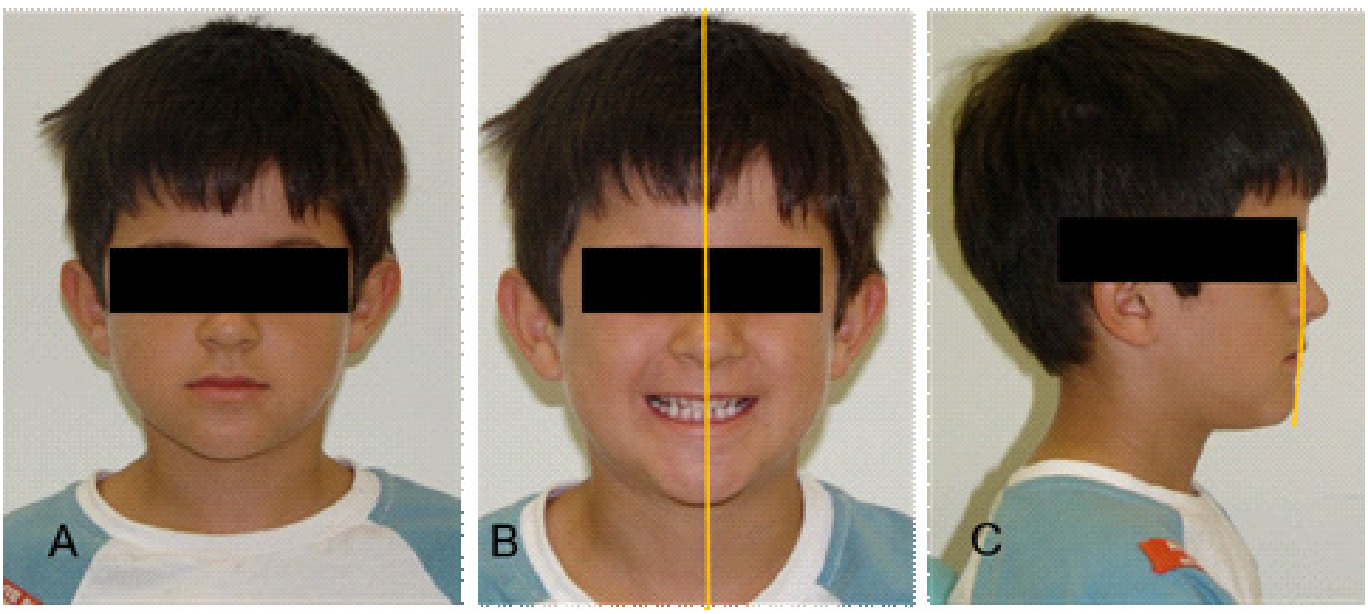

Figure 2. A- Mild facial asymmetry. B- Midline deviation. C- Facial convexity.

According to the Universidade de São Paulo (USP) cephalometric analysis, the patient was classified as Class III due to a retruded maxilla and a well-positioned mandible. This analysis also showed evidence of harmonious facial growth (figure 3).

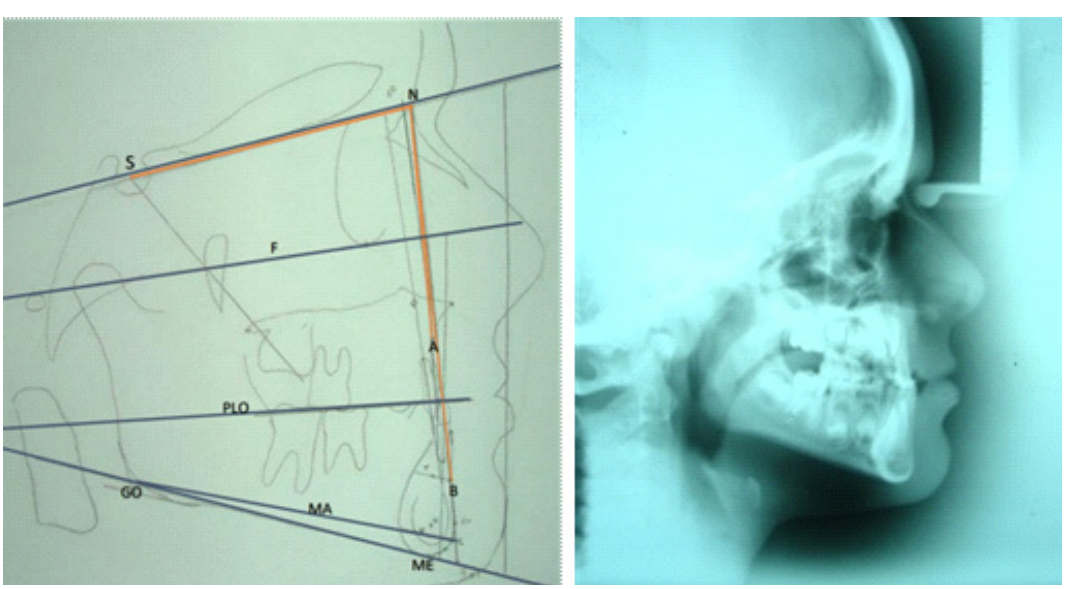

Figure 3. Cephalometry USP- SNA 79º / norm 82º), (SNB 8º / norm 80º), (ANB-1º / norm 2º), (S-N. GO-ME 32° / norm 32°) and (FMA 25º / norm 25°).

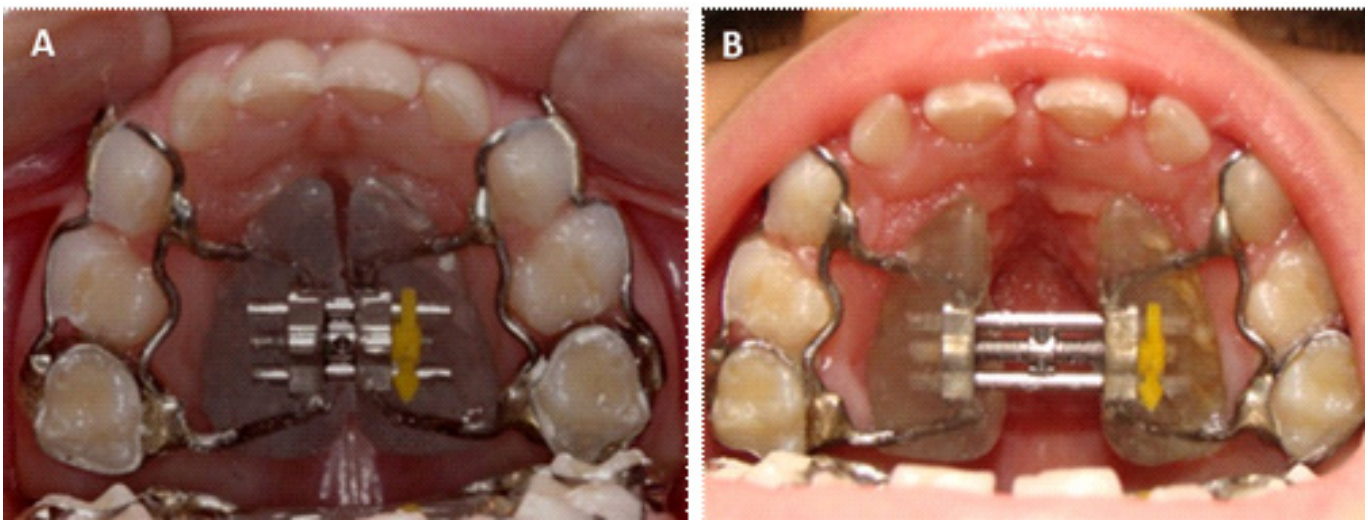

Figure 4. A- Haas instrument before activation begins. B- After the end of disjunction on the 13th day.

After the intraoral clinical examination and complementary exams, a diagnosis of skeletal complete crossbite was made.

Rapid maxillary expansion with a Haas-type expander followed using a reverse traction mask was planned. After the installation of the expander (figure 4A), the mother was instructed to activate the appliance, which was initiated with 2/4 of a turn, twice a day, for the first five days. Then, the activation was reduced to 2/4 of a turn, once a day, until the expansion was completed, which occurred on the thirteenth day (figure 4B). Immediately after the end of the expansion, the reverse traction mask was installed (figure 5), with elastics generating about 500 grams of force on each side, for 18 hours a day, during an 8-month

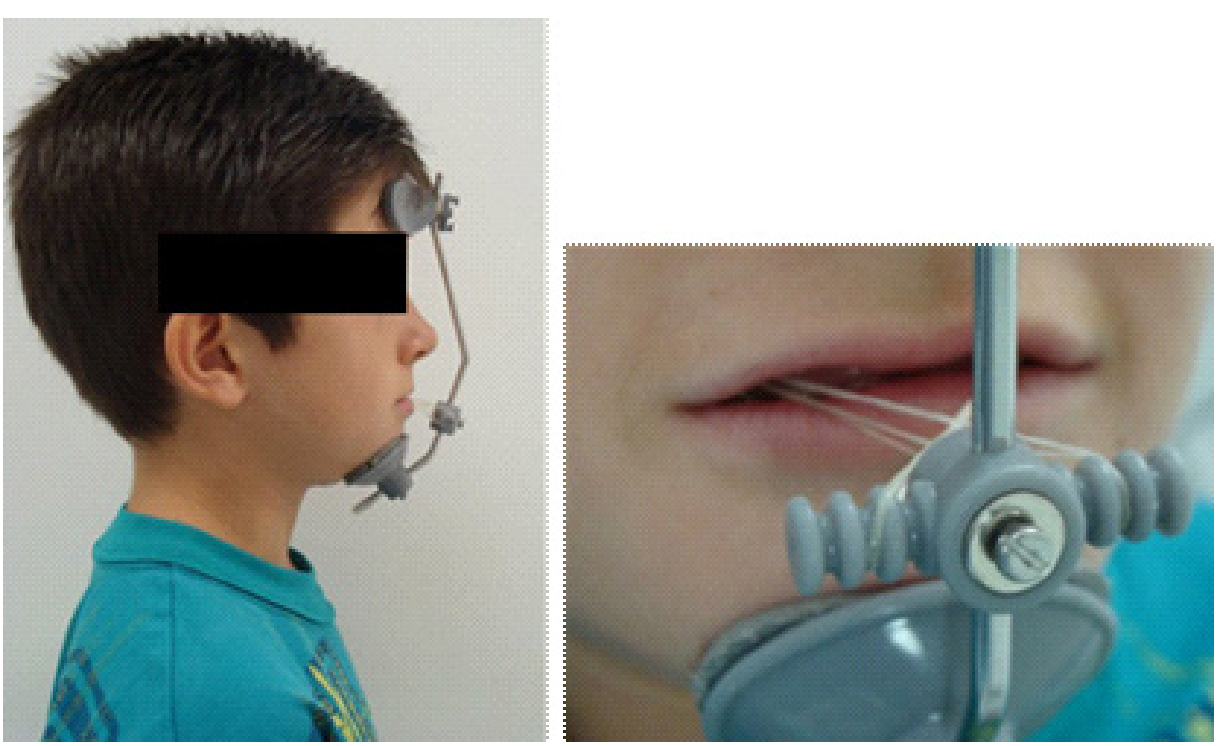

Figure 5. Reverse Traction Mask, installed after the end of maxillary disjunction.

period, at which time the treatment was completed (figure 6A). The parents were informed about the importance of regular follow-up visits to monitor craniofacial development and the possibility of future re-expansion and reverse traction of the maxilla. The parents were also advised to take the child for an evaluation with an otorhinolaryngologist. After 10 months of treatment completion, the patient returned to the dental office, where treatment stability was observed. After this last consultation, the patient did not attend the periodic visits and was only located and re-examined after 12 years when it was reported that no orthodontic or orthopedic treatment had been performed during this period. The intraoral examination showed treatment stability, although the second permanent molars were slightly crossed (figure 6B).

Figure 6. A- Images after the end of treatment. B- Twelve years after the end of treatment, evidencing the stability of the case.

Due to poor oral hygiene and a cariogenic diet, caries activity, gingivitis, and the need for restorative treatment were observed. Therefore, dental treatment with restorative and oral health promotion measures was indicated. Subsequently, the patient was advised to start corrective orthodontic treatment.

The Informed Consent Form (ICF) was duly signed. This case report was described according to the Case Report (CARE) guidelines and was approved by the Ethics Committee of Faculdade São Leopoldo Mandic (approval number 6.911.408) [14].

DISCUSSION

This case report describes a complete crossbite in a patient at the beginning of mixed dentition. After a thorough diagnosis, rapid palatal expansion with a Haas-type expander was chosen. According to the literature, this type of expander is recommended for deciduous and mixed dentition due to its acrylic resin support base that is closely opposed to the palatal mucosa, making it dentomucosal supported [15].

The activation protocol used in this case adhered to the variations found in the literature, with its effectiveness confirmed on the thirteenth day when a good transverse relationship between the arches was observed, with a slight 2 mm overcorrection occurring when the palatal cusps of the upper posterior teeth touched the buccal cusps of the lower posterior teeth [16-21].

The installation of the Petit face mask immediately after the completion of the expansion is consistent with the literature, which states that in cases of Class III malocclusion determined by maxillary retrusion, reverse maxillary traction is indicated [19]. The established protocol was successful, as the forces generated by the elastics corrected the anterior crossbite, which was confirmed by achieving a positive overjet.

The treatment of this complete crossbite can be considered a success, as orthognathic surgery was avoided [3]. Even with 12 years without the proper supervision of the patient's dentition development and craniofacial growth, the outcome of this expansion and reverse traction of the maxilla supports the findings in the literature, which emphasize that long-term follow-up has shown that good results can be achieved in about 65 to 75% of Class III cases treated during the deciduous or mixed dentition periods [4,21-24].

Considering the possible etiological factors found in the literature, it is concluded that there was no significant hereditary involvement, as facial and cephalometric analyses, combined with the data obtained from the anamnesis, indicate a craniofacial pattern within the family norm. However, the gestational history and serious health problems from an early age are strong indicators of systemic and environmental etiology [5].

Among the environmental factors related to the reported malocclusion, the literature highlights oral breathing, which can be associated with a variety of causes, including the absence of natural breastfeeding and bottle-feeding. As soon as oral breathing is detected, a multidisciplinary approach should be initiated, where the otorhinolaryngologist, speech therapist, and qualified dentist work together to treat this deviation from normality. The fact that the patient did not start multidisciplinary treatment early favored the development of complete crossbite.

CONCLUSION

Therefore, it is concluded that systemic and environmental etiological factors should be prevented and/or treated whenever possible at an early age, and when malocclusion is already established, it should be corrected as early as possible [20]. This case report confirms the importance of treating crossbites during childhood, as even without proper follow-up during growth, the need for orthognathic surgery was avoided. The etiological relationship between systemic illnesses, oral breathing, and harmful oral habits in the development of the studied malocclusion was also evident.

Conflict of interest: The authors declare that there are no conflicts of interest.

Contributors

AA Souza Junior, data curation, formal analysis, investigation, methodology, resources, supervision, writing – original draft, writing – review and editing. MIR Lavio, supervision, writing – original draft, writing – revision and editing. RAS Dilly, supervision, writing – original draft, writing – review and editing. APRC Andrade, supervision, validation, writing – review and editing. AFB Calvo, supervision, validation, writing – review and editing. T Gimenez, supervision, validation, writing – review and editing.

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