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ORTHODONTIC MANAGEMENT OF MANDIBULAR LATERAL INCISOR-CANINE TRANSPOSITION IN PEDIATRIC PATIENT: A RARE CASE

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ABSTRACT

Mandibular lateral incisor and canine (Mn.I2.C) transposition is a dental anomaly characterized by the positional exchange of these teeth. This condition can lead to aesthetic and functional complications, as well as impede the eruption of adjacent teeth. Early diagnosis is crucial, as it allows for timely intervention and improves treatment outcomes. Management options include orthodontic correction, extraction of the transposed teeth, alignment, or maintaining their position based on clinical considerations. Practitioners must

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consider factors such as the patient's age, dental arch dimensions, and potential impacts on occlusion when determining the appropriate treatment plan for affected individuals. This case report aims to enhance the existing literature by focusing on the early identification and management of transposition between Mn.I2.C teeth.

KEYWORDS: Alignment; Anomaly; Correction; Transposition; Orthodontic treatment.

MANEJO ORTODÓNTICO DE LA TRANSPOSICIÓN DE INCISIVO LATERAL Y CANINO MANDIBULAR EN PACIENTE PEDIÁTRICO: UN CASO RARO

RESUMEN

La transposición de incisivo lateral y canino mandibular (Mn.I2.C) es una anomalía dental caracterizada por el intercambio posicional de estos dientes. Esta condición puede provocar complicaciones estéticas y funcionales, así como dificultar la erupción de los dientes adyacentes. El diagnóstico temprano es fundamental, ya que permite una intervención oportuna y mejora los resultados del tratamiento. Las opciones de manejo incluyen corrección ortodóntica, extracción de los dientes transpuestos, alineación o mantenimiento de su posición según consideraciones clínicas. Los profesionales deben tener en cuenta factores como la edad del paciente, las dimensiones del arco dental y los posibles impactos en la oclusión al determinar el plan de tratamiento adecuado para los individuos afectados.

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Este informe de caso busca enriquecer la literatura existente al centrarse en la identificación temprana y el manejo de la transposición entre los dientes Mn.I2.C.

PALABRAS CLAVE: Alineación; Anomalía; Corrección; Transposición; Tratamiento ortodóntico.

Introduction

Transposition is a dental anomaly that describes the positional exchange of two adjacent teeth [1, 2]. When the positional shift of a tooth extends toward the opposite side of the dental arch, it is referred to as transmigration [3]. Its etiology is multifactorial, involving both genetic and environmental influences and factors such as genetics, ectopic tooth bud positioning, crowding, mechanical interference, cyst formation, early loss or prolonged retention of primary teeth, trauma, and local pathologies all contribute to its development [4, 5].

Transposition can be observed in both the primary and permanent dentition, though it is more common in the permanent dentition.1 It is more frequently observed in females than in males and occurs more often in the maxilla than in the mandible. It is typically unilateral rather than bilateral [1, 6].Other dental anomalies may accompany it, with hypodontia reported to have a co-occurrence rate of 37% [4]. The most frequently observed type is between maxillary canine and first

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premolar (Mx.C.P1) [7]. In the mandible, although it is less common, it most frequently occurs between the lateral incisor and the canine.1 In a study, the overall prevalence of transposition was found to be 0.33%, while the prevalence of mandibular lateral incisor and canine (Mn.I2.C) transposition was determined to be only 0.03% [6].

Transposition can be defined in two distinct ways. A true, mature or complete transposition occurs when both the crown and root positions are exchanged. In contrast, a pseudo, initial or incomplete transposition refers to a situation where the root apex remains relatively in its normal position, but the crowns have switched places. Early distal tipping is accompanied by severe mesio-lingual rotation of the crown [2, 4]. Severe displacements, such as transpositions between canine and first molar or between the canine and central incisor, are also called as ectopic eruptions [4].

Treatment options for transposition can vary depending on the condition and developmental stage of the teeth, as well as the patient's age and the timing of diagnosis. When diagnosed early, interceptive treatment through the extraction of primary teeth can help guide the transposed teeth back to their correct positions. If there is insufficient space in the dental arch, extraction of the transposed tooth or teeth may be considered. Orthodontic treatment can also be used to reposition the teeth correctly. If repositioning is not feasible, morphological adjustments to the existing teeth can be made to improve alignment

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[1, 4, 7]. Extraction of the transposed tooth followed by autotransplantation as a replacement is another treatment option, though it is relatively new and scarcely reported in the literature [1].

This case report aims to contribute to the literature by addressing the early detection and treatment of pseudo-transposition between Mn.I2.C teeth.

Case Report

This case report was written in accordance with the CARE guidelines. A nine-year-old female patient presented to our clinic with complaints of crowding in the teeth of mandible. Intraoral and radiographic examinations revealed a pseudo-transposition between the Mn.I2.C teeth, as well as the persistence of primary teeth #82 and #83. A tomography was obtained to assess the presence of any pathological formations in the area and to better evaluate tooth positions. No pathological formations were observed in the tomography, and the axial section images of the relevant area are presented in Figure 1.

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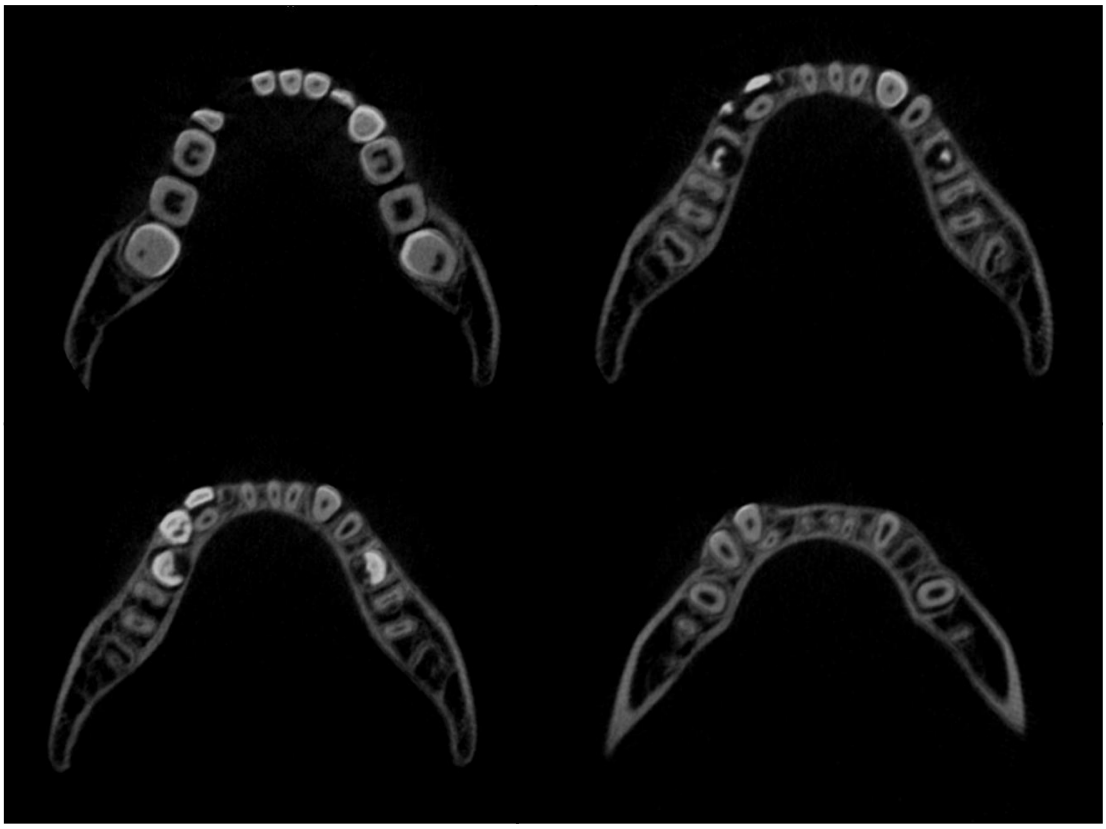

Figure 1. The axial section images in the tomography.

The patient has a Class I dental occlusion. The initial panoramic radiograph of the patient is presented in Figure 2. Initially, the treatment plan included the extraction of primary teeth #82 and #83 as interceptive, followed by monitoring the eruption of tooth #43 for a period of time and lingual arch was also placed in the mandible.

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Figure 2. Initial panoramic radiograph.

Two months after the extraction of the primary teeth, a follow-up examination revealed a decision to proceed with fixed orthodontic treatment to correct the positioning of the teeth (Figure 3a). At the start of the orthodontic treatment, tooth #42 was connected to tooth #41 with an elastic chain, and teeth #41, #31, and #32 were secured together with a wire ligature, with a 0.12 Ni-Ti wire applied (Figure 3b). In the subsequent appointment, an elastic chain was attached from tooth #42 to a button placed on the lingual surface of #41 to facilitate mesial movement of #42; a 0.14 Ni-Ti wire was used, and the archwire was not threaded through the bracket on #42. To correct the midline, the left mandibular teeth were again secured with a wire ligature, allowing teeth #41, #31, and #32 to shift leftward (Figures 3c-d). Once tooth #42 had adequately moved mesially, the button on the lingual of #41 was removed, tooth #42 was attached to the buccal bracket with an elastic chain, and a bracket was bonded to tooth #43,

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and distalization was initiated in interim sessions. A 0.16 Ni-Ti wire was used (Figures 3e-f). For easier rotation correction of tooth #42, slight interproximal reduction was performed mesial to #43 and distal to #41, allowing the archwire to be threaded through tooth #42. A 0.16 SS wire was used (Figures 3g-h). The treatment lasted for 18 months. The patient and their family expressed satisfaction with the prevention of tooth loss and the successful guidance of the teeth into their normal positions during eruption.

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Figure 3. Fixed orthodontic treatment process: (a) preoperative intraoral image; (b) the attachment of #42 to the bracket on #41 was achieved using an elastic chain; (c-d) The attachment of #42 to the lingual button on #41 was achieved using an elastic chain and the bracket was bonded to tooth #43 for distalization; (e-f) in the later stages of treatment, #42 was once again connected to the bracket on #41 using an elastic chain; (g-h) the archwire was threaded through the bracket on #42.

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The intraoral images taken at the end of treatment show that the midline has been corrected, and the positions of teeth #43 and #42 are now appropriate. Since the canine teeth have not fully erupted, the lingual retainer has not been placed on the canines (Figure 4a-b-c). The panoramic radiograph taken during the final session is presented in Figure 5.

Figure 4. The final session of treatment: (a) intraoral image taken before the removal of the brackets; (b) intraoral image taken after the removal of the brackets; (c) lingual retainer.

Figure 5. The patient's final radiograph.

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Discussion

The positional exchange between two adjacent teeth is referred to as transposition, and while its treatment can be complex and challenging, it necessitates a multidisciplinary approach [1, 2, 4, 7]. Transposed teeth can be classified as true, mature, or complete transpositions and pseudo, initial, or incomplete transpositions, based on the positions of their roots and crowns [2, 4]. Although transposition is quite rare in the mandible, the most frequently observed type occurs between the Mn.I2.C teeth [1]. It is noted that clinical findings of mandibular lateral incisors in Mn.I2.C pseudo-transposition include distal tipping, mesiolingual rotation (ranging from 60° to 120°), and coronal displacement [8]. This case report describes the treatment of the rarely seen Mn.I2.C pseudo-transposition, which was detected at an early stage.

Permanent mandibular incisors typically erupt lingual to the primary teeth; however, in their study, Hameed and colleagues noted that the mandibular lateral incisors erupted in a distal direction relative to the primary teeth, leading to Mn.I2.C transposition [5]. In our case, tooth #42 also showed a tendency to erupt distally due to the persistence of the primary tooth. This condition poses an obstacle to the eruption of adjacent teeth (#43 and #44). Additionally, pseudo-transposition between the Mn.I2.C teeth can lead to aesthetic and functional disturbances [4]. Factors such as the patient's age, the condition of the occlusion, aesthetic

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expectations, cooperation, the periodontal support of the teeth, and the duration of treatment play a significant role in determining the treatment option such as correction, alignment or extraction [2]. Taking all these factors into consideration, it was decided to correct the positioning of the teeth with the assistance of fixed orthodontic treatment in this patient.

Venere *et al.* [2], in their case report on pseudo-transposition between the Mn.I2.C teeth, performed correction using fixed orthodontic treatment because they detected the condition at an early stage, similar to our case. In their published case report on a patient with similar characteristics to our case, Singh and colleagues [9] also opted for correction of the transposed teeth's positions using fixed orthodontic treatment. Early diagnosis, the application of light forces for short durations, and close patient monitoring between treatment phases are noted as important factors in the success of fixed orthodontic treatments [10]. However, it should be noted that extraction may still be a viable option due to the crowding present in the current dental arch, and further case reports are needed to explore this approach across a variety of scenarios.

The process of correcting teeth by repositioning them to their true alignment is a complex and risky procedure that can be detrimental to the teeth and supporting structures, potentially leading to tooth loss. Given these risks, some clinicians advocate for the option of alignment to be preferred in the early stages of treatment.

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However, as demonstrated in our case, the treatment was successfully completed without loss of teeth or supporting structures. Therefore, we believe that prioritizing correction in the treatment of transpositions, especially when detected early, will result in greater aesthetic satisfaction for patients. Although there are currently no comparative studies in the literature on this topic, there is a need for more case reports and studies.

Conclusion

The management of transposition is complex and challenging, often requiring a multidisciplinary approach that involves collaboration between pediatric dentistry and orthodontics, especially in children. A thorough understanding of clinical and radiographic features, combined with knowledge of etiology and classification, facilitates prompt diagnosis and timely intervention. As demonstrated in this case report, early diagnosis and intervention can prevent the extraction of the affected tooth or teeth and assist in guiding them into their correct positions.

Declarations

Ethics and integrity statement

All the clinical examinations described in the manuscript have been carried out in compliance with the principles outlined in the Declaration of Helsinki and its subsequent revisions, or equivalent ethical guidelines.

Patient consent statement

In this case report, detailed information was provided to the patient and their

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family, and signed consent forms were obtained before the treatment.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Authors contributions

BK and MK designed and performed the study. BK analysed the data and wrote the manuscript. MK revised the manuscript critically for important intellectual content and supervised the study. All authors read and gave final approval of the manuscript.

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