

MAXILLARY TOOTH TRANSPOSITION A REVIEW OF THE LITERATURE

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ABSTRACT

Maxillary tooth transposition is characterized by positional interchange of two teeth in maxillary arch hence providing an orthodontist with a special challenge diagnostically and therapeutically. This is a relatively rare dental developmental anomaly, but when ever it occurs it compromises the esthetics and function to a significant extent. Presently we have tried to overview this important anomaly in detail. The description, classification, etiology, pathology and tips to treatment will be discussed.

Key words: Dental developmental anomaly, Maxillary tooth transposition.

Definition

Tooth transposition is an ectopic eruption in which a permanent tooth develops and erupts in the position normally occupied by another permanent tooth.¹ The term transposition is usually used to describe the interchange in position of the two adjacent teeth within the same quadrant of the dental arch.² More precisely, tooth transposition is defined as the positional interchange of two adjacent teeth, especially their roots, or the development or eruption of a tooth in a position occupied normally by a nonadjacent tooth.³

Frequency

Tooth transposition is documented to be seen in one of 300 orthodontic patients. Although transposition may occur between any two adjacent teeth, but the most frequent form of maxillary tooth transposition is between maxillary permanent canine and first premolar [Mx. C. P1] and to a lesser extent, between maxillary permanent canine and lateral incisor [Mx. C. 12].

Thus maxillary canine is the tooth most frequently involved in tooth transposition.⁴ When canine is displaced palato-facial plane it may become impacted palatally or facially. And when it is displaced mesio-distally, an ectopically erupted canine can become transposed.⁵ Transposition may also occur between nonadjacent teeth, but it is rare and bracketed as ectopic eruption.

Several researches reported the prevalence of maxillary canine impaction to be between 1-3%⁶⁻¹⁰ and maxillary canine first premolar transposition to be between 0.135-0.51 percent.¹⁻¹⁴ Tooth transposition has been reported to involve more females as compared to male.^{15,16} Transposition in primary dentition has never been reported. Maxillary teeth are more frequently transposed as compared to mandibular teeth.^{17,18} Among the maxillary teeth permanent canine is the most frequently involved tooth in transposition usually with the first premolar,^{16,17} and less often with lateral incisor.^{1-15,18} The transposition of maxillary permanent canine with central incisor,¹⁹ second premolar,²⁰ and

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even first molar²¹ have been reported. Extremely rare cases of tooth transpositions without the involvement of canine are also reported, i.e., maxillary central and lateral incisors transposition.^{22,23}

Unilateral vs Bilateral

Unilateral tooth transpositions have been reported far more frequently than bilateral and left side becomes the victim more frequently than the right side.¹⁵⁻²⁴ Only one case of asymmetric transposition in both arches was found in the literature, involving maxillary canine and the first premolar on the right side and of the mandibular canine and the lateral incisor on the left side.²⁵

Complete vs Incomplete

A complete transposition is one in which both the crown and the entire root of the involved teeth exchange places in the arch and are fully parallel. In incomplete transposition (also called "pseudo" or "partial-transposition") the crowns may be transposed while the root apices remain in the normal position.²⁶ Alternatively, the crowns may be in correct order while the root apices are transposed, thus the two involved teeth overlap and their long axes cross each other.

Etiology

Consensus is not made on the cause of tooth transposition. Several schools of thoughts have been presented over these years. Genetic involvement,^{13,14,27-31}

an interchange in the position of the developing dental lamina of the involved teeth,^{32,36} trauma to the milk tooth leading to dilacerations of the successor tooth,^{6,7} lack of resorption of the root of the primary tooth, and mechanical interference to the erupting canine due to retained primary tooth.^{15,24,37}

Accompanying dental anomalies

Tooth transposition is often accompanied by several congenital dental disturbances such as peg-shaped lateral incisors, hypodontia, ankylosed milk teeth, severely rotated teeth, and dilacerated teeth.^{1,18} Shapira et al reported 18.5% of the individuals with transposition to have one or more missing teeth, excluding third molars. Lateral incisor was the most frequently missing tooth (14%). This was followed by the maxillary (6%) and the mandibular (3%) second premolar. Small sized

lateral incisors were detected in 9% of the cases with transpositions. 32% individuals had retained milk teeth, 45% had severely rotated maxillary canines and 14% had impacted third molars.⁵

Classification

Peck S. and Peck L. classified maxillary tooth transposition in a classic article published in May 1995 in American journal of orthodontics and dentofacial orthopedics. On the basis of anatomic factors, five types of maxillary tooth transpositions were firmly identified among 201 people in their study. The classification is stated below according to the teeth involved.^{3,38, 41}

- 1 Canine-First premolar [Mx. C. P1]
- 2 Canine-Lateral incisor [Mx. C. 12]
- 3 Canine to First molar site [Mx. C to M1]
- 4 Lateral incisor-Central incisor [Mx. 12. I1]
- 5 Canine to Central incisor site [Mx. C to I1]

Treatment

Treatment options include alignment of the transposed teeth in their transposed state, extraction of one of them or complete correction of the transposition. The ideal approach will be to completely correct the transposition of the teeth but most of the times it may not be possible, although in the recent literature several case reports have shown success with this approach.⁴² Several factors must be considered when transpositions are being corrected such as positions of root apices, facial esthetics, malocclusion, age of the patient, motivation and expectations of the patient. Risk to the teeth and adjacent tissues and treatment time must be discussed with the patient prior to correction. Alignment in the transposed position will involve reshaping the crown morphology and periodontal gingival recontouring procedure.

CONCLUSION

Whenever an orthodontist encounters a case of tooth transposition he or she is challenged to carefully consider the heroic approach and unusual treatment plans. The current review of the tooth transposition in maxilla will help us clarify scientific understanding of these rare and severe positional variations. Better understanding of this developmental anomaly will

improve our clinical management of these orthodontic patients.

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