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Transposition of teeth: A review of literature

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Abstract

Introduction: Tooth transposition is a rare developmental anomaly characterized by positional interchange of two teeth within the same quadrant. Its incidence compromises the esthetics and function to a significant degree. The current literature review is offered to highlight certain aspects of this anomaly to develop an understanding that might be helpful in management for restoration of esthetics and function of affected patients.

Material and Methods: Several electronic databases were searched and hand searching was also done to recognize the consequent articles. A total of 46 studies were initially retrieved out of which 35 relevant studies were selected for the review.

Results: Tooth transposition is a rare anomaly of permanent dentition and is not reported in primary dentition. Maxillary transpositions are more frequent and transpositions rarely occur in mandible. Maxillary canine is the most frequent tooth found to be transposed. Treatment depends on the location of affected teeth and age of the patient.

Conclusions: Tooth transposition is a rare developmental dental anomaly that affects esthetics and function. A high-quality perceptive of this entity might be helpful to develop meaningful clinical management of the affected patient.

Keywords: Tooth transposition, dental developmental anomaly, ectopic eruption

Introduction

Transposition was first described by Harris[1] in 1849, as an aberration in the position of teeth. Characteristically, tooth transposition is defined as the positional interchange of two adjacent teeth, especially their roots, or the eruption of a tooth in a position occupied normally by a nonadjacent tooth.[2] It is considered to be an uncommon developmental dental anomaly of unknown origin in which the involved tooth develops and erupts in an interchanged position within the same quadrant.[3]

Material and Methods

The method for this review was based on the guidelines published in the Pakistan Orthodontic Journal and a literature review was done. Internationally published research literature, review articles and relevant citations were included. After the electronic literature search, a hand search of key orthodontic journals was undertaken to identify recent articles. The review was restricted to articles dealing with transposition of teeth. Exclusion criteria included articles that did not follow the objective of this review and articles in a language other than English.

Results

A wide search of published articles (The Angle Orthodontist, American Journal of Orthodontics and Dentofacial Orthopedics, British Dental Journal, European Journal of Orthodontics) was done using both the electronic database and hand searching. A total of 46 studies were retrieved initially. 35 studies having close relevance to the current study objective were used to express the review of literature for transposition of teeth.

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Discussion

Prevalence: The literature shows that any tooth can show transposition. It occasionally happens that a central incisor is situated between the lateral incisor and the canine of the same side, right central incisor may be situated in the place of the left and the left in the place of the right incisor. It might also be that a lateral incisor is situated between the canine and first premolar and sometimes canine erupts between the first and second premolar.[4,5] Statistically, the maxillary permanent canine is the most frequently involved tooth in transposition (0.135-0.51%) and shows the highest incidence of transposition with the first premolar.[6] Although less frequent, but canine transposition has also been documented with lateral incisor, central incisor and rarely with the second premolar or first molar.[7,8,9]

Tooth transposition in mandibular arch is extremely rare (0.003%). The most common teeth involved are canines and lateral incisors.[10,11] A few cases of mandibular second premolar and first molar have also been reported in literature.[11-13]

Transposition of teeth is reported to be seen in permanent dentition only and is equally distributed between both males and females in terms of occurrence.[14] Certain investigators however found out that females are more affected than males.[15] So far no case has been documented where tooth transposition occurred simultaneously in both jaws. Also tooth transposition has not been reported to occur in primary dentition.[16]

Variety of Transposition: Transposition may be complete or incomplete.[17] It may be unilateral or bilateral.[18] In complete transposition, both the crown and entire root of involved teeth interchange their places while in incomplete type, only the crowns are interchanged and the root apices remain in their normal position.[17] Unilateral transposition occurs more frequently than bilateral (12:1 ratio) and the left side is reported to be more frequently involved than the right side (2:1 ratio).[19]

Etiology: The satisfactory cause of tooth transposition is still to be established. A few acceptable causes that have been documented are hereditary, an interchange of dental lamina of involved teeth, retained deciduous teeth, dilacerations of the successor tooth due to trauma to their predecessor tooth, physical obstruction in the path of eruption and bone pathology such as cyst formation.[20-23]

Associated Anomalies: Transposition of teeth is frequently accompanied by several dental disturbances. The most common among these are dilacerations, hypodontia, missing (small or peg-shaped) lateral incisors, ankylosed and rotated teeth.[24] Certain authors have also reported missing teeth associated with tooth transpositions. The most frequent among these was maxillary lateral incisor (14%). The second most common was maxillary and mandibular second premolar (6% and 3% respectively). Peg shaped lateral incisors were detected in 9% of the reported cases. Retained teeth were found in 32%, rotations were documented in 45% and impacted third molars were reported in 14% of the individuals who exhibited transposition of teeth.[25-28]

Diagnosis: Early diagnosis of developing transpositions can be done by thorough intraoral examination and required supportive radiographs.[29] Shapira[4] advocated diagnostic radiographs preferably at age of six to eight years.

Treatment modalities: Treatment of transposed teeth is often challenging as the success of treatment depends on a number of factors. Among these the most considered are age of the patient, motivation of the patient, facial esthetics, type of malocclusion and position of root

apices.[30] Risk factors to the adjacent teeth and their supporting structures should always be discussed with the patient before commencing the treatment.[31] Various reported modalities range from correction of transposed teeth to their actual position by orthodontic means to alignment of the teeth in transposed position. In such cases, alignment of teeth is followed by reshaping of crown morphology along with periodontal treatment to restore esthetics. In case of detected developing transposition at early age, extraction of retained teeth has also been advocated by certain orthodontists.[30,32-34]

Nestle[35] also gave an unusual treatment modality involving transplantation of a transposed premolar for a congenitally missing maxillary lateral incisor in order to avoid fixed prosthesis in anterior region.

Conclusion

Tooth transposition is one of the rare developmental dental anomalies that effect esthetics and function. It renders a great challenge towards a noteworthy treatment approach to restore esthetics and function. A high-quality perceptive of this entity might be helpful to develop meaningful clinical management of the affected patients.

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