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Rare Case of Bilateral Transposition: A Case Report

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ABSTRACT

Maxillary canine-1st premolar transposition is a developmental disturbance of tooth sequence characterized by interchange of positions of maxillary canine and 1st premolar. Early diagnosis and interception of transposition can simplify the orthodontic treatment. This is a case report of the management of a developing maxillary canine and 1st premolar transposition by non-extraction therapy. Natural tooth sequence was attained and symmetric and functional Class I molar relation was achieved.

Keywords: Transposition, Bilateral Canine transposition, Maxillary canine-premolar transposition, Ectopic eruption.

INTRODUCTION

Tooth transposition is defined as the interchange of position of two adjacent teeth – particularly of the roots. "Ectopic Eruption" is the development and/or eruption of a tooth occurs in a position normally occupied by a non-adjacent tooth.[1] Ectopic eruption of varying degrees have been labelled as pseudo transpositions by some authors. Ectopic eruption is a broad category referring to any abnormal or aberrant eruptive path taken by a tooth.[1] Tooth transpositions, therefore, must be properly considered as a subdivision of ectopic eruption. All transpositions can be considered as examples of ectopic eruption. However, few ectopic eruptions are transpositions.[2] Tooth transpositions can be complete or incomplete. A complete transposition is when the positions of the crown and root of two adjoining teeth get interchanged in the dental arch. An incomplete transposition is where the crowns are transposed but the roots retain in their normal positions.[3]

Tooth transposition is usually associated with other dental anomalies, such as hypodontia, peg-shaped teeth, severe rotations, retention of deciduous teeth, dilacerations, and malformations of other teeth.[4] Canine transposition can affect either of the dental arches of both males and females. However, the incidence among females has been more frequently reported.[2] This anomaly has been more frequently reported in the Maxilla. Unilateral canine transposition has been reported to occur more frequently (79%). The left side is more commonly affected (69%) Bilateral transposition has been reported in 5% of the cases.[5]

Peck and Peck reviewed a large number of case reports of tooth transpositions in the maxillary arch. They proposed a classification based on anatomical factors among 201 individuals in a study sample. The five maxillary transposition types were

named and abbreviated according to the teeth involved:

- Canine- first premolar (Mx. C. P1)- 71%
- Canine-lateral incisor (Mx. C. I2)- 20%
- Canine to first molar site (Mx. C to M1)- 4%
- Lateral incisor- central incisor (Mx.I2. I1)- 3%
- Canine to central incisor site (Mx. C to I1)- 2%

S. and L. Peck reported that transpositions have a genetic origin, although a variety of local factors can contribute to their development. Other possible causes of transposition include:

- The interchange of positions of the developing tooth buds at an early stage of dental development.[2, 8, 11]
- An over-retained deciduous canine could be the primary cause of the displacement and migration of the erupting permanent canine from its normal path of eruption.[2, 9, 11]
- Bone pathology, such as cyst formation, may also cause displacement and transposition of the tooth.[2, 9, 11]
- Dentofacial trauma in the deciduous dentition and subsequent permanent tooth drift.[9, 10, 11]

Transposition is a rare developmental dental anomaly. The maxillary permanent canine is the tooth most frequently involved. Early diagnosis of a developing transposition is extremely important and has a great influence on prognosis of Orthodontic treatment. A transposition is usually first detected clinically. A conventional orthopantomogram can be useful if the patient is between 6 and 8 years of age. When the transposition is detected early, the complete development and expression of this anomaly can be prevented by interceptive procedures. The modalities of treatment could include extraction of deciduous teeth and guiding the eruption of the permanent teeth. When transposition is complete, the treatment to completely reposition the involved teeth is complicated. It may cause damage to the supporting tissues. Thus, alignment of these teeth in their transposed positions is usually preferred. Extraction of a permanent tooth, usually the premolar, is required when teeth affected by transposition present caries or poor periodontal support or when there is a severe tooth-size discrepancy.[2]

CASE REPORT

A female patient aged 13 years reported to the Department of Orthodontics and Dentofacial Orthopaedics at the Haldia Institute of Dental Sciences, Haldia. Her chief complaint was irregularity of the teeth in upper and lower jaws.

Extraoral examination [Figure 1] revealed mesocephalic head, mesoprosopic facial form, no facial asymmetry, the facial profile was straight. Facial proportions were within normal range. The intraoral examination showed the presence of all permanent teeth except third molars in all the quadrants. A retained maxillary left deciduous canine was present. Further examination revealed an Angle's Class I molar relationship on both sides, overjet of 1.5 mm) and overbite of 3 mm (Figure 1). The maxillary right and left canines erupted buccally between premolars.

Panoramic radiographic examination revealed the maxillary canines were erupting between the two maxillary premolars on both the right and left sides. There were complete transpositions of maxillary canine with maxillary first premolar bilaterally. The roots of maxillary first and second premolars were diverging apically. Cephalometric analysis shows skeletal class III base with average growth pattern.

Treatment Objectives: Because facial appearance was satisfactory, correction of crowding while maintaining a pleasing profile was the treatment goal. The treatment objectives were: (1) Maintenance of class I molar relationship (2) Maintenance of ideal overbite and overjet (3) Aligning the transposed maxillary

canines and first premolars. (4) Maintenance of facial balance.

Figure 1: Pre- Treatment Extra and Intra- oral photographs

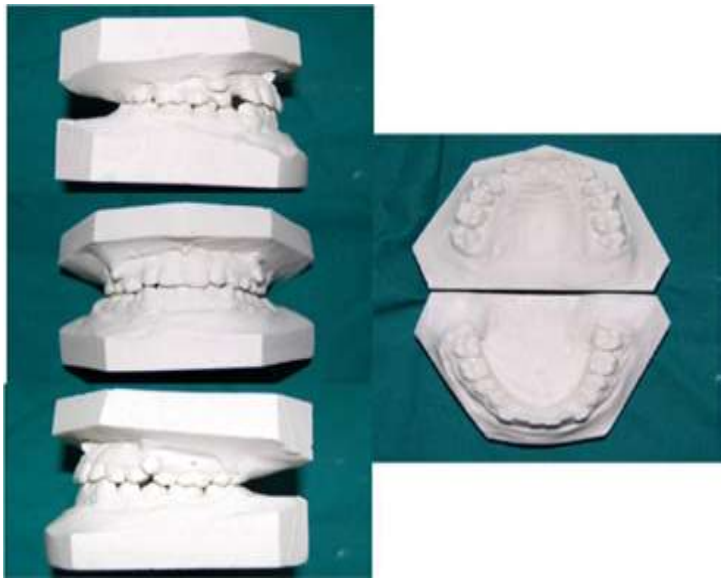

Figure 2: Pre- Treatment Dental Models

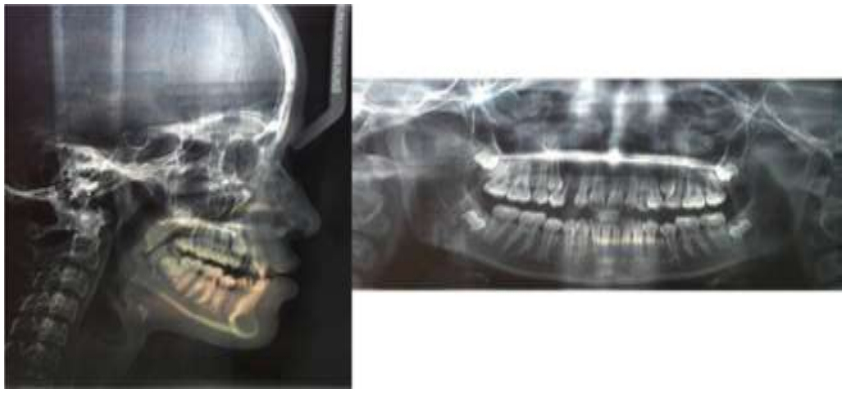

Figure 3: Pre- Treatment Radiographs

Treatment Options

1. Correcting the order of transposed teeth
2. Maintaining the order of transposed teeth.
3. Extraction of one transposed teeth

Treatment Plan

An attempt to correct transposed teeth in the permanent dentition was not attempted due to the potential risk of damaging the teeth or supporting structures. Therefore, alignment of the involved teeth in their transposed position was done. The treatment plan was to maintaining the order of transposition. The retained left deciduous canine was extracted in the initial stage of treatment. A 0.22″slot (MBT – 0.022 × 0.028) Pre-adjusted edgewise prescription was used.

Figure 4: Post Treatment Extra and Intra- Oral Photographs

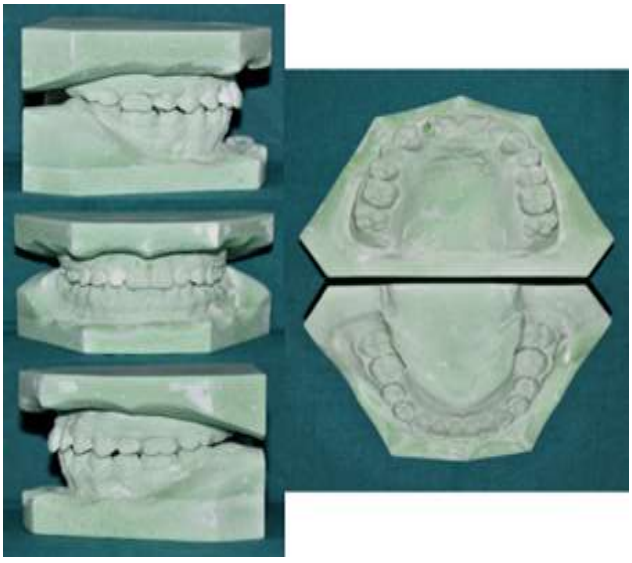

Figure 5: Post Treatment Dental Models

Treatment Mechanics

The orthodontic treatment was initiated by banding maxillary first permanent molars in all quadrants and bonding of brackets in upper and lower arches except maxillary canines. Canine bracket was bonded onto the first premolar crown to achieve canine

prominence. Alignment was carried upto 0.017″×0.025 niti arch wire progressively. Once the initial alignment was completed, 0.017× 0025 stainless steel arch wires were placed both in the upper and the lower arch. Open coil springs were placed between first and second premolars to gain space for the buccally transposed canine. The maxillary canines were bonded and aligned ~~to~~ within the arch. In final phase of treatment, 0.19×0.025″ stainless steel arch wire was used. Panoramic radiograph was taken to check for the root parallelism.

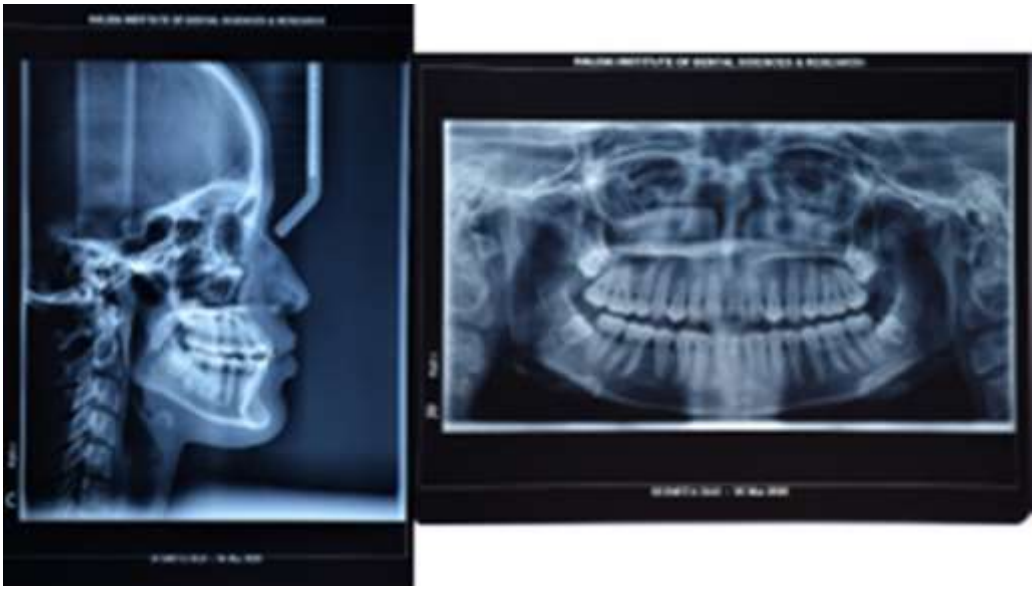

Figure 6: Post Treatment Radiographs

Treatment result

The maxillary canines and first premolars were successfully aligned maintaining the order of transposition. Angle's class I molar relationship with ideal overbite and overjet was maintained. Maximum intercuspation was obtained.

DISCUSSION

According to Peck and Peck, the best time for the intervention of transposition is when the maxillary canine is undescended with its cusp tip positioned superiorly relative to the root of the first premolar. It was decided not to intervene and correct the transposition in this patient as the maxillary canines had already erupted buccally.[6]

The treatment alternatives were to correct the bilateral transposition with or without the extraction of premolars. The correction of transposition was possible by extraction of four first premolars. This treatment plan was also faster and simpler in terms of mechanics. But this treatment plan was not indicated in this patient as the profile of the patient was straight. The other treatment options were either to correct the transposition or aligning the teeth in a transposed order. The attempt to correct transposition of teeth would require prolonged orthodontic treatment and patient compliance. It could cause damage to the surrounding tissue and resorption of the roots due to root interference.[2,12] Treatment plan with retaining the teeth in transposed order was thought to be a practical approach as it would require less treatment time. Esthetics and function would not have compromised much with a transposed finish as the two teeth had resemblance, and the lingual cusp of the first premolar could be reduced in the event of functional interference. It was decided not to correct the transposition and aligning the teeth in transposed position after considering the case difficulty, timing, risks, esthetics, function, stability, biological cost or

damage. The disadvantages of maintaining the transposed positions include occlusal interference during mandibular lateral movements. The anterior esthetics may be compromised as the gingival margin of the first premolar is relatively lower than canine. This may require reduction of the palatal cusps of transposed first premolar and gingival recontouring. The patient was informed about the possibilities in order to maintain the teeth in transposed position. The patient refused to undergo any gingival recontouring procedure and satisfied with the alignment of maxillary anterior teeth.

CONCLUSION

Early diagnosis of any transposition can help in correction with favourable prognosis and less chance of injuries to the periodontal tissues. The mechanics to correct transposition are complex, treatment time is long, and dental tissues can be damaged. The patient's compliance, esthetics, function, caries risk, and age should all be considered when deciding whether treatment of a transposition should involve tooth extractions, tooth alignment in the transposed order, or orthodontic correction of the transposition.

Declaration by Authors

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