

## Transposition of lateral incisor and canine in two sisters- a case report and literature review.

**Dr. Urvashi Tank**

(III-year PG Student, Department of Pediatric and Preventive Dentistry)

**Dr Tanvi Saraf**

(Associate Professor, Department of Pediatric and Preventive Dentistry)

**Dr. Ashwin Jawdekar**

(Professor and Head, Department of Pediatric and Preventive Dentistry)

### ABSTRACT-

Transpositions are rare anomalies where there is an exchange of positions between two adjacent teeth. Treatment, ideally involves alignment of teeth, consideration for aesthetic, social and functional purposes. This article/ case report describes transposition in two sisters of age 11 and 14 year and discusses the treatment possibilities for aesthetic and functional needs. The treatment considerations encompass comprehensive caries management: restorative and endodontic treatments including a gutta percha obturation of a pulpally involved primary molar for delaying the resorption, preventive care and regular follow-ups until definitive treatment.

**Keywords-** Dental transposition, canine, lateral incisor, missing teeth, familial, interceptive orthodontics, endodontics.

### INTRODUCTION

There are several factors which could be the responsible for development of anomalies in developing dentition. These factors are broadly divided into genetic factors and environmental factors. Genetic factors correlating with mutations, inheritance or metabolic. Environmental factors correlating with physical changes, chemical changes of biological factors.<sup>1</sup> Generally, the cause of these anomalies could be a combination of several factors.<sup>1</sup> Developmental anomalies may be associated with various syndromes.

Dental eruption has been defined as “The movement of a tooth from its original position of development to a functional position within the oral cavity .” (Massler and Schour,1941). Tooth transposition is defined as “A type of eruption anomaly where there is either an exchange of position between two adjacent teeth, or the development and eruption of a tooth in a position normally occupied by another non-adjacent tooth.”<sup>2</sup> In 1849, Harris first described the term transposition.<sup>2</sup>

### CLASSIFICATION

Peck S. and Peck L. classified maxillary tooth transposition.

The classification is stated below according to the teeth involved.<sup>3</sup>

A)

| <u>Teeth transposed</u>    | <u>Code used</u> |
|----------------------------|------------------|
| Canine-First premolar      | Mx. C. P1        |
| Canine-Lateral incisor     | Mx. C. 12        |
| Canine to First molar site | Mx. C to M1      |

|                                 |             |
|---------------------------------|-------------|
| Lateral Incisor-Central incisor | Mx. 12. I1  |
| Canine to Central incisor site  | Mx. C to I1 |

B) Unilateral transposition and Bilateral transposition.<sup>4</sup>

### **PREVALENCE**

Transposition affects both genders, although more frequently seen in females.<sup>5</sup>

Prevalence of transposition in India is reported to be 0.43% with prevalence being significantly higher in syndrome associated cases. Prevalence of transposition in patients with Down's syndrome is 14.29% and in cleft palate patients is 4.1% reportedly<sup>6</sup>

### **AETIOLOGY**

The aetiology of transposition seems to be multifactorial one of the possible causes could be exchange in position of developing tooth buds. Genetic and heredity factor can also play a role.<sup>7-13</sup>

Etiological factors include

- 1) History of trauma during early stage of life. Transpositions seen with root ankylosis might have aetiology as trauma, transposition seen with rotations also suggest traumatic aetiology.
- 2) Pathologic conditions, e. g. tumour
- 3) One of the possible causes could be heredity as the position of tooth in the arch could be a result of altered DNA code or it could be also due to aberrant gene function.
- 4) One of the most probable causes is during the process of odontogenesis there could be exchange of tooth germs or exchange of dental buds seen during earlier stages of life.
- 5) Prolonged presence of primary tooth or delayed resorption of primary predecessor may cause interferences with the dental crypt of its permanent successor to take its proper position.
- 6) Early loss of permanent maxillary first molar triggers the distal displacement of canine.

Transpositions are generally associated with other dental anomalies like hypodontia, severely rotated teeth, peg shaped laterals, ankylosed teeth, dilacerated teeth. Shapira et al (1983) has stated that there are one or more missing teeth associated with transposition, and have found this in 18.5% of individuals. Most frequently missing tooth was lateral incisor found in 14% of individuals, followed by maxillary and mandibular premolars found in 6% and 3% of individuals. Thirty two percent of the cases had retained primary teeth and 14% of the cases had missing third molar.<sup>2,13</sup>

This article reviews transposition of teeth maxillary arch with missing premolars in 2 sisters, management of dental caries, and identification of aesthetic and functional needs.

### **CASE REPORT 1**

A 14-year-old girl in her late mixed dentition period (with dental age 11-12 years) reported for routine dental examination.

Based on her medical history, she was in good overall health. There was no history of past dental visits. On intraoral examination, in the maxillary arch, lateral incisor-canine transposition was seen, bilaterally. The lateral incisors on both sides were distal to the neighbouring canines and both were well situated in the arch line. The canines had not completely erupted to the level of occlusion. No

history of trauma was reported by the parent. The patient was examined and was advised an OPG for further diagnosis and planning.

Panoramic radiograph revealed congenital absence of second premolar on both sides in the mandibular arch also third molar buds were not seen in the maxillary as well as mandibular arch.

Table 1: Summary of caries-management along with preventive measures

| Treatment needed   | Preventive measures   |
|--|---|
| Preventive phase<br>Oral prophylaxis<br>Pit and fissure sealants-<br>16,26,36. | <b>Home care measures</b> <ul style="list-style-type: none"> <li>• Increase intake of fruits and vegetables</li> <li>• Avoid intake of sweet and sugary foods.</li> <li>• Brush twice daily with fluoridated toothpaste.</li> </ul> |
| Endodontic management<br>RCT c 85  | <b>Office care measures</b><br>Biannual application of fluoride<br>Application of fluoride varnish  |

All the preventive treatments were carried out before beginning with the endodontic treatment of carious mandibular right molar (85) involving pulp. After the administration of local anaesthesia, (2% lignocaine with 1:200000 adrenaline), access cavity was prepared and the pulpal tissue was removed from the pulp chamber. The pulp appeared inflamed and hyperaemic. Cleaning and shaping of the canals was performed using hand instruments and chemicals (EDTA, irrigants: sodium hypochlorite and normal saline). Calcium hydroxide dressing was placed in all the canals and the access cavity was sealed with ZOE. Teeth were then obturated in the second visit using gutta-percha and ZOE sealer with the lateral condensation technique. Radiographs were obtained during the procedure and immediately after the obturation. After sealing the access cavity with RMGIC, a stainless steel crown was adapted and cemented on 85 and later on 75 after restoration with RM-GIC due to the presence of proximal caries.

The patient is advised a regular follow-up.



Image 1: Pre-operative photograph

Image 2: Preoperative photograph



Image 3: Pre-operative photograph

Image 4: Pre-operative  
Orthopantogram

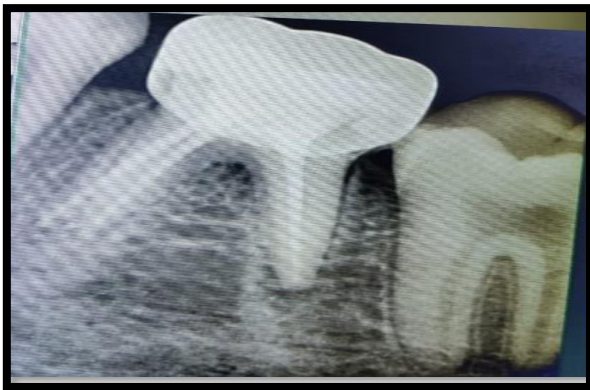


Image 5: Post-operative IOPA of  
right primary mandibular molar  
with missing successor showing  
gutta percha obturation and SSC.



Image 6: Post-operative photograph with stainless steel crown cemented on 75 and 85.

## CASE REPORT 2

A 11-year-old girl in her late mixed dentition period (with dental age 9-10 years) reported for routine dental examination.

Based on her medical history, she was in overall good health. There was no history of past dental visits. On intra oral examination, in the maxillary arch, lateral incisor- canine transposition was seen, bilaterally. The lateral incisors on both sides were distal to the neighbouring canines and both were well situated in the arch line. The canines had completely erupted to the level of occlusion. Mandibular anterior exhibited crowding. No history of trauma was reported by the parent. The patient was examined and was advised an OPG for further diagnosis and planning.

Transposition associated with congenitally missing teeth was seen, Panoramic radiograph revealed congenital absence of second premolar on both sides in the mandibular arch also third molar buds were not seen in the maxillary as well as mandibular arch. Over retained 54,55,65,74 and 84 were seen. no history of trauma was reported by the parent.

Table 2: summarizes the treatment need along with preventive measures

| Treatment needed   | Preventive measures   |
|--|---|
| Preventive regimen                                       | <b>Home care measures</b> <ul style="list-style-type: none"> <li>• Increase intake of fruits and vegetables</li> <li>• Avoid intake of sweet and sugary foods.</li> <li>• Brush twice daily with fluoridated toothpaste.</li> </ul> |
| Oral prophylaxis<br>Pit and fissure sealants-16,26,36,46 |   |
| Conservative management<br>85- GIC                       | <b>Office care measures</b><br>Biannual application of fluoride<br>Application of fluoride varnish  |
| 54,55,65,74- Extraction                                  |   |



Image 1: Preoperative photograph

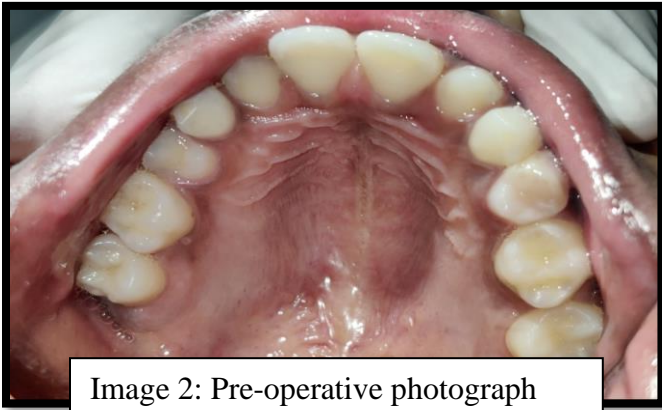


Image 2: Pre-operative photograph

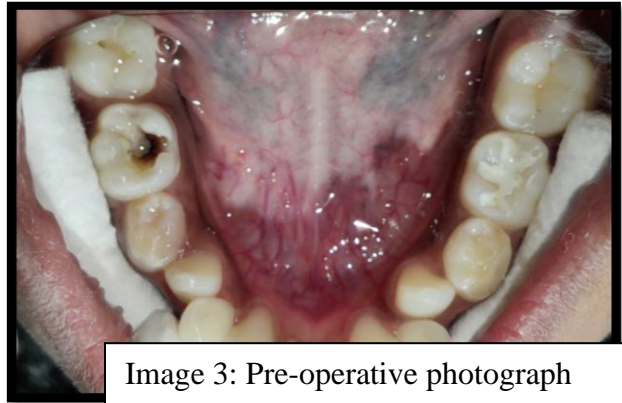


Image 3: Pre-operative photograph



Image 4: pre-operative  
Orthopantomogram



Image 5: Resin modified  
Glass ionomer cement  
restoration with 85.

Treatment as outlined above, was completed and further follow-up is recommended.

A discussion was held with both the parents of the sisters regarding the necessity of the management of transposition and missing teeth. They were presented with different treatment options starting with immediate interceptive care to deferring any treatments until definitive care (including orthodontic, implant and prosthodontic) at a later stage. The parents have decided to defer the treatment, currently.

## DISCUSSION

The aetiology of transposition could be considered multifactorial with both genetic and environmental contributions. Genes play an important role in patterning the dentition.<sup>15</sup> Genetic influences could alter the order of developing tooth follicles. Although, homeobox genes control transcription factors. Such genes could cause tooth agenesis rather than transposition. Maxillary canine are the most commonly transposed teeth because of their corner location between the developing incisor and premolar fields. This region is known for high thresholds of gene activity.<sup>15</sup> Furthermore, maxillary canine tooth has a long path of eruption, and is most likely to be deflected during its descent.<sup>15</sup>

Maxillary canine transposition occurred bilaterally in one quarter of the populations favouring female expression, these findings correlated with the findings in this case. Familial occurrence was noted in 15 percent of the cases, the traits being expressed in one or more members.<sup>2,3,10</sup> The most common congenitally missing permanent teeth are third molars followed by second premolars and then followed by lateral incisors.<sup>16,17</sup> In the present report, both the sisters showed bilateral transposition of lateral incisors and canines in the maxillary arch; second molars in mandibular arch were found missing in the older sibling and all second molars were found missing in younger sibling which is a rarity and both mandibular second premolars were found missing in both the cases.

Based on the literature available, preservation of the relevant primary molars must be attempted in case of the congenital absence of their permanent successors.<sup>14,18</sup> It has been advocated in the literature to use pure ZOE pastes as the material of choice for root filling of primary teeth in order to allow physiologic root resorption.<sup>14,18</sup> However, with missing successor, it is critically important to enable the preservation of the primary molar for a longer period of time. In such conditions, a material capable of achieving good seal and not undergoing resorption is needed.<sup>19</sup> Therefore, gutta percha obturation of 85 was done in order to overcome the concerns such as the resorption of the root and problems following extraction of primary tooth. It is believed that such a permanent treatment will reduce the remaining potential of resorption.<sup>20</sup>

One of major purposes of this is to maintain the space until the patient could receive more advanced treatments such as implants and prosthesis.<sup>18</sup> The physiologic resorption of the deciduous molars without the second premolars occurs at an average age of 22 years, 10 years later than normal exfoliation time. Thus, an implant replacement can be done about the same time.<sup>20</sup>

Newly developed materials in endodontics like Mineral Trioxide Aggregate (MTA) or a more recently developed materials like Calcium Enriched Mixture (CEM) or tricalcium silicate cement can also be used during the obturation to provide resistance against resorption in the preservation of pulpectomized primary molars without permanent successors.<sup>14</sup>

Early detection of the transposed teeth is important for making a long-term treatment plan. Evaluation with the help of radiographic examination is usually adequate. The most critical factors which need to be considered during the treatment plan are: risk to adjacent tissues, age of patient, position of root apices, patient motivation, aesthetics, malocclusion and time needed for treatment.<sup>21,14</sup>

Various treatment options can be considered depending on the stage in which the transposition is detected. If the transposition is detected early, interceptive procedures are planned. Here the main aim is preventing the complete development of transposition with the help of extraction of deciduous teeth and placing eruption guides for permanent teeth. If transposition is detected at later stages, orthodontic treatment should be planned.<sup>21,22,23</sup> As per the need, reshaping the crown morphology and periodontal gingival recontouring procedures may also be necessary.<sup>24</sup>

**Treatment options can be summarized as below:**

- Alignment of the transposed position followed by reshaping of crowns and recontouring of gingivae
- Extractions of transposed teeth and replacement
- Orthodontic movement of transposed teeth into normal arch positions.

Although treatment options were discussed with the parents for both the sisters, no treatment for transposed teeth was carried out as the parents wanted to consider the same later. Therefore, regarding the missing teeth, too, treatment options like replacement with a prosthesis or implants would be considered later. Thus, only management of dental caries was completed and appropriate preventive care was recommended.

**CONCLUSION**

This article reports a rare case of familial (2 sisters) bilateral maxillary transposition associated with missing mandibular premolars. Caries management included endodontic treatment of primary second molar with gutta percha obturation owing to the congenital absence of permanent successor in one child. Possible treatment options for the transposition of teeth have been suggested to parents such as immediate interceptive treatment or definitive treatment after completion of secondary dentition. Regular follow-up and appropriate preventive care has been advocated.

**INFORMED CONSENT:** Publication consent is given by parents.

**CONFLICT OF INTEREST:** None

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