Mandibular Lateral Incisor-Canine Transposition: A Case Report

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Abstract: **Tooth transposition is a rare dental anomaly which is characterized by an interchange in the position of two adjacent permanent teeth on the same side of the dental arch. Tooth transpositions occur less often in the mandibular arch than in the maxilla and with less variety. Early diagnosis and detection of a developing transposition is based on both clinical and radiographic examination. When detected early, interceptive treatment may resolve the developing problem. This paper discusses a patient who presented with a mandibular permanent lateral incisor-canine transposition.**

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Clinical Relevance: **Failure to recognize a developing dental transposition may delay referral to a suitable specialist.**

Transposition is a moderately rare dental anomaly which is characterized by an interchange in the position of two adjacent permanent teeth on the same side of the dental arch.[1] The permanent maxillary canine is the tooth most commonly involved in transposition. This most often occurs with the first premolar and less commonly with the lateral incisor. Authors disagree on whether there is a greater female preponderance for this condition.[1,2] A prevalence of 0.03% has been quoted.[3] This illustrates the rarity of tooth transpositions. Based on published surveys, transpositions involving mandibular teeth account for 15–30% of all tooth transpositions. Two types of mandibular transpositions have been described:

- Mandibular lateral incisor-canine transposition; and
- Mandibular canine transmigration – this is where the transposition is caused by the ectopic eruption of an impacted mandibular canine after it has transmigrated across the midline.[3]

Mandibular transpositions are particularly rare, with the former type accounting for 0.03% and the latter accounting for 0.02% of all transpositions.[3]

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AETIOLOGY

The aetiology of transposition remains speculative.[1,4,5] It has been suggested that transposition results from an interchange in location between the tooth germs of developing teeth. A second theory implicates retained primary canines as the cause of deviation of the permanent canine from its normal eruptive pathway.[4] Trauma to the primary dentition has also been cited as an aetiological factor in transposition as dilacerations of permanent incisor roots have been found adjacent to transposed teeth. A gene-based (i.e. hereditary) aetiology is strongly suggested, along with racial differences, a high frequency of other associated dental abnormalities (e.g. peg-shaped lateral incisors, developmentally missing teeth) and bilateral occurrence.[5] Transposition in the mandible may be the result of displacement and distal migration of the lateral incisor. In the maxilla, the primary cause is the displacement of the permanent canine.[4]

CASE REPORT

A 10-year-old girl was referred to the orthodontic department for advice regarding the management of an ectopically developing $\overline{2}$/. She presented with a mild Class II division 1 malocclusion on a Skeletal I base. Extra-oral examination revealed an increased Frankfort-mandibular plane angle and no facial asymmetry. There was no previous history of trauma and no family history of transposition. There was, however, a family history of developmentally missing teeth. Two cousins (from the paternal side) had a history of developmentally missing upper permanent lateral incisors.

Intra-oral examination revealed an anterior open bite of 4 mm (she gave a history of a previous thumb-sucking habit which ceased at age 7). She was in the mixed dentition stage of dental

***Figure 1**. Intra-oral frontal view showing the 2/ transposition.*

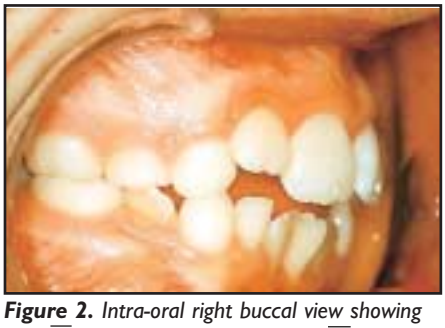

***Figure 2.** Intra-oral right buccal view showing how 2/ has caused the early loss of D/ and has erupted into its space.*

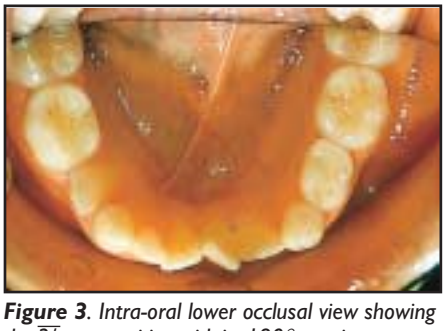

***Figure 3**. Intra-oral lower occlusal view showing the 2/ transposition with its 180° rotation.*

development, with all permanent incisors and all first permanent molars erupted.

The 2/ had erupted into the 4/ position and was 180° rotated (Figures 1–3). The upper centre line was correct but the lower centre line was 2 mm to the right. The molar relationship was a half unit Class II on both sides. Both upper permanent canines were unerupted and palpable high up in the buccal sulcus. The erupted 2/ had caused the early loss of D/. The B/ was retained in its normal position.

An orthopantomogram showed that all permanent teeth were present or developing (including all four permanent third molars). It also showed the 2/ to be completely transposed with 3/ and that 54/ were developing in their normal positions (Figure 4).

MANAGEMENT

In view of the fact that the patient was still in the early mixed dentition stage of dental development, a review appointment was made for 12 months' time. No extractions have been carried out at this stage and it is likely that extractions will be delayed until the 4/ erupts. It is very probable that 2/ will be extracted in due course (with the possibility of other permanent teeth) for orthodontic purposes. Fixed appliances will be required to resolve the crowding, to level and align the arches and to reduce the overjet when the patient is in the early permanent dentition.

DISCUSSION

Tooth transposition is a rare dental anomaly but can provide a significant orthodontic challenge. Tooth transpositions occur less frequently in the mandible than in the maxilla.[3] Early diagnosis and detection of a developing transposition is based on thorough clinical and radiographic examination. When detected early, interceptive treatment may resolve the developing problem and reduce future complications.[1,6] Alternatively, the transposition can be accepted[4,6,7] (e.g. upper permanent canine–first premolar transpositions) or can be treated orthodontically.[1,4–6,8]

A recent study looked at 60 cases of mandibular lateral incisor-canine transposition and found that there was a female preponderance for this type of dental anomaly.[3] This gender difference has also been attributed to other studies of related dental abnormalities, such as hypodontia, palatally displaced maxillary canines and peg-shaped permanent lateral incisors.[3,7,9] A biological explanation for the higher female prevalence of mandibular lateral incisor-canine transposition anomaly has been suggested.[3] The same study found that 68% of this type of transposition was right-sided but the authors could not give a valid explanation for this finding.

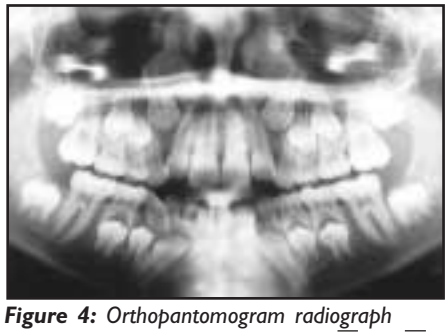

***Figure 4:** Orthopantomogram radiograph showing the complete transposition of 2/ with 3/. N.B. The 54/ are developing in their normal positions.*

They concluded that the existing evidence points to a strong genetic component in the aetiology of mandibular lateral incisor-canine transposition. There is, however, no generally accepted single aetiological factor implicated in tooth transpositions.[5]

In this particular Class II division 1 case, the extraction of the transposed lower incisor could have undesirable consequences. It can result in an increase in overjet and overbite[10] which would exacerbate the original malocclusion. However, in view of its severe rotation, it is highly probable that the 2/ will be extracted in this case. Rotated teeth are known to be more prone to relapse owing to the elastic recoil effect of stretched circumferential supra-crestal gingival fibres.[11]

CONCLUSION

Dental transposition is a rare phenomenon but early detection can result in early management and alleviation of the problem. General dental practitioners should be aware of its existence and that early referral to an orthodontic specialist is advisable. It should also be remembered that transpositions can be associated with other more commonly seen dental anomalies, such as peg-shaped permanent lateral incisors, hypodontia and ectopic palatal maxillary canines. It is therefore important to be extra vigilant in patients presenting with these types of dental abnormalities.

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BOOK REVIEW

Periodontics 5th edition. By B.M.Eley and J.D.Manson. Wright Elsevier, Edinburgh, 2004 (396pp. £44.99). ISBN 0-72361-097-5.

This comprehensive manual of periodontics was first published in 1983 as an undergraduate textbook by J.D. Manson. This fifth edition has been extensively rewritten in a completely new format with the addition of several new sections. All illustrations are now well chosen, in high quality colour, and are very well reproduced, together with excellent colour diagrams and clear reproductions of radiographs. All chapters have an extensive list of references, although there are not many more recent papers, which must always be a problem given the lead time to produce a major textbook.

In the introduction, the authors state that the book is aimed at the undergraduate, hygienists and other interested readers. Therein lies one of the problems of this book. All chapters are very well evidence-based but have now expanded somewhat above the level of the undergraduate and certainly well above the level of the most knowledgeable hygienist. If, on the other hand, it is used as a reference book to search for information on certain aspects of periodontology, both I and several colleagues felt the index would be difficult to use by undergraduates or other users who have not yet acquired a reasonable knowledge of periodontal terminology. There is, for instance, no direct lead to 'Risk Factors', although all are well described and discussed under various headings.

This minor criticism apart, the book is a comprehensive rework of a very popular textbook and will continue to serve its purpose well.

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COCHRANE SYNOPSES

Kujan O, Glenny AM, Duxbury AJ, Thakker N, Sloan P. Screening programmes for the early detection and prevention of oral cancer (Cochrane Review). In: The Cochrane Library, Issue 4, 2004. Chichester, UK: John Wiley & Sons, Ltd.

'More evidence needed to find out whether screening programmes could detect oral cancer earlier and reduce the number of deaths from this disease.

Cancer of the mouth and back of the throat (oral cancer) has a low survival rate, largely because the disease is often not diagnosed until it is advanced. Screening the general population for oral cancer might make it possible to detect cases of the disease earlier. The most common method is visual inspection by a clinician, but other techniques include the use of a special blue 'dye' and an imaging technique. The review found that there is not enough evidence to decide whether screening by visual inspection reduces the death rate for oral cancer, and no evidence for other screening methods.'

Marinho VCC, Higgins JPT, Logan S, Sheiham A. Topical fluoride (toothpastes, mouthrinses, gels or varnishes) for preventing dental caries in children and adolescents (Cochrane Review). In: The Cochrane Library, Issue 4, 2004. Chichester, UK: John Wiley & Sons, Ltd.

'The use of fluoride toothpastes, mouthrinses, gels or varnishes reduces tooth decay in children and adolescents.

Tooth decay (dental caries) is painful, expensive to treat and can seriously damage teeth. Fluoride is a mineral that prevents tooth decay. The review of trials found that children aged 5 to 16 years who applied fluoride in the form of toothpastes, mouthrinses, gels or varnishes had fewer decayed, missing and filled teeth regardless of whether their drinking water was fluoridated. Supervised use of self applied fluoride increases the benefit. Fluoride varnishes may have a greater effect but more high quality research is needed to be sure of how big a difference these treatments make, and whether they have adverse effects.'