Clinical Report

Intrabony Migration of Impacted Teeth

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Abstract: Intrabony migration of impacted teeth is a rare dental anomaly, which occurs only in the permanent dentition of the lower jaw. The teeth involved in this phenomenon are the mandibular lateral incisor, canine, and second premolar. Migration of the lateral incisor is usually in a distal direction, resulting in transposition with the canine. Migration of the canine is most frequently in a mesial direction, resulting in transmigration across the mandibular symphysis to the opposite side of the dental arch. The second premolar most often migrates distally, sometimes past the gonial angle and as far as the coronoid process. Surgical and orthodontic treatment options are presented for the three intrabony migrating teeth. (*Angle Orthod* 2003;73:738–743.)

Key Words: Impaction; Migration; Transmigration; Ectopic eruption; Transposition

INTRODUCTION

Very little information is available in the literature on intrabony migration of impacted teeth, a phenomenon of yet unknown etiology.[1,2] This is a rare and unusual developmental dental anomaly, which occurs only in the permanent dentition of the lower jaw. It involves the mandibular lateral incisor, the canine, and the second premolar. Atypical pre-eruptive tooth movements occurring in the maxilla are usually considered under a rubric of transposition and will not be considered in this article.

The mechanism that causes migration of a tooth is still obscure. A tooth is considered to have migrated only after its normal eruption is prevented and it has left its normal site of development within the bone. Migration may occur as a result of a localized pathologic process, such as a cystic lesion or an odontoma.[3] Such instances of migration can be proven only by a longitudinal radiographic survey taken over a period of several years, as has been reported for the mandibular second premolar traveling under the molars to the ramus-corpus angle.[4] The path of least resistance probably determines the direction of movement of the migrating tooth. It follows the direction of its long axis, with the crown leading the migration.[5,6]

Although unilateral migration of an impacted tooth is more common,[7] bilateral transmigration of mandibular canines has also been reported.[8] As with several other dental anomalies, this anomaly occurs more often in females than in males.[6,9] Impacted teeth may migrate in the bone mesially or distally. Specifically, the mandibular permanent lateral incisor (and in rare instances the first premolar) usually migrates distally,[10] whereas the mandibular permanent canine most often migrates mesially,[11] sometimes across the symphysis to the opposite side, thereby undergoing the intrabony movement termed ''transmigration.''[3,8,9,12]

This article discusses various possible etiologic factors causing intrabony tooth migration and presents several treatment options and procedures for typical migration situations. An overview of these typical migrations is presented below.

Lateral incisor

The mandibular permanent lateral incisor is the most frequently displaced mandibular tooth.[10] Its abnormal eruptive path is usually a result of the presence of a physical obstacle, such as a supernumerary tooth, an odontoma, severe crowding, or retained deciduous teeth. Displacement from the normal path of eruption may occur, however, for unknown reasons, with no clear relationship between the displaced permanent tooth and the usually cited etiologic factors.

Displacement of the mandibular permanent lateral incisor occurs unilaterally more often than bilaterally, and the right side is involved more frequently than the left.[10,13] The displaced tooth usually migrates distally in the bone, bypassing lingually the deciduous lateral incisor and canine to as

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FIGURE 1. A nine-year-old girl's radiograph showing ectopic mandibular right permanent lateral incisor distally inclined, above the permanent canine and first premolar. Note the retained deciduous lateral incisor and canine and the premature mesial root resorption of the deciduous first molar.

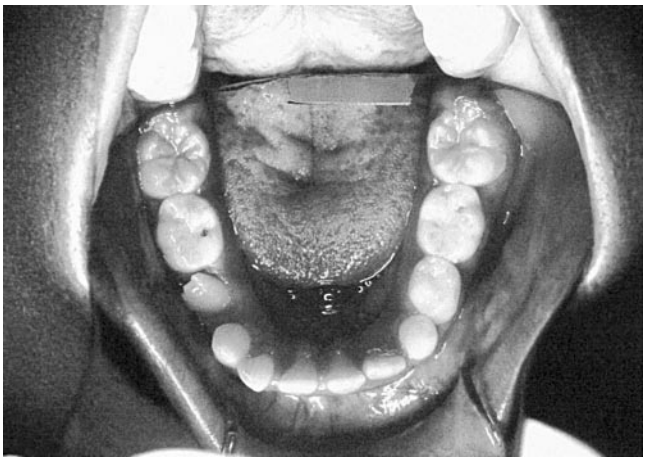

FIGURE 2. Photograph of a nine-year-old boy showing ectopically and distally erupted, 90° rotated mandibular right permanent lateral incisor, after early exfoliation of the deciduous first molar.

far as the mesial root of the deciduous first molar (Figure 1). Its migratory pressure causes early resorption and exfoliation of the deciduous first molar.

In most cases the lateral incisor will erupt ectopically, above the developing first premolar, impeding its eruption (Figure 2). The permanent canine will then erupt in its normal position, but in transposition with the lateral incisor, which has already erupted ectopically (Figure 3).[10,14]

Early detection of such a condition by a radiographic survey, along with timely removal of the retained deciduous teeth and uprighting and mesial movement of the lateral incisor would prevent the development of such transpositions.[15,16] However, if the condition is detected too late and the canine has already erupted between the central and lateral incisors, the treatment of choice would be to align the

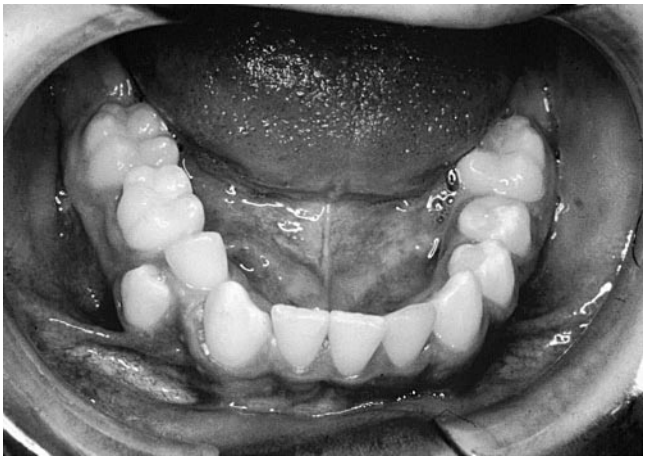

FIGURE 3. Photograph of an 11-year-old boy showing mandibular canine in transposition with the distally erupted lateral incisor. Note the buccal ectopic eruption of the first premolar.

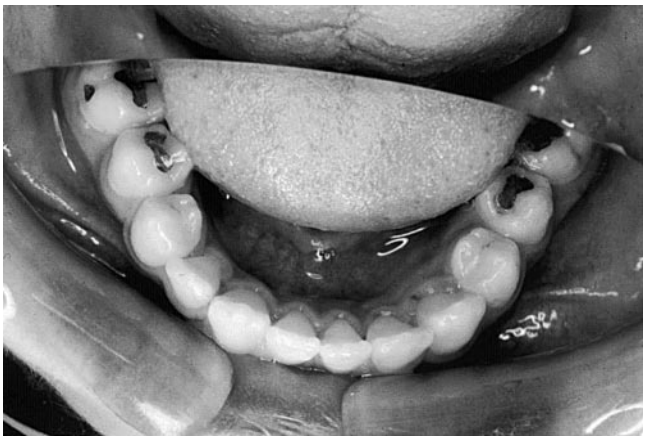

FIGURE 4. Photograph of a 12-year-old girl showing mandibular canine and lateral incisor aligned in their transposed position.

teeth in their transposed position and reshape the cusp into an incisal tip of the canine (Figure 4). It is interesting to note that all the displaced (migrating) lateral incisors were significantly rotated during their course of migration, up to 180°. However, the reason for this is not known.[10] Such a rotation probably makes the penetration and migration processes through the bone easier, presumably because of a ''screwdriver drilling motion'' through the bone.

Canine

Unlike the maxillary canine, the mandibular canine rarely becomes impacted. Also, its displacement is not very common. The cause is usually a supernumerary tooth, an odontoma (Figure 5), or crowding. It may, however, occur with no apparent reason. Some reports suggest that canine migration is congenitally inherited.[16] When the migration occurs, the mandibular canine is usually horizontally impacted, and, if not obstructed by the roots of the adjacent teeth, it may migrate mesially through the bone toward the

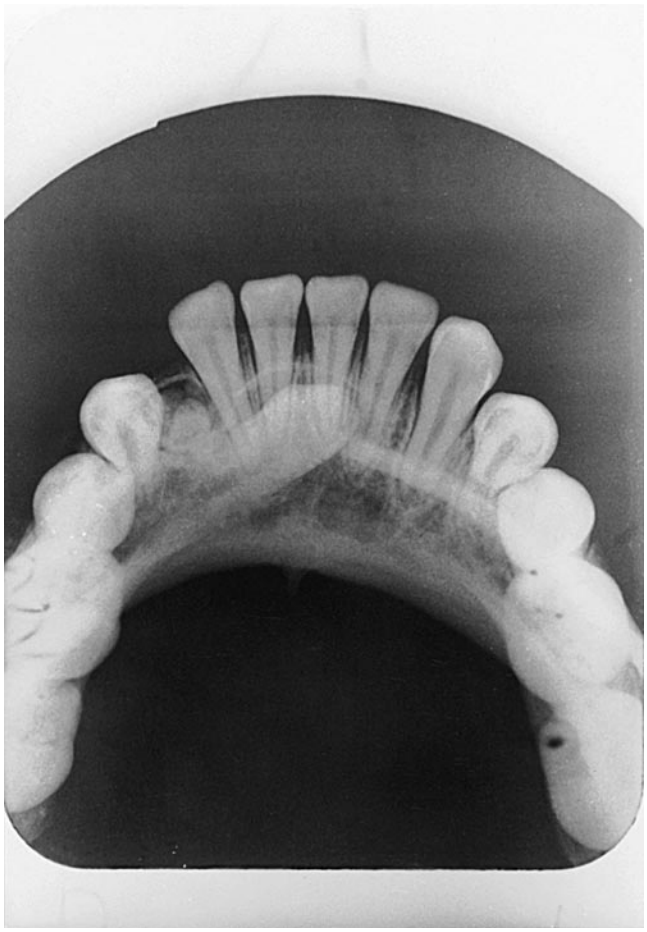

FIGURE 5. Occlusal radiograph of a 12-year-old girl with an odontoma causing mesial displacement of the impacted mandibular canine migrating across the midline.

midline and across the mandibular symphysis to the opposite side. This intrabony migration apparently commences at the early mixed dentition and may take place over a period of several years. Such a process was traced with serial radiographs showing the mandibular impacted right canine migrating mesially on the labial side, bypassing the incisors, and crossing the midline to the opposite side.[17]

Most canines transmigrated as far as the canine root on the contralateral side, as demonstrated in Figure 6. Rarely, one was found under the first molar on the opposite side of the dental arch.[18,19] It is less common for the impacted canine to migrate distally, as demonstrated in Figure 7, where the left canine migrates as far as the roots of the permanent first molar.

The transmigrated teeth maintain their nerve supply from the original side.[20] In a recent report the mandibular left canine was found to be affected more often than the right[9] and to migrate more in females than in males (1.6:1 ratio).[16]

Such migration is more common unilaterally, but bilateral occurrence of transmigrated mandibular canines has also been reported.[8,21] Bilateral migration of mandibular ca-

FIGURE 6. Panoramic radiograph of a 13-year-old boy showing a mandibular impacted, lateral incisor and canine, one on top of the other, both crossing the midline to the opposite side.

FIGURE 7. Panoramic radiograph of a 38-year-old male showing distally migrated and impacted mandibular left canine.

nines may occur in spite of there being adequate space for their eruption. The misplaced impacted mandibular canine, located near the inferior border of the mandible, may not be detected in a routine intraoral periapical radiograph. Therefore, the use of a panoramic radiograph is imperative and is recommended for discovering such rare malpositions (Figure 8).

The treatment of choice for a transmigrated, impacted mandibular canine is usually surgical extraction of the impacted tooth, although the use of surgical exposure and orthodontic alignment has been reported in a few selected cases.[22,23]

Second premolar

After the third molars and maxillary canines, the most commonly impacted tooth is the mandibular second premolar with a reported impaction incidence of 2.1% to 2.7%.[1,2] The frequency of its intrabony distal migration is

FIGURE 8. The displaced mandibular canine is horizontally impacted close to the inferior border of the mandible, as detected on a panoramic radiograph.

FIGURE 9. Panoramic radiograph showing mandibular left second premolar horizontally impacted under the roots of the retained deciduous second molar.

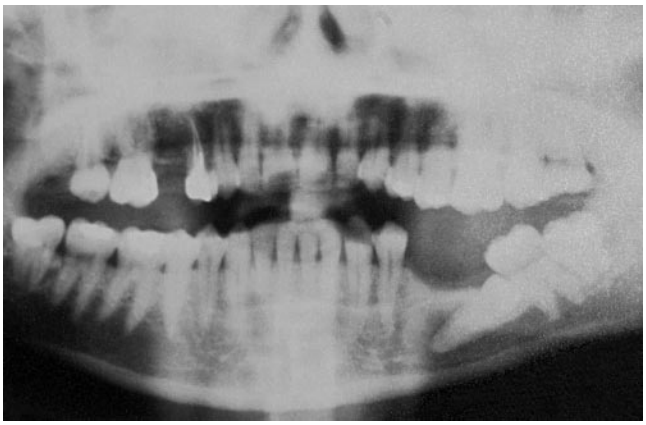

FIGURE 10. Panoramic radiograph showing the impacted mandibular left second premolar that migrated distally up to the second molar root.

FIGURE 11. Periapical radiograph of a 14-year-old boy showing the impacted mandibular second premolar that migrated as far as the second molar root.

0.25%, and this migration occurs more often in females than in males (1.7:1 ratio).[24] Distal displacement and intrabony migration of the mandibular second premolar are idiopathic and have been reported to occur only unilaterally. No other dental anomalies have been reported to be associated with it.

The tooth bud of the mandibular second premolar may develop with a variable degree of distal inclination under the distal root of the deciduous second molar (Figure 9).[25] When this root is resorbed and the permanent molar is extracted early, the second premolar may migrate distally and erupt just mesial of the permanent second molar.[5,24] The initial angulation of the tooth and the early loss of the deciduous second molar are important factors in the distal tooth migration of premolars. Alternatively, it may continue its intrabony migration until it becomes impacted against an adjacent tooth (Figures 10 and 11).

In extreme cases the second premolar was reported to migrate as far distally as the mandibular angle[26] and the coronoid process.[6,27] Such a migration is slow and occurs over a period of several years. Females are more susceptible to this migration, which happens mostly in adults over 20 years of age.[6,24]

Treatment options for impacted migrated second premolars include surgical exposure combined with orthodontic therapy, which aims to bring the tooth into occlusion (Figures 11 and 12).[3,28] Attempts to rescue the deeply impacted and migrated second premolar cause substantial risk to the roots of adjacent teeth. Consequently, surgical removal or transplantation to its normal position in the arch is recommended when local factors are favorable. Another indication for extracting the impacted and migrated canine

FIGURE 12. Periapical radiograph at the end of orthodontic treatment showing the impacted mandibular second premolar aligned in the arch.

or second premolar is the possibility of causing pressure resorption of the roots of adjacent teeth, periodontal disturbances, neuralgic symptoms, or cyst formation.[29] In specific cases where no untoward signs or symptoms are present, a conservative approach of no treatment, but with periodic radiographic observation, should be considered.

In their recent reports, Peck et al[30–32] discuss impaction and transposition of teeth with other associated anomalies. The hypothesis of genetic influence in these anomalies is described. Specific differences are noted in the two orofacial ''genetic fields,'' the anterior field, extending to and including the canines, and the posterior field, including the premolars and molars.[33] Their study concerned itself primarily with maxillary arch anomalies. Extending the same principles and testing them in the mandibular arch, one would find it difficult to accept the genetic explanation offered for the reported intrabony mandibular developmental anomalies. This report did not explain the variety of etiologic factors or contributions. On the basis of this, as well as several similar published reports, the multifactorial causality for the stated anomalies may still be the best explanation we can provide of their etiology.

Intrabony migration of impacted teeth may not be discovered on a routine intraoral periapical radiograph because the tooth is most frequently horizontally positioned under the apices of the permanent teeth close to the mandibular border. Therefore, it is imperative that the radiographic examination should include panoramic and sometimes occlusal radiographs. The state-of-the-art methodology for detecting and localizing various positional anomalies is computerized tomography.[26,27] Although this procedure is still quite costly and not always available, its acceptance and superior diagnostic effects must be recognized.

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