Transmigration of Impacted Canines: Six Case Reports

Gömük Kanin Dişlerde Transmigrasyon: 6 Olgu Sunumumu

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Dental transmigration is an infrequent eruptive disorder and it develops exclusively in mandibular canines while maxillary canines are rarely involved. Six cases of this rare dental anomaly are presented and discussed with clinical and radiological characteristics in this case series. Although new findings about transmigration of maxillary and mandibular canines are reported in the literature, controversy over the etiology continues. Early detection of a transmigrant tooth is essential for the treatment, planning and prevention of more complicated situations. The surgical removal of the tooth should be considered to prevent the possible damage to the numerous teeth developing along the path of migration. However, the surgical removal of an asymptomatic transmigrated tooth may be limited to periodic clinical and radiological follow-up visits.
INTRODUCTION

Migration of a canine from its normal position to the contralateral hemiarch, crossing the midline is known as transmigration. This phenomenon is a rare, unusual developmental anomaly of unknown origin and it occurs almost exclusively with mandibular canines but also develops rarely in maxillary canines as well. This condition was first reported by Aydin and Yılmaz in 2003. In a review of 4,500 panoramic radiographs, Aydin et al. identified eight mandibular canines and six maxillary canines (0.31%). Aras et al. also reported 12 cases of transmigrant maxillary canines in a sample of 6000 individuals.

This anomaly is most often asymptomatic, with no pain or over pathology, and usually cannot be detected during a clinical examination. Mandibular transmigration is rarely discovered on a routine periapical radiograph because the tooth is most frequently horizontally impacted under the apices of the permanent teeth adjacent to the mandibular border. Similarly, a palatally impacted canine is sometimes horizontally positioned very high in the palatal vault, close to the floor of the nasal cavity and thus might not be detected on a routine periapical radiograph. Therefore, when any permanent tooth is clinically missing, a panoramic radiographic examination is essential. Transmigrating teeth can cause pressure, resorption of roots or tilting of adjacent teeth and neuralgic symptoms causing pain and discomfort in the patient.

Our PubMed search revealed only five published articles that described maxillary canine migration to the contralateral side. The aim of this case series report was to describe the clinical and radiological characteristics of 6 additional cases of transmigrant canines, two of which are in the maxilla and four in the mandible.

Case 1

A 52-year-old female was referred for the construction of a prosthesis to a dental practitioner. It was observed by the dentist in the panoramic radiograph that the mandibular left canine was impacted. Then the patient applied to Ege University School of Dentistry, Department of Oral and Maxillofacial Surgery for the removal of this tooth. Intraoral examination showed that there was a swelling at the fornix vestibulum of the anterior portion of the mandible. Radiological examination revealed that the canine was impacted mesioangularly with part of the crown crossing the midline. The crown of the tooth was surrounded by a follicular cyst (Figure 1).

Case 2

An 18-year-old female was presented to our department with a complaint of moderate pain in the right third molar region of the mandible. The panoramic radiograph revealed all the third molars were impacted and were covered with mucosa. Both of the maxillary canines were also unerupted. The right maxillary canine was impacted mesioangularly and the left maxillary canine was impacted horizontally. Tooth 53 was missing. The left maxillary canine had migrated across the midline located below the apices of the incisors and showed no evidence of resorption or pericoronal radiographic changes suggestive of cystic degeneration (Figure 2). Adjacent teeth appeared normal. Tooth 63 did not show any signs of physiological resorption. The patient was asymptomatic and was informed of the condition.

Case 3

A 15-year-old male was presented to our department with a complaint of painless moderate swelling in the left canine region of the mandible. Oral examination revealed that left mandibular canine was missing in the dental arch and there was a swelling at the fornix vestibulum of the left canine region. Tooth 72 and 73 were in the dental arch. Panoramic radiograph showed transmigration of the mandibular left canine associated with a radiopacity compatible with an odontoma (Figure 3).

Case 4

A 39-year-old male was presented to our clinic with pain in the right maxillary premolar region. Clinical examination showed that there was a swelling at the fornix vestibulum of the
premolar teeth. Extraorally, the right sulcus nasolabialis had become indistinct. For the radiological evaluation, a panoramic radiograph was taken. It depicted a transmigrated impacted canine tooth with a supernumerary tooth which were surrounded by a follicular cyst (Figure 4). Follicular cyst was extending from the maxillary right incisive tooth to the maxillary right first molar tooth.

Case 5

A 12-year-old male was presented to our clinic with pain in the right mandibular canine region. Oral examination revealed that right mandibular canine was missing in the dental arch. Tooth 83 was in the dental arch. The panoramic radiograph and 3D computed tomography revealed that the right mandibular canine had migrated to left side crossing the midline below the apices of the incisors, and showed pericoronial radiographic changes suggestive of cystic degeneration (Figure 5 and 6). Surgical removal of the transmigrated canine was advised to the patient’s family. Standart intraoral approach was used for surgical extraction (Figure 7).

Case 6

A 23-year-old female complained about her left mandibular first molar region. The panoramic radiograph revealed that the right mandibular canine had migrated across the midline. The left maxillary canine had also migrated across the midline located below the apices of the incisors and showed no evidence of resorption or pericoronial radiographic changes suggestive of cystic degeneration. Adjacent teeth appeared normal (Figure 8). The patient was asymptomatic and was informed of the condition.

DISCUSSION

Canine impaction is more prevalent in the maxilla than in the mandible, but canine transmigration is more frequent in the mandible. The larger cross-sectional area of the anterior mandible compared with the anterior maxilla may be a reason for the higher frequency of mandibular...
canine transmigration\textsuperscript{6}. Rarity of transmigration of an impacted maxillary canine may be due to the negligible distance between the apexes of the maxillary canines and the floor of the nasal fossae, and to the presence of the midpalatal suture, which is a considerable barrier against maxillary canine migration\textsuperscript{11}.

The etiology of transmigration is unknown; however, abnormal displacement of the tooth bud or deviation during development is the most commonly accepted explanation\textsuperscript{5}. However, heredity, multifactorial genetic factors,\textsuperscript{14,15} the long eruption path of canine tooth germs, premature loss of primary teeth and occupation of this space by an adjacent tooth, discrepancies in tooth-size, unfavourable alveolar arch length, and over length of crowns, odontomas, cysts and traumatic factors
which lead to displacement of tooth buds can also be the causative factors\textsuperscript{2,4,12,16}.

Alaejeos-Algarra et al.\textsuperscript{12} stated that canine tooth germs were located further from the normal site of eruption than were the germs of other teeth. Although this is true for maxillary canines, it is not valid for the mandible. An anomalous position of the tooth germ may also be involved in the pathogenesis of canine transmigration\textsuperscript{17}. However, all available evidence points to the tooth bud developing in its normal place and subsequently migrating to an ectopic position.

Joshi\textsuperscript{2} reported that trauma to the mandible at a very early age of the patient, and a very small obstacle, such as root fragment, could be sufficient to divert such a tooth to an abnormal path. Mitchell\textsuperscript{18} noted that traumatic fracture of the mandible near the site of the mandibular canine was observed in one 7-year-old patient as a causative factor leading to the transmigration of the mandibular permanent canine. However, in the patient group of another study\textsuperscript{19} on impacted mandibular canines, only one patient had a history of trauma when he was eight years old but these authors do not think that trauma can be an etiological factor for impaction of teeth. In our case series, none of the patients had a history of trauma.

Sumer et al.\textsuperscript{20} reported that a permanent canine within a dentigerous cyst might transmigrate due to the cystic pressure. Although in one of their patients, the transmigrated canine was associated with a dentigerous cyst, these authors thought that it might not be possible to determine whether the tooth had transmigrated before the pathological process developed or not. Joshi\textsuperscript{2} also reported that it was difficult to understand whether these pathologies were responsible for the transmigration process or the pathological situations having occurred after the migration of the canine. In our cases 1, 4 and 5 transmigrated canines were associated with dentigerous cysts but we also think like these authors that it is difficult to determine when these canine teeth have transmigrated. On the other hand, in the second case, and the last case as the patients were asymptomatic, surgical removal of the teeth were postponed and the patients were kept on periodic recalls.

In 70% of the odontomas, pathological alterations are observed in the neighboring teeth such as devitalization, malformation, aplasia, malposition and the remaining embedded\textsuperscript{21}. In our case 3, an odontoma was present in the place of permanent canine, therefore, it was possible to think that the canine had migrated due to the odontoma. This finding was in accordance with a previous report by Aktan et al.\textsuperscript{22} who also stated that a 16 year-old- girl's right mandibular canine was impacted, crossing the midline under the apices of the incisors due to a compound odontoma in the original position of the right canine.

Gonzalez-Sanchez et al.\textsuperscript{23} identified two supernumerary teeth in two cases that may have been the cause of the canines’ change in orientation. Our case 4 also involved a supernumerary tooth and we think like these authors that supernumerary tooth may be the cause of migration of the canine tooth.

Joshi’s study\textsuperscript{2} showed 70.8% overretained deciduous canines, and 29.2% had exfoliated in the mandibular arch. This observation shows that, in the absence of the developing permanent mandibular canine under the deciduous canine, the resorption process of the root of the deciduous canine is rather slow. We think that, in our second, third and fifth cases deciduous canines were in the dental arch because of the transmigrated canine teeth not being under the deciduous canines.

Transmigration of canines has been reported more frequently in females than males in the ratio 1.6:1\textsuperscript{24}. Aydin et al.\textsuperscript{6} reported that the incidence of transmigrated maxillary canines was the same in both sexes. Also in Aras’s study\textsuperscript{9} a total of 12 patients had transmigrant maxillary canines, at a ratio of 1M:1F. In this case series report, transmigration was observed in three females and in three males.

The mandibular canines have been reported to transmigrate mesially, bypassing the incisors and crossing the midline to as far as the canine
of the opposite side, both unilaterally and bilaterally\textsuperscript{7,13}. All transmigrant maxillary canine cases have been reported as unilaterally up to now. Concurrent with these previously reported findings in literature, in all of our cases, canines also migrated unilaterally. In the second case, both of the maxillary canines were impacted but only the left canine transmigrated.

Several treatment options are available for the transmigrated canines, which include surgical removal, transplantation, orthodontic intervention and periodic observation but surgical removal appears to be the most favored treatment for migrated canines\textsuperscript{4}. In our first, fourth, and the fifth cases, because of the cyst formations around the transmigrated mandibular and maxillary canines, enucleation with surgical removal of these teeth were made.

If the mandibular incisors are in a normal position and space for the transmigrated canine is sufficient, transplantation may be undertaken\textsuperscript{4,25,26}. Aras et al.\textsuperscript{9} reported that in one case, the transmigrant canine was transplanted to the normal position because of the failure of the eruption force. Another treatment options are correction by orthodontic movement of the horizontally impacted and transmigrated mandibular or maxillary canines to their normal anatomic positions in the arch. Wertz\textsuperscript{27} repositioned a vestibularly impacted transmigrant canine in this way. However, if the crown of the transmigrated canine moves past the opposite incisor area or if the apex is seen to have migrated past the apex of the adjacent lateral incisor, it might be mechanically impossible to bring the tooth back into the place. In such cases, extraction is preferred to prevent the possible damage to the numerous teeth developing along the path of migration\textsuperscript{2,28}. If the patient is asymptomatic, the transmigrated canine can be left in place; however, regular follow-up with radiographs is essential to detect potential pathology associated with the impacted canine\textsuperscript{2,3,4,29}. On the other hand, the patient’s desire must be taken into consideration because the patient may insist on the surgical removal of the impacted canine tooth. In our case 2 and 6, orthodontic movement of the transmigrated canine was impossible because of their positions. The patients were asymptomatic, the transmigrated canines were left in places, however, to prevent the long-term complications, the patients were recalled with 6-month intervals for radiographic controls. In case 3, the patient refused surgical treatment including extraction of the odontoma and transmigrated tooth.

**CONCLUSIONS**

Migration of the maxillary and mandibular canines through the midline is generally asymptomatic. Whenever the permanent canines are not observed in the oral cavity in the expected time scale, panoramic radiographic examination is essential. Early diagnosis is important for the treatment planning and prevention of more complicated situations. Although new findings about transmigration of maxillary and mandibular canines are reported in the literature, controversy over the etiology continues and questions on this topic still remain unresolved. Therefore, detailed mechanisms of the transmigration origin is a subject of further researches.

**REFERENCES**


