Transmigrant maxillary canines

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Objective. The objective of this study was to investigate the incidence and pattern of transmigrant maxillary canines.
Patients and methods. The records of 6000 patients who were presented to our oral and maxillofacial surgery services between January 1998 and January 2007 were reviewed. Observations were made as to the right/left localization and number of transmigrant canines; sex and age of patients; retained deciduous canines; and any other associated pathology.
Results. A total of 12 patients presented with transmigrated maxillary canines with 6 females (age 15 to 37) and 6 males (age 17 to 57) in 6000 individuals (0.2%). All transmigrant canines were unilateral. The numbers of left and right transmigrant maxillary canines were equal. Ten individuals in 12 patients had not retained deciduous canines. None of these patients had any pathology associated with impacted canines.
Conclusion. The canine transmigration can occur not only in the mandible but also the maxilla. Further studies are necessary to examine this rare phenomenon to allow classification of transmigrant canines in the maxillary arch. Thus, the incidence, demographic factors, and etiology of this phenomenon can be clarified. How transmigrant maxillary canines pass on the contralateral side of the mid palatal suture must be completely clarified. **(Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:e48-e52)**

Intraosseous migration of impacted teeth is a rare and unusual developmental dental anomaly of unknown origin. The etiology and mechanisms of tooth migration are still obscure.[1,2] Migration of a canine within the jaw apparently commences in the early mixed dentition stage, and the majority of tooth movement usually occurs before root development is complete.[3-5] Preeruptive migration of a tooth across the midline is termed "transmigration."[1,6-9] This term was first used by Ando et al.[10] in 1964. Although transmigration of an impacted mandibular canine through symphysis to the contralateral side of the arch had been documented,[1,4,6-14] transmigration of impacted maxillary canines was first reported by Aydin and Yılmaz[8] in 2003. Up to now, only 4 articles have been published concerned with transmigration of maxillary canine.[2,3,8,12] Two articles from the same group of workers reported 6 cases of transmigrated maxillary canines[8,12] in a sample of 4500 people. Since then, Shapira and Kuftinec[2] and Ryan et al.[3] have reported 1 case of transmigrant maxillary canine each. Consequently, this phenomenon has been previously reported in the literature in only 8 instances.[2,3,8,12]

In this study, we attempted to determine the incidence of transmigrant maxillary canine teeth and to discuss etiology and mechanism of transmigration. We also report 12 cases of transmigrant maxillary canines in a sample of 6000 individuals.

MATERIALS AND METHODS

We designed a retrospective cohort study composed of 6000 panoramic radiographs that were taken on patients who presented to our Oral and Maxillofacial Surgery service at the Ataturk University Dentistry Faculty between January 1998 and January 2007. One group of researchers examined the radiographs at the same time on standard light boxes. Observations were made as to the right/left localization and number of transmigrant canines; sex and age of patients; retained deciduous canines; and any other associated pathology. In this study, a migration across the mid-palatal suture, regardless of the distance, was accepted as a transmigration[12] (Figs. 1 to 4). Following the radiographic evaluations, patient records were studied. The treatment of patients with transmigrated canines was recorded.

RESULTS

Twelve (0.2%) of 6000 individuals had transmigrated canines, of which 6 were females (ages 15 to 37) and 6 were males (ages 17 to 57). All transmigrant

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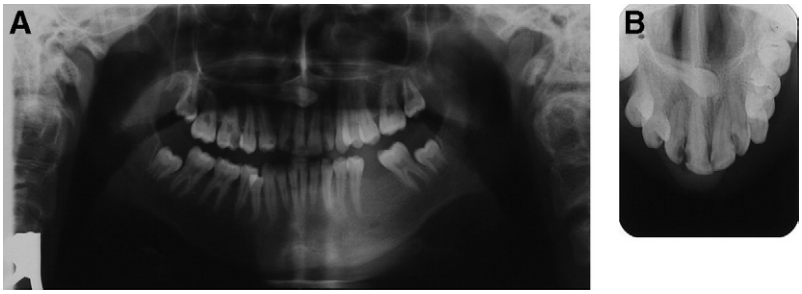

Fig. 1. **A, B,** The panoramic and occlusal radiographs of the migrated maxillary canine from the right side.

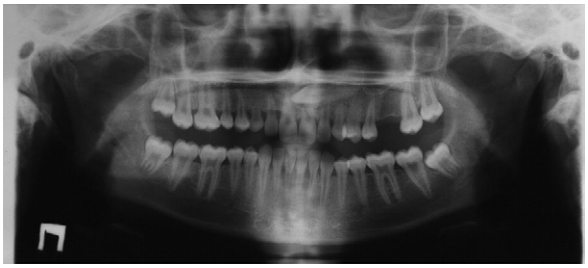

Fig. 2. Canine horizontally impacted apices of the incisors and primary canine retained.

canines were unilateral and impacted. Six canines migrated from the left to the right side, and 6 migrated vice versa. Two of 12 patients had retained primary canines and the remainder had exfoliated primary canines (Fig. 2). All of the transmigrant maxillary canines were in varying stages of intraosseous travel and positioning within the maxilla, as none of them was associated with any pathological entity. In treatment protocol, 10 of 12 transmigrant canines were extracted; 1 transmigrant canine was transplanted to the normal position because of forced eruption failure; and 1 canine was periodically observed (Tables I and II).

DISCUSSION

It is difficult to postulate how or why a canine tooth, which should have been formed on the left side, actually gets formed on the right side.[15] Joshi[6] reported that transmigrant canines moved across the midline without the influence of any pathological entity. The etiology and exact mechanism of transmigration is still not clear, although a number of factors have been suggested.[9,16] The most likely explanation is a developmental aberration; the crypt of the developing permanent canine being misplaced.[15] Many authors have speculated about the cause of impacted canines. Etiologies of impaction may be inadequate space, supernumerary teeth, premature loss of the deciduous dentition, retention of the deciduous canine, excessive crown length, hereditary factors, functional disturbances of the endocrine glands, tumors, cysts, and trauma.[1,6,7,9,13,17]

Maxillary canine impaction is approximately 20 times more common than mandibular canine impaction. However, transmigrant mandibular canines occur more commonly than maxillary ones.[3] Maxillary canine transmigration might be difficult because of anatomical constraints. Three possible hypotheses were previously mentioned as constraints. The first hypothesis was that the maxillary mid-palatal suture acts as a barrier, preventing transmigration to the contralateral side.[2,18,19] The second hypothesis was clarified by the relatively short distance between the floor of the nose and the roots of the maxillary incisors, and that the roots of the maxillary incisors are longer than their mandibular counterparts.[3,18] The last hypothesis, according to Auluck and Mupparapu,[20] is that it is the position and the angulations of the impacted maxillary canine that determine their movement across the mid-palatine suture.

According to Auluck and Mupparapu,[20] impacted maxillary canines require a large amount of force to overcome the strong barrier in their path—the mid-palatine suture. When the maxillary canines are positioned perpendicular to mid-palatine suture, they might have enough horizontal component of eruptive force to migrate to the contralateral side. With an axiocoronal angulation, i.e., 45 degrees to 90 degrees, the eruptive force will have both vertical and horizontal (angular) components. The horizontal component of the eruptive force of such an impacted maxillary canine might not be sufficient to overcome the resistance of the midpalatine suture, and thus, these teeth abruptly abandon their movement at the midline.[20]

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.[2,13] However, all transmigrant maxillary canine cases have been reported as unilaterally up to now. In the present study, all trans-

Fig. 3. **A, B,** The views of transmigrant maxillary canine.

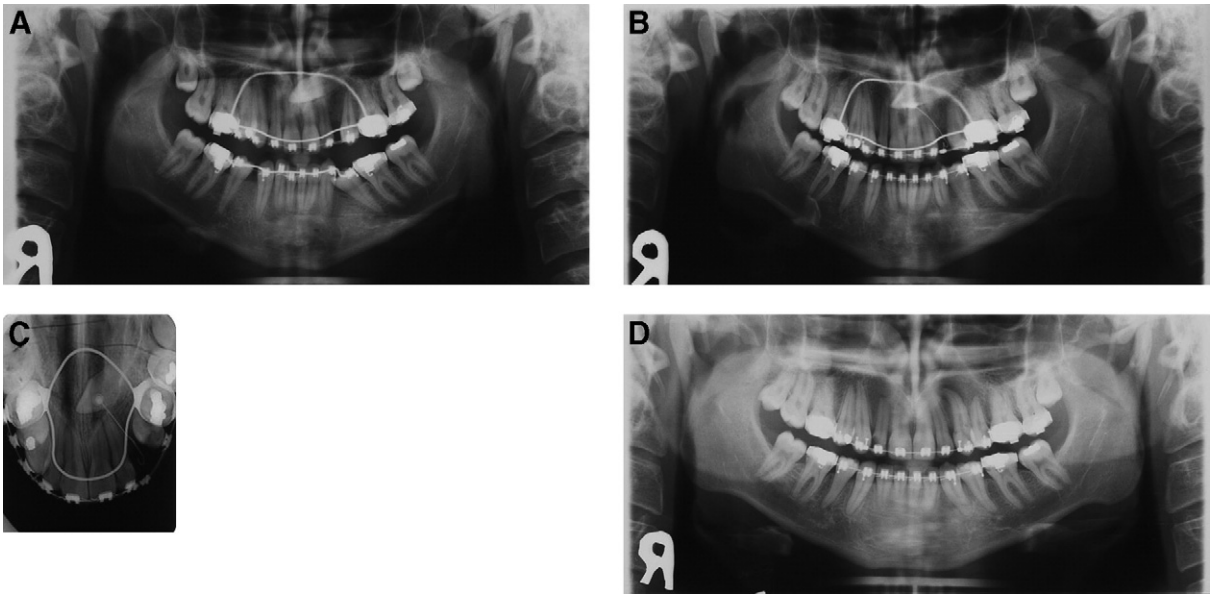

Fig. 4. **A,** Patient with impacted left transmigrant maxillary canine retained palatal to the adjacent incisors. **B, C,** Failure of the forced eruption after 16 months. **D,** The panoramic radiograph of ototransplanted maxillary transmigrant canine to the ideal position.

Table I. Incidence, age, and gender ratio for maxillary canine transmigration

	Cases	*Incidence*	*Females*	*Males*	*Gender ratio*	*Mean age*	*Age range, y*
Transmigrant maxillary canines	12	0.2%	6	6	F1:M1	31.5	15-57

migrant maxillary canines were unilateral, as in the literature. In recent reports, the maxillary left canines were found to be affected in the same way as the right canines.[2,3,8,12] In our study, the numbers of affected left canines was equal to the right.

Although migration of impacted teeth, similar to some other dental anomalies, has been reported more often in female than in male patients,[2,6,14] this gender predilection was different in some studies.[12,13] However Aydin et al.[12] reported that the incidence of transmigrated maxillary canines was the same in both sexes. Also in our study a total of 12 patients had transmigrant maxillary canines, at a ratio of 1M:1F.

Joshi[6] reported that almost all the transmigrant mandibular canines were impacted. Aydin et al.[12] reported that only 1 maxillary transmigrant canine was partially erupted in their series, while the others were reported as impacted.[2,3,8,12] In our study, there were no erupted transmigrant maxillary canines.

The resorptive process of the root of the deciduous

Table II. Clinical and radiographic features of transmigrated maxillary canines observed in the present study

Patient number	*Age*	*Side*	*Sex*	*Eruption status*	*Primary canine*	*Uni/Bi*	*Treatment protocol*	*Associated pathology*
1	15	R	F	I	CE	Uni	Extraction	None
2	31	L	F	I	CE	Uni	Extraction	None
3	17	L	F	I	CR	Uni	Extraction	None
4	37	R	F	I	CE	Uni	Extraction	None
5	49	R	M	I	CE	Uni	Observation	None
6	55	L	M	I	CE	Uni	Extraction	None
7	21	R	F	I	CE	Uni	Extraction	None
8	19	R	F	I	CR	Uni	Extraction	None
9	43	L	M	I	CE	Uni	Extraction	None
10	17	L	M	I	CE	Uni	Transplantation	None
11	17	R	M	I	CE	Uni	Extraction	None
12	57	L	M	I	CE	Uni	Extraction	None

L, left; R, right; *F,* female; *M,* male; *I,* impacted; *CR,* retained primary canine; *CE,* exfoliated primary canine; *Uni/Bi,* unilateral/bilateral.

canine is slow in the absence of a permanent canine in correct position, and it is therefore often retained.[3,16] Some authors advocate extraction of the deciduous canine to encourage normal development of the permanent tooth.[3,21] But we do not assume this as an etiological factor for transmigration of teeth. In this study, 10 primary canines were exfoliated or extracted.

Clinicians consider various treatment options available for the patient, including the following: surgical removal, transplantation, exposure and orthodontic alignment, and observation.[22] Surgical extraction appears to be the most favored treatment for migrated canines, rather than a heroic effort to bring the tooth back to its original place.[9] Surgical exposure, with or without consequent orthodontic treatment, is generally undertaken in children and adolescents.[23,24] Ten transmigrant canines were extracted in this series. According to Shapira and Kuftinec,[2] correction by orthodontic movement of the horizontally impacted and transmigrated mandibular or maxillary canines to their normal anatomic positions in the arch should not be attempted. In these patients, tooth transplantation might be a treatment of choice.[23,24] Ioannidou and Makris[23] reported that the tooth was stable 12 years after autotransplantation of a transmigrant mandibular canine. In one case, we transplanted the transmigrant canine to the normal position because of failure of the eruption force. Some authors believe that periodically evaluated nonerupted, symptomless teeth may be left in place.[9,22]

In conclusion, (1) canine transmigration occurs both in the mandible and in the maxilla. (2) Further studies are necessary to examine this rare phenomenon and to allow classification of transmigrant canines in the maxillary arch. The incidence, demographic factors, and etiology of this phenomenon need further clarification. (3) The mechanism of how transmigrant maxillary canines pass to the contralateral side of the mid-palatal suture needs to be further studied.

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