Transmigrant Mandibular Canines

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Purpose: The aim of the present study was to investigate the patterns of transmigrant mandibular canines, the incidence and classification of transmigrant canines, and the associated pathology of these teeth.

Patients and Methods: This retrospective cohort study was composed of 4,500 panoramic radiographs of patients who presented to our Oral and Maxillofacial Surgery Services from January 1998 to December 2005. Panoramic radiographs were reviewed. Observations were made on the status of missing permanent mandibular canines, retained deciduous canines, side and number of transmigrant canines, gender and age of patients, and any other associated pathology.

Results: In the present study, a total of 15 patients had transmigrated canines—6 females (ages 13-33 years) and 9 males (ages 13-57 years). All transmigrant canines were unilateral. Two canines were impacted in the mandible enveloped in cystic lesions. The rest of the transmigrated canines were in varying stages of intraosseous travel and positioning within the mandible, with no pathological entity.

Conclusion: The use of a panoramic radiograph is imperative and is recommended for discovering such rare malpositions. If the mandibular canine that has migrated across the mandible is associated with pathology, it may be removed. Otherwise, it should be kept under observation.

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In human dentition, maxillary and mandibular canines are important from an esthetic as well as a functional point of view when they are present in their normal position.[1] Although the maxillary permanent canine is frequently misplaced, failure of eruption of the mandibular canine is an unusual event.[1-3] A study by Rohrer[4] examining 3,000 patients radiographically found 62 impacted maxillary canines (2.06%) and only 3 impacted mandibular canines (0.1%), a 20:1 ratio. The preceding studies show that impacted mandibular canines occur in approximately 0.1% of patients examined.[3]

Ando et al[5] were the first to use the term "transmigration." Pre-eruptive migration of a tooth across the midline is termed "transmigration."[1,3,6-8] Javid[9] expanded the definition to include cases in which more than half the tooth had passed through the midline. This condition has not been reported for teeth other than mandibular canines.[6,7] Females appear to be affected more than males, with the right side more common than the left.[10] Most patients do not have any symptoms, and these canines are often discovered at the radiological examination before orthodontic treatment.[1]

In this study, we attempted to determine the incidence of transmigrant mandibular canine teeth in a Turkish subpopulation.

Materials and Methods

We designed a retrospective cohort study composed of 4,500 panoramic radiographs from patients who presented to our Oral and Maxillofacial Surgery Services from January 1998 to December 2005. Observations were made on the status of missing permanent mandibular canines, retained deciduous canines, side and number of transmigrant canines, gender and age of patients, and any other associated pathology. To be included in the sample, mandibular transmigrant canine clinical records and radiographs had to be present.

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Table 1. INCIDENCE, AGE, GENDER RATIO FOR MANDIBULAR CANINE TRANSMIGRATION

	Cases	Incidence	Females	Males	Gender Ratio	Mean Age	Age Range (yrs)
Transmigrant canines	15	0.33%	6	9	F 1:M 1.5	25	13-57

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We classified transmigrant mandibular canines according to Mupparapu.[7] The investigator classified these teeth into 5 types based on their migratory pattern and their position in the jaw. The classification can be summarized as: type 1, canine impacted mesioangular across the midline, labial or lingual to the anterior teeth; type 2, canine horizontally impacted near the inferior border of the mandible inferior to the apices of the incisors; type 3, canine erupting on the contralateral side; type 4, canine horizontally impacted near the inferior border of the mandible below the apices of posterior teeth on the opposite side; type 5, canine positioned vertically in the midline with long axis of the tooth crossing the midline.

Results

A total of 15 patients had transmigrated canines, with 6 in females (ages 13-33 years) and 9 in males (ages 13-57 years) (Table 1). All transmigrant canines were unilateral. Nine canines migrated from the left side, 6 from the right (Fig 1). Six patients had retained primary canines, and the remainder had exfoliated primary canines (Fig 2). Two canines were impacted in the mandible enveloped in cystic lesions (Fig 3). Both of these cysts were infected, and one of them showed a fistula under the mandible extraorally. The rest of the transmigrated canines were in varying stages of intraosseous travel and positioning within the mandible with no pathological entity. Of the 15 patients in the present study, 5 canines exhibited type 1 (Fig 4) transmigratory pattern (33.3%), type 2 (Fig 3) had 3 (20%), type 3 (Fig 2) had 4 (26.7%), type 4 (Fig 5) had only 1 (6.7%), and 2 of the canines were classified as type 5 (Fig 6) transmigration (12.5%). Nine patients had no impacted teeth except the transmigrant canine. The others had at least 1 impacted tooth (Table 2).

Discussion

Although the maxillary permanent canine is frequently misplaced, misplacement of the mandibular tooth is a comparatively rare event.[2] The incidence of ectopic mandibular canines is low in comparison with that of ectopic third molars, maxillary canines, and mandibular premolars.[11] Intrabony migration of impacted teeth is a rare dental anomaly that occurs only in the permanent dentition of the lower jaw. 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.[12] Transmigration was defined as movement of an unerupted mandibular canine across the midline.[9,13] They are often in a horizontal position and can migrate anteriorly, but semihorizontal transmigrant canines have also been reported.[3,8] This condition has not been reported for teeth other than mandibular canines.[6,14] This phenomenon has been reported in the literature in at least 157 instances.[13] Javid[9] reported a radiographic survey of 1,000 stu-

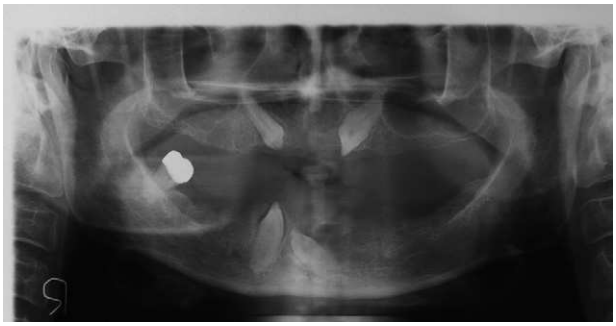

FIGURE 1. Migrated mandibular canine from the left side.

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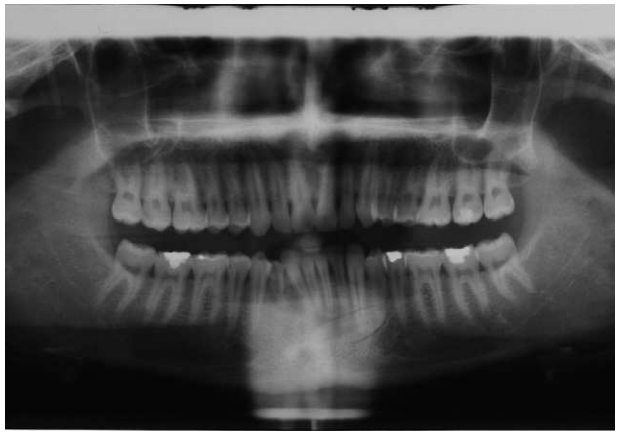

FIGURE 2. Type 3 transmigrant canine and primary canine retained.

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FIGURE 3. The type 2 transmigrated left canine associated with dentigerous cyst.

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FIGURE 5. Canine horizontally impacted near the inferior border of the mandible apices of the premolars on the opposite side (type 4).

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dents that showed 1 transmigrant canine. In our study, we found only 15 transmigrated canines in the 4,500 panoramic radiographs (0.33%). Further studies are necessary to show the incidence of transmigration of canines.

Nodine[15] has described the condition in prehistoric skulls. Thoma[16] described this anomaly in living patients for the first time. Subsequently, different investigators have described cases of various transmigrated mandibular canines. With the advent of panoramic radiography, reports have been more frequent.[8] Some investigators have reported that unilateral cases occur more often than bilateral cases.[1,17] In the present study, all of the transmigrant canines were unilateral, the same as in the literature. In recent reports, the mandibular left canines were found to be affected more often than the right, as in our study.[1,12] In our study, left canines were affected more than right (1.5:1).

According to Joshi,[1,18] females tend to have this condition more frequently than males. It is not possible to offer any plausible reason for this fact. However, it can be observed that most of these patients reported first to the orthodontist for their malocclusion problem, and the impacted unerupted and migratory teeth were detected secondarily during the clinical and radiological examination. Among orthodontic patients, women are usually more common than men, and this would also reflect on such findings.[1] But this gender predilection was different in our study: a total of 15 patients had transmigrated canines, with 6 in females (ages 13-33 years) and 10 in males (ages 13-57 years). In the present study, males tend to have this condition more frequently than females, as in the study by Aydin et al.[13] Aydin et al[13] reported a 1 male:0.33 female ratio in transmigrant mandibular canines. In our study, there was a 1 male:0.67 female ratio for the affected teeth. Joshi and Shetye[18] reported that almost all the transmigrant canines were impacted. In our study, there were no erupted transmigrant canines.

Mupparapu[7] reported that type 1 was most common (45.6%), followed by type 2 (20%), type 4 (17%), type 3

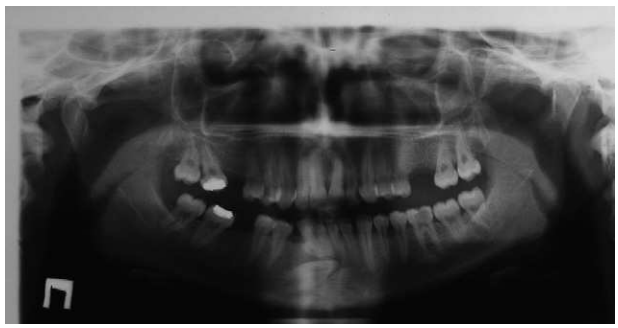

FIGURE 4. Panoramic radiograph showing type 1 transmigrant mandibular canine on the right side.

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FIGURE 6. Panoramic radiograph showing transmigrated mandibular left canine to the midline (type 5).

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Table 2. CLINICAL AND RADIOGAPHIC FEATURES OF TRANSMIGRATED MANDIBULAR CANINES OBSERVED IN THE PRESENT STUDY

Patient Number	Age	Side	Gender	Position	Eruption Status	Type	Primary Canine	Uni/Bi	Other Impacted Teeth	Associated Pathology
1	57	L	M	MA	I	3	CE	Uni	2 (13-23)	None
2	19	L	M	H	I	2	CE	Uni	1 (13)	None
3	24	R	F	H	I	1	CE	Uni	—	None
4	34	L	M	H	I	2	CE	Uni	—	Cyst
5	33	L	F	MA	I	3	CR	Uni	—	None
6	13	L	F	V	I	5	CR	Uni	—	None
7	13	R	F	H	I	2	CR	Uni	2 (13-23)	None
8	21	L	F	V	I	5	CR	Uni	1 (38)	None
9	22	R	M	MA	I	1	CE	Uni	2 (38-48)	None
10	23	L	M	MA	I	1	CE	Uni	6 (18-27-28-37-38-48)	None
11	26	L	M	MA	I	1	CE	Uni	—	Cyst
12	21	R	M	H	I	3	CR	Uni	—	None
13	41	R	M	H	I	3	CE	Uni	—	None
14	13	R	M	MA	I	1	CR	Uni	—	None
15	15	L	F	H	I	4	CE	Uni	—	None

Abbreviations: L, left; R, right; F, female; M, male; MA, mesioangular; H, horizontal; V, vertical; I, impacted; CR, retained primary canine; CE, exfoliated primary canine; Uni/Bi, unilateral/bilateral.

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(14%), and type 5 (1.5%). In the present study, type 1 was most common (33.3%), followed by type 3 (26.7%), type 2 (20%), type 5 (13.3%), and type 4 (6.67%), possibly due to the limited number of cases.

It is difficult to postulate how or why a canine tooth that should have developed on the left side of the mandible actually developed on the right.[2] In a review, transmigrant canines moved across the midline without the influence of any pathological entity.[6] The etiology and exact mechanism of transmigration is still not clear, although a number of factors have been suggested.[8,19] The most likely explanation is a developmental aberration, the crypt of the developing permanent canine being misplaced.[2] Many investigators have speculated about the cause of impacted mandibular canines.[3] These causes are 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.[1,3,8,20,21] Although Mitchell[20] reported a case of displaced mandibular canine associated with trauma 6 years previously, in our study, no patients had trauma history. In this study, 6 primary canines were not exfoliated or extracted. But we do not think there is an etiological factor of this condition for transmigration of teeth. We reviewed panoramic radiographs for any other impacted teeth. Nine patients had no impacted teeth except the transmigrant canine. The others had at least 1 impacted tooth.

The anomaly is properly diagnosed by radiographic evaluation, which is primarily based on the panoramic radiograph. Most transmigrated canines are asymptomatic, although follicular cyst formation and chronic infection with fistula formation and some symptoms such as pain and swelling have been reported.[8] In our 2 patients, the impacted canines were associated with dentigerous cysts. Both of these cysts were infected and painful, and one of them showed a fistula under the mandible extraorally. Of the other transmigrant canines, only 3 patients had symptoms.

Several treatment options proposed for unerupted mandibular canines are surgical removal, transplantation, exposure and orthodontic alignment, and observation. 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. This is especially true when the mandibular arch is crowded and requires therapeutic extractions to correct the incisor crowding.[8] And most surgeons agree that reasons for the impacted mandibular canine should include suspected pathological condition, infection, interference with prosthetic devices, and disturbance of existing dentition, pain, and ectopic eruption.[3] But, if the mandibular incisors are in a normal position and space for the transmigrated canine is sufficient, and if the patient has no symptoms, transplantation may be undertaken. And, if it is mechanically possible to bring the mandibular impacted canine into place, orthodontic treatment may be used. And, some investigators believe that symptomless nonerupted teeth can be left in place, but in these patients, a series of successive radiographs should be taken periodically.[8] We extracted 12 transmigrant canines in this series.

The transmigrated teeth maintain their nerve supply from the original side.[12] Surgical removal of the tooth with an inferior dental nerve block on the migrated side caused pain.[8] Once the contralateral side was blocked, pain ceased. This confirmed the origin of the tooth because it maintained its nerve supply from the original side.[8] If the operation is performed under local anesthesia, it is necessary to take care to anesthetize the transmigrated tooth from the side where it originated. However, if the surgical extraction is done under general anesthesia, this problem does not arise.[1] Both mandibular nerves were blocked when we performed these operations under local anesthesia.

If an impacted mandibular canine is misplaced, located near the inferior border of the mandible, it 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. If the mandibular canine that migrated across the mandible is associated with pathology, it may be removed. Otherwise, it should be kept under observation.

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