

Transmigration of Mandibular Canines - A Rare and Alluring Entity, Case Series of 2 Cases

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Abstract: *Transmigration is a rare entity. The occurrence of transmigration of mandibular canines varies from 0.14% to 0.31%. Canines are considered as cornerstones of the dental arches. In this paper we report 2 cases of impacted mandibular canines migrating through the midline and review the various etiologies and management of transmigration and significance of early recognition. Routine intraoral periapical radiographs may not reveal transmigration and they should be supplemented by a orthopantomogram, especially in a mixed dentition stage if the permanent canine has failed to erupt for more than one year.*

Keywords: transmigration of canines, treatment of transmigrated canine

1. Introduction

According to the scheme of occlusion the canine is intended to be the cornerstone of dentition. Nevertheless, this keystone of the occlusion is found in positional changes more often than any other tooth, and its inability to find its ideal position in the arch is a calamity to the occlusal mechanism.¹ Impaction of various teeth occurs occasionally which may pose a problem during orthodontic treatment. A tooth is deemed to be impacted if it fails to erupt within six months of eruption of its counterpart. Canine is universally accepted to be the second most frequent tooth to be impacted its frequency being about 3%. In spite of the frequent occurrence and our awareness of the problems posed by impacted canines, the aetiology remains obscure. Over the years, numerous researchers have focused on trying to identify specific and non-specific aetiological factors responsible for displacement of canines and several theories have been put forward to explain this anomaly. These can be broadly divided into generalized and localized causes. The generalized ones have been attributed to many diseases, syndromes and systemic factors including hypopituitarism, hypothyroidism, cleidocranial dysostosis, Down syndrome, achondroplasia, hypovitaminosis (A or D), amelogenesis imperfecta and osteopetrosis^{2,3,4} A tooth is considered to be impacted if it fails to erupt in the dental arch past its chronological time of eruption, or six months past the eruption of its counterpart, also if its roots are fully formed and the apical foramina has completed.⁵

In 1971, Tarsitano et al coined the term "transmigration" to describe the displacement and migration of an impacted tooth across the midline to the opposite side of the jaw.⁶ Later, the definition was expanded by Javid⁷ to include cases in which than half of the tooth had passed through the midline. The cause of such displacement could be spontaneous or as a result of a localized pathologic lesion, such as an odontoma or a dentigerous cyst⁸

The incidence of mandibular canines migration across the midline is scarce. The prevalence of impacted maxillary canines has varied from 0.12% in a study conducted by Aras et al.⁹ to 0.34% in another study¹⁰ The occurrence of

transmigration of mandibular canines varies from 0.14% to 0.31%^{10,11}. However, Joshi¹² stated that the tendency of a canine to cross the mandibular midline is a more important consideration than the distance of migration after crossing the midline. There are no clinical symptoms of transmigration, although follicular cyst formation and chronic infection with fistulization have been reported⁷. Due to transmigration aesthetics may be compromised, which might have psychological implications. Canines are considered as turning point in the dental arches. In this paper we report 2 cases of impacted mandibular canines migrating through the midline and review the various aetiologies and management of transmigration and significance of early recognition.

2. Case Series

Case 1

A 19-years-old male reported to the orthodontics department, with the chief complaint of forwardly placed upper front teeth. On Intraoral clinical examination he had all his permanent dentition except for the missing lower right permanent canine. He had Angle's class II division 1 subdivision left malocclusion with end on canine relation on left side [Figure 1 a-d]. His medical and dental history was non-significant. Routine orthodontic diagnostic procedures were carried out including cast analysis, panoramic, occlusal radiograph and lateral cephalogram [Figure 1, e and f]. On orthopantomogram examination we observed the lower right canine to be in a transmigrated horizontal position with crown tip of transmigrated right canine lying below the apex of left permanent second premolar (type 4 of Mupparapu pattern of transmigration)²². To locate the transmigrated canine in 3D position and to check its proximity to mandibular canal and lower border of mandible a sectional CBCT of left side of mandible was done. On CBCT examination buccal surface of canine was located buccoinferiorly with lingual surface of crown facing towards the nerve canal. Buccal cortex in relation to canine was thinned out. As the proximity of most prominent point of canine to lower border of mandible was 0.3 mm and the distance between lingual surface of canine to inferior alveolar nerve was 0.7 mm (figure 2a and 2b) it was decided

to leave the tooth as it till it creates some complications such as a cystic lesion or root resorption of other teeth.

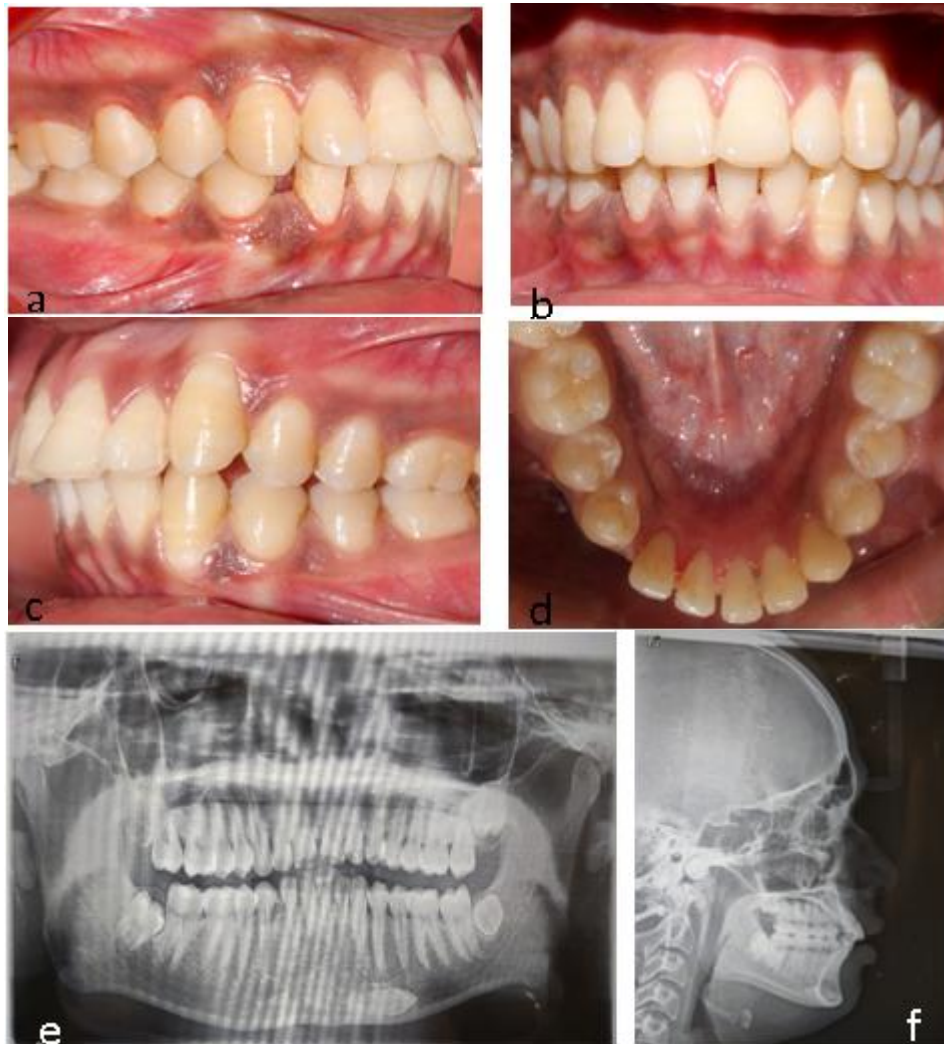


Figure 1: Pretreatment records (a-d) intraoral photographs of the patient showing missing lower right permanent canine, spaced mandibular anteriors and Class II subdivision left buccal occlusion retained (e) orthopantomogram revealing transmigrated lower right permanent mandibular canine with its crown tip lying below the apex of left second premolar (f) lateral cephalogram

Case 2

A 15 year old male patient reported to the department of orthodontics with chief complaint of irregular upper front teeth. Intraoral clinical examination revealed that he had class II subdivision left buccal occlusion with end on canine relationship on left side, retained lower second deciduous molars on both sides and retained lower right deciduous canine. His medical and dental history was non contributory.

All the routine diagnostic procedures were carried out including cast analysis, panoramic, occlusal radiograph and lateral cephalogram. On Orthopantomogram analysis transmigration lower right permanent canine to the left side was seen. The crown tip of the transmigrated canine approximated the mesial surface of root of left permanent canine near its apex (type 2 of Mupparapu pattern of transmigration)²² [Figure 3]

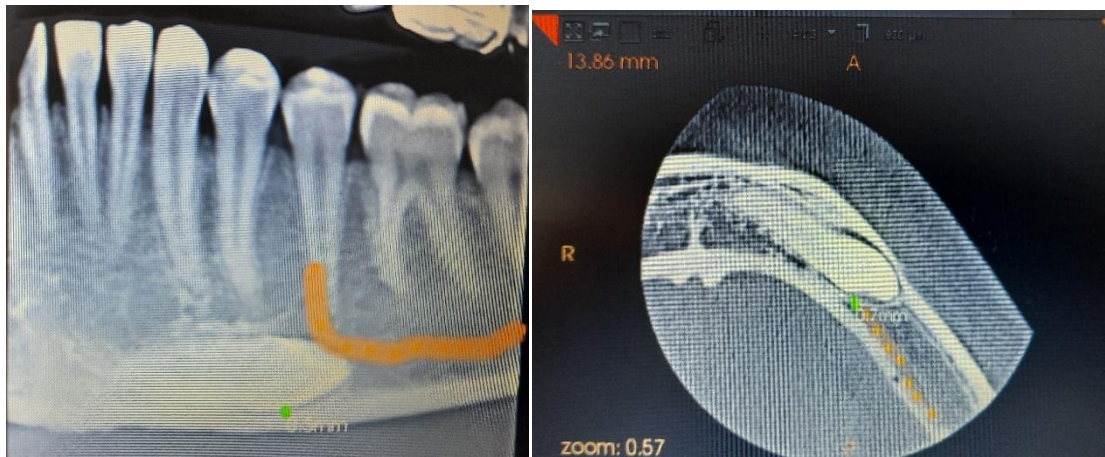


Figure 2: A-sectional CBCT image of left side of mandible showing proximity of 0.3 mm of transmigrated canine from lower border of mandible. b -CBCT image showing proximity of 0.7 mm of lingual surface of canine from the inferior alveolar nerve



Figure 3: Orthopantomogram of case 2 showing the crown tip of transmigrated canine near the apex of opposite side permanent canine

3. Discussion

The phenomenon of transmigration has been reported most frequently in permanent canines especially the mandibular canines¹³. The frequency of transmigration is higher with mandibular canines because of greater cross sectional area of anterior mandible and greater distance between root apices and lower border of mandible¹⁴. This entity is rare with maxillary canines because of lesser distance between roots of incisors and floor of nasal cavity and closer proximity between roots.

A specific aetiology of this oddity is unknown, but certain causative factors such as trauma, heredity, the long eruption path of canine tooth germs, premature loss of primary teeth, hypodontia, space being filled up by an adjacent tooth, tooth size disharmony, unfavourable alveolar arch length, fractures with displacement of tooth bud have been suggested¹². The incidence of transmigration also depends upon the angle formed between midsagittal plane and long axis of canine. If the angle formed by the midsagittal plane

and unerupted canine is less than 30°, transmigration is unlikely. If the angle is between 30° and 50° canine may tend to cross the midline. When the angle exceeds 50°, crossing the midline becomes a rule¹⁵. It was suggested that there would be a greater distance of travel in older patients because a longer time had been available for the migratory canine to travel¹⁵. It was suggested by Noidine¹⁶ that even a very small hindrance, such as a small root fragment or an odontoma, would be sufficient to deflect a tooth from its normal path of eruption. Ando et al¹⁷ suggested that agenesis of permanent lateral incisors may result in deviated path of eruption and hence the transmigration.

Al-Waheidi¹⁸ suggested that there is an association between transmigration and appearance of a cystic lesion and that a cyst at the crown of the canine may facilitate the migration process. But this belief has been opposed by some authors, such as Joshi and Howard, who did not report any associated cystic lesions with transmigration. Therefore, the role of cystic lesions in the etiology of transmigration is difficult to determine. A cyst being an expansive lesion is more likely to

displace the tooth in any direction in the path of the least resistance. Among the transmigrated mandibular canine, cases reported here, were not found to be associated with any pathology. Javid suggested a hypothesis that an abnormally strong eruption force, moves the canine through the dense symphysis and that the conical shape of canine may be a reason of transmigration⁷. However, this hypothesis was refuted because by the time the canine migrates ectopically, the mandible has transformed into a single bone and the symphyseal remodelling is complete. Vichi and Franchi proposed that agenesis of the neighbouring teeth, in particular the lateral incisor, may favour retention of the primary canine and that the surplus of space in the dental arch may account for the absence of a correct guide for eruption. They stated that the unerupted canine deviates from its normal developmental site and moves to a horizontal position, migrating through the symphyseal bone only if enough space is available in front of the mandibular incisors¹⁹.

Since the transmigrated teeth maintain their nerve connection to the original side where their tooth germ was formed it is important to anaesthetise the nerve on the original side²⁰. Transmigration of tooth is generally a unilateral phenomenon, but 16 cases of bilateral transmigrations have been reported. There a slight female predilection (1.6 : 1) for transmigration and left side is involved more as compared to right side²¹. Mupparapu had classified the transmigrated canines based on patterns of intraosseous transmigration²². These are summarized as follows.

Type 1. The canine is impacted mesioangularly across the midline, labial, or lingual to the anterior teeth with the crown portion of the tooth crossing the midline.

Type 2. The canine is horizontally impacted near the inferior border of the mandible below the apices of incisors.

Type 3. The canine has erupted either mesial or distal to the opposite canine.

Type 4. The canine is horizontally impacted near the inferior border of the mandible below the apices of either premolars or molars on the opposite side.

Type 5. The canine is positioned vertically in the midline with the long axis of the tooth crossing the midline.

Treatment modalities of transmigrated canines are varied such as surgical extraction, transplantation, exposure and orthodontic alignment¹³. But out of all these the most adopted treatment is surgical extraction. This is especially preferred when the mandibular arch is crowded and requires therapeutic extractions to correct the incisor crowding. If there is sufficient space for transmigrated canine and mandibular incisors are in normal position then transplantation can be undertaken¹³. Howard had done a successful transplantation of transmigrated canine when there was enough space to accommodate the tooth¹⁵.

Wertz proposed orthodontic traction to bring a labially impacted transmigrated canine into position²³. In some situations like if the crown of such a tooth migrates 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 it into place. Taguchi et al reported considerable improvement in the position of those

canines associated with an odontoma, after removal of the odontoma and surgical exposure²⁴ while some believe that symptom free and nonerupted teeth can be left in situ²⁵. These patients require a regular follow up with a series of successive radiographs to be taken periodically. A progressive worsening of the position of the unerupted canine or appearance of any cystic change of the follicle should consider the possibility of surgical extraction. There are certain specific indications for the surgical extraction of transmigrated canines such as if it causes pressure resorption of the roots of adjacent teeth, periodontal disturbances, or other possible foci for sepsis, prosthetic problems, malalignment of the adjacent teeth, and neuralgic symptoms¹³.

Patients presenting with transmigration have an age range of 8–62 years^{13,20} and this suggests that migration typically starts at age of 6–8 years when root formation has not been completed. If the permanent mandibular canine is missing from the arch or is lagging more than one year behind the normal eruption schedule then the possibility of transmigration should be suspected. Intraoral periapical radiographs will not always reveal an impacted canine or transmigration and therefore the importance of panoramic radiograph as a screening radiograph, when there is delay in eruption of permanent canine for more than one year, cannot be infringed as at later stage the treatment of transmigrated tooth will be more cumbersome. This outweighs the radiation risk if impacted or transmigrated canine is found, and we consider the complications associated with transmigration and its complicated treatment. It is advisable to always check for angulation of mandibular canine with midsagittal plane in every screening orthopantomogram. If the angulation is above approximately 30°, patient should be recalled for periodic assessment after every 3 months.

4. Conclusion

Transmigration of the mandibular canine is a rare phenomenon, and timely screening radiographic examination of a patient is crucial for treatment planning. Routine intraoral periapical radiographs may not reveal transmigration and they should be supplemented by a orthopantomogram, especially in a mixed dentition stage if the permanent canine has failed to erupt for more than one year. The side from which the transmigrated tooth originated should be anaesthetised before surgical extraction. Angulation of long axis of unerupted canine with midsagittal plane should always be checked in mixed dentition period and if the angulation exceeds 30 degrees then the patient should be kept on a periodic follow up protocol²⁶. An early and prompt diagnosis and treatment of transmigration would lead to better management and lesser complications associated with transmigrated canine.

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