

CASE REPORT

PATTERN OF BILATERAL TRANSMIGRATION OF IMPACTED MANDIBULAR CANINES: A RADIOGRAPHIC STUDY OF 3 CASES

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INTRODUCTION: Migration of a tooth across the midline is called TRANSMIGRATION which is a rare anomaly. Nodine (1943)¹ & Thoma (1952)² observed this condition in pre-historic skulls & living patients respectively. Ando et al (1964)³ were the first to use the term "transmigration". Tarsitano (1971)⁴ et al defined transmigration as the phenomenon of an unerupted tooth crossing the midline. Javid (1985),⁵ expanded the definition to include, more than half the tooth which had passed through the midline. Joshi (2001)⁶ felt that the tendency of a canine to cross the barrier of the midline suture is more important consideration than the distance travelled.

Transmigration is mainly associated with impacted teeth. Though all permanent teeth may be impacted, yet mandibular and maxillary third molars, maxillary canines, maxillary and mandibular premolars, mandibular canines and maxillary central incisors are the teeth most frequently involved in the mentioned order. Maxillary canine impaction is a well-known dental anomaly and its incidence is in the range 0.8–2.8%.⁷ Mandibular canine impaction is less frequent. It is observed that transmigration involves almost exclusively mandibular and maxillary canines. Literature reports transmigration of mandibular canines are much higher than those of maxillary canines.⁸ Of the reported cases of transmigration, the bilateral type of transmigration is even rare, very few cases have been reported so far.⁹ Mupparapu has proposed a classification for both unilaterally and bilaterally transmigrating mandibular canines. (Figure 1 & 2) Documented cases of bilateral canine transmigration and the patterns of transmigration were studied in depth for this report, and 3 new cases are added.

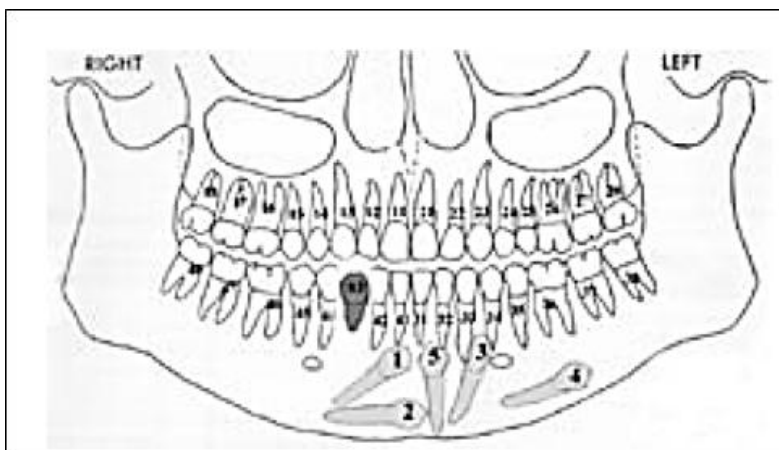


Fig. 1: Diagrammatic representation of the five distinct patterns of unilateral transmigration of mandibular canines by Mupparapu

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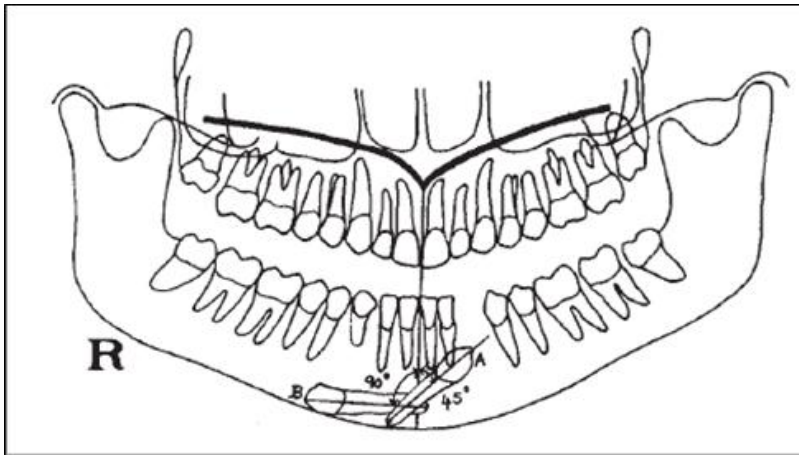


Fig. 2: Diagrammatic representation of transmigrating mandibular canines axially inclined at 45- and 90-degree angulations from the midsagittal plane by Mupparappu

CASE REPORTS: A 20-year-old man reported to the Department of Oral Medicine and Radiology, I.T.S dental college, Greater Noida, India, with a chief complaint of mobile tooth in mandibular anterior tooth region. Panoramic radiographic examination revealed that the canines were bilaterally transmigrating. The mandibular right canine appeared to be inferiorly positioned compared to the mandibular right canine. (Fig 3)



Fig. 3: Type III subtype A. Transmigrating canines positioned one above the other in the symphyseal region. The canine inclination is close to 90 degrees from the midsagittal plane

A 45-year-old man reported to the Department of Oral Medicine and Radiology, I.T.S dental college, Greater Noida, India, with a chief complaint of mobile tooth in mandibular anterior tooth region. Panoramic radiographic examination revealed that the canines were bilaterally transmigrating. The mandibular right canine appeared to be inferiorly positioned compared to the mandibular right canine. (Fig 4)

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Fig. 4

A 23-year-old man reported to the Department of Oral Medicine and Radiology, I.T.S dental college, Greater Noida, India, with a chief complaint of missing tooth in mandibular anterior tooth region. Panoramic radiographic examination revealed showed bilaterally transmigrating mandibular canines in the symphyseal region, with impacted incisors. For relevant positioning of central, lateral incisors and canines patient was subjected to CBCT. (Fig. 5 & 6)



Fig. 5: Type I subtype A. Bilaterally transmigrating mandibular canines near the symphysis region. The right canine is crossing the midline, and the left canine is near the midline.

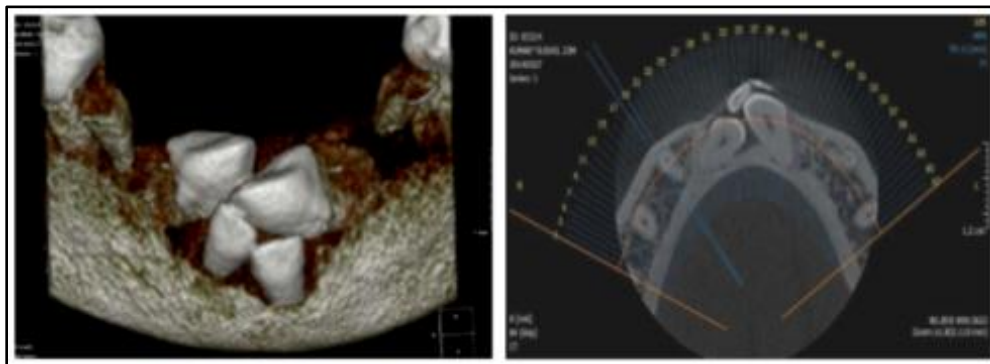


Fig. 6: CBCT image shows: 33 & 43 - Oblique mesioangular impaction is noted in the sub-crestal region of alveolus with incisal edge of crown indenting the alveolar crestal region in the midline mandible. 32 & 42 - Oblique vertical impaction noted in left anterior mandibular midline region, on the labial aspect of crown of impacted tooth 33 & 43.

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DISCUSSION: Though the etiology and exact mechanism of transmigration is still not clear, over the years various probable factors have been associated. These are anomalous position of tooth germ,⁹ displacement of dental lamina in the embryonic life,^{10,11} strong eruption force,^{5,6} agenesis of the adjacent teeth,¹² premature loss of deciduous teeth,³ retention of canines,¹² crowding,¹ spacing,¹² supernumerary teeth, excessive length of crown¹, bony pathology resembling a cystic lesion,^{2,13,14,15} tumors, cysts, odontomas,¹⁶ genetic role,^{17,18} fracture¹⁰ and idiopathic causes. Howard observed that impacted mandibular canines that lie between 25 and 30 degree in the midsagittal plane do not migrate across the midline whereas between 30 and 95 degree tend to cross the midline.¹⁹ Vichi et al¹² proposed that proclination of the lower incisors, increased axial inclination of the unerupted canine and an enlarged symphyseal cross-sectional area of the chin may be favourable conditions for transmigration. Studies have shown that bilateral transmigration of canines is rare. In the context of bilaterally transmigrating mandibular canines, it is essential to study the canines based on the eruption status, pattern of migration, and projected eruption path. Mupparapu classification helps to predict the eventual eruption pattern of solitary mandibular canines that are transmigrating. (Table 1 & 2) A total of 14 cases of bilateral mandibular canine transmigrations were previously reported in the English literature and 3 new cases are added with this report. (Tables 3 & 4) From the literature review, the most common type of bilateral canine transmigration noticed was type I subtype A (60%), followed by type III subtype A (22%) and type II subtype A (9%). In our case reports 2 were type III subtype A, 1 was type 1 subtype A. Type II bilateral transmigrations may be candidates for guided eruption as well as orthodontic repositioning on the opposite side of the arch, as the inclination of the long axis is more favorable for orthodontic treatment, provided the teeth attempt to erupt in the region of the opposite canine. Type I and type III bilateral transmigrations are difficult to treat orthodontically because of their positional inclination within the mandible.²⁰ Qaradaghi²¹ had name "kissing canines" or "mirror image canines" which is defined as the migration of both canines at the same rate and on the same horizontal axis parallel to each other and meeting each other at the midline. (Figure 7) A proper documentation and categorization of the patterns of eruption would help the clinician formulate appropriate treatment to restore esthetics and function without loss of any natural teeth. Transmigration of the permanent canine is a rare dental anomaly. It is important to diagnose this condition at earlier stages of migration to prevent more complex problems. Clinicians should be encouraged to report more cases of this condition to enable further classification and a better understanding of this rare anomaly.

Type I	Canine positioned mesio-angularly 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 incisor teeth.
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 contralateral side.
Type 5	Canine positioned vertically in the midline with the long axis of the tooth crossing the midline.

Table 1: Mupparapu's proposed classification of unilaterally transmigrating mandibular canines

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Type I	Mandibular canines transmigrate across the midline, and the final position is around the midsymphyseal region with most of the crown and root portions on the opposite side of the midsagittal plane with a long-axis inclination of less than 45 degrees to the midsagittal plane (Fig 6).
Subtype A	Only 1 canine completely crosses the midline and the other canine is just at the midline, or both partially cross the midline.
Subtype B	Both canines completely cross the midline.
Type II	Mandibular canines transmigrate across the midline, and the final position of the canines is anywhere between the midline and the canine region of the opposite side with a long-axis inclination of 45 to 90 degrees to the midsagittal plane
Subtype A	Only 1 canine completely crosses the midline and the other canine is just at the midline, or both canines partially cross the midline.
Subtype B	Both canines completely cross the midline.
Type III	Mandibular canines transmigrate across the midline having a long-axis inclination of about 90 degrees. Essentially, the teeth are horizontally positioned within the body of the mandible. The final position of both transmigratory canines may vary anywhere from the midsymphyseal region to the opposite canine region or beyond
Subtype A	Canines are positioned within the symphysis region, one above the other.
Subtype B	Canines are within the body of the mandible but occupy a distinct and separate position on opposite sides beyond the midsymphyseal region, far from their ideal position within the arch.

Table 2: Mupparapu's proposed classification of bilaterally transmigrating mandibular canines

CASE NO.	AGE	SEX	AXIAL INCLINATION	TYPE	RETAINED DECIDUOUS	DENTAL ANOMALIES	ASSOCIATED PATHOLOGIES
1.	20	M	90 DEGREE	TYPE III SUBTYPE A	RETAINED 73,83	-	-
2.	45	M	90 DEGREE	TYPE III SUBTYPE A	RETAINED 73,83	-	-
3.	23	M	45 DEGREE	TYPE1 SUBTYPE A	RETAINED 73,83	IMPACTED 32,42	-

Table 3: Clinical and radiographic features of transmigrated mandibular canines observed in the present series of 3 patients

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Author	Journal/year	Categorization using the proposed classification	No. Of cases reported	Associated pathology
Cowman and Wooton ²⁰	N Z Dent J, 1979	Type I subtype A	1	None
Joshi et al ²¹	Br J Orthod, 1982	Type III subtype A	1	None
Joshi MR ²⁷	Angle Orthod, 2001	Type I subtype A	1	None
Al-Wahedi ¹²	Quintessence Int, 1994	Type III subtype A	1	none
Javid ²²	Int J Oral Surg, 1985	Type I, subtype A (final positions not reported for 2 cases)	3	none
Jalili ²³	J Indian Dent Assoc, 1986	Type I subtype B	1	none
Gadgil ²⁴	Oral Surg Oral Med Oral pathol 1986	Type I subtype A	1	All incisors impacted impacted along transmigrated canines
Mehta et al ²⁵	J Indian Dent Assoc, 1986	Type I subtype A	1	none
Kuftinec et al ²⁶	J Am Dent Assoc, 1995	Type I subtype A	1	none
Aydin and Yilmaz ²	Dentomaxillofac Radiol, 2003	Type III subtype A	1	none
Mupparapu et al	Quintessence Int, 2007	Case 1: Type I subtype A Case 2: Type II subtype A Case 3: Type III subtype A Case 4: Type I subtype A Case 5: Type I subtype A	5	Case 3: Cyst associated with the crown of the left canine; none associated with remainder
Idris Faiq Qaradaghi	Rev Clín Pesq Odontol. 2010	Case 1: Type 1 subtype A Case 2: Type 1 subtype A	2	None

Table 4: Characteristics of previously reported and new cases of bilaterally transmigrated mandibular canines

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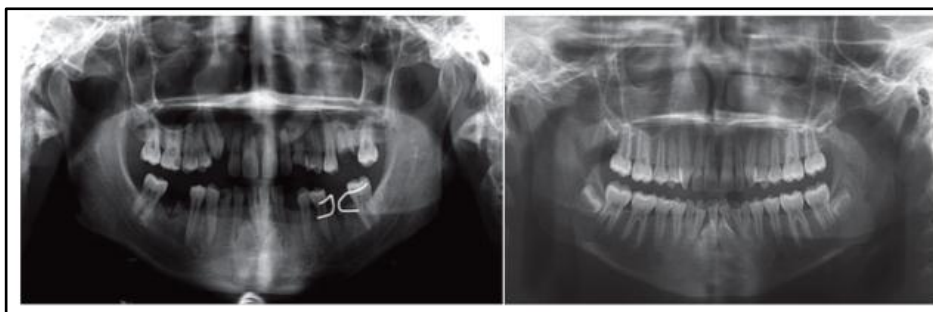


Fig. 7: Both lower canines have crossed the midline and kissed each other with labial surfaces

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