

# Concomitant occurrence of type IV canine transmigration in association with other dental variations -a rare case report

## Abstract

Human being can exhibit variations in dentition pertaining to the tooth size, shape, structure and composition resulting in diverse group of developmental dental anomalies when disturbance occurs during tooth formation. Dental literature shows occurrence of either single or two dental anomalies in a single patient. Occurrence of multiple dental variations in an individual is an extremely uncommon phenomenon. The present research article illustrates the concomitant occurrence of different dental anomalies and variations pertaining to tooth eruption pattern, congenital tooth agenesis and tooth shedding process. As development of such multiple dental malformations in a non-syndromic, single patient is an extremely rare entity, it is worth to record and publish such rare dental variations to the existing dental literature to enhance the quality of dental research treasure. Hence, the present case was recorded, and the research paper was drafted and published.

**Keywords:** canine tooth transmigration, concomitant occurrence, dental developmental anomalies, over-retention of primary canine, rudimentary maxillary third molars

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## Introduction

Tooth anomalies involving the shape, composition, number, size, structure of the root or crown portion of a tooth can occur when the disturbance occurs during developmental process. Diverse array of such tooth malformations can be seen either in erupted tooth or in impacted tooth.<sup>1-3</sup> 'Tooth transmigration' is the developmental disturbance involving eruption pattern of the tooth referring to a condition when the impacted tooth instead of erupting into the oral cavity moves within the alveolar bone and crosses the dental midline and moves towards opposite side of the dental arch.<sup>4</sup> Therefore, this condition is always seen in impacted tooth and its exact etiology is not known. Various factors such as developmental, environmental and genetic factors may play role in tooth transmigration.<sup>5</sup> Permanent mandibular canine is the most common tooth influenced by transmigration; however, maxillary canine and incisor tooth have also been reported with transmigration though their occurrence is rare.<sup>6-8</sup> This condition should be differentiated from 'tooth migration' where the impacted tooth migrates distally rather than crossing the midline. In dental literature this pattern of tooth migration is also referred as 'paramolar wanderung' in which mainly permanent premolars are affected.<sup>9</sup> There are no reports showing occurrence of transmigration involving primary canines or any other tooth. Most of the time, it is asymptomatic and found accidentally following radiographic examination like panoramic radiograph. The reported prevalence of mandibular canine transmigration ranges from 0.1% to 0.78% in general population.<sup>4</sup> This condition is seen associated with retained primary tooth or agenesis of adjacent tooth.<sup>1-3</sup>

Tooth agenesis is the most common dental entity seen in many cases involving the third molars, maxillary lateral incisors and mandibular premolars. Congenital agenesis of the mandibular third molar is the developmental absence involving either one or both third molar. This finding is more common, reported with a prevalence of 20-35% across the globe among different population.<sup>3</sup> This dental entity is considered a normal evolutionary change, as human jaw sizes have

gradually decreased. More commonly it can occur as non-syndromic and an isolated form. It is noted that agenesis of other teeth increases the chance of third molar agenesis. Pertaining to maxillary third molars developmental disturbances including agenesis, malformation in shape and size can be noticed. Indian rare case report illustrated occurrence of multiple cusps (6 supernumerary cusps) in association with dental evaginatus in a maxillary third molar.<sup>1</sup> In this case the maxillary third molar appeared like a 'flower' shape due to presence of six supernumerary cusp with centrally placed dens evaginatus or central tubercle or occlusal tubercle. Another report showed occurrence of impacted maxillary third molar which had intra-coronal resorption associated with large periapical cyst diagnosed in a 73-year-old female Indian patient.<sup>2</sup> Rudimentary third molars exhibit small abnormal size and shaped crown with short, blunt and fused roots resembling supernumerary fourth molars or distomolars. Literature shows reports on individual occurrence of dental anomalies. Concomitant occurrence of multiple dental anomalies and dental variations in a non-syndromic patient is an uncommon scenario. Hence, the purpose of this article is to illustrate the occurrence of type IV mandibular canine transmigration associated with congenital agenesis of mandibular bilateral third molars and impacted rudimentary maxillary bilateral third molars in a single, non-syndromic Indian female patient.

## Case details

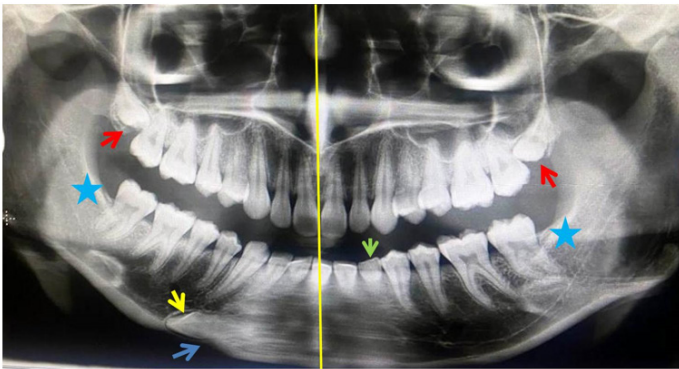
A 24-year-old female patient reported to a private dental clinic complaining of pain in the upper right tooth region from past three days. Patient was apparently normal with normal built and gait. There were no signs and symptoms of any systemic, metabolic or syndromic conditions. Past dental history did not reveal any previous dental treatment. On intraoral examination, deep periodontal pockets were detected in the maxillary right quadrant in relation to the 16 and 17. In addition 18 appeared impacted causing discomfort to the patient. Further examination of the oral cavity revealed over-retention of the 73 and clinical absence of 33. For complete evaluation of deep periodontal pocket and to rule out the clinical missing of 33, patient

was subjected to panoramic radiograph examination (Figure 1). The details of the patient along with clinical features and radiographic findings are explained in detail as shown in Table 1. Considering

chief complaint of the patient, scaling and deep curettage of pockets followed by surgical removal of the third molar was planned.

**Table 1** Elaborative details of the patient with impacted and transmigrated mandibular left canine

Age	Gender	Chief Complaint	Clinical Features	Radiographic Features (Figure 1)
24 years	Female	Pain in the upper right back tooth region.	Over-retained primary mandibular left canine.	Permanent mandibular left canine horizontal impacted, transmigrated and seen below the roots of right premolars at the lower border of the mandible and ahead to mental foramen.
			Clinically missing permanent mandibular left canine.	Congenital agenesis of mandibular third molars.
			Clinically missing mandibular right and left third molars.	Rudimentary shaped impacted maxillary third molars. <sup>18</sup>
			Rudimentary shaped maxillary bilateral third molars. <sup>18</sup>	Over-retention of 73 with complete length of root and no root resorption.
				Pronounced notching of the inferior border of the mandible in relation to the transmigrated canine.



**Figure 1** Panoramic radiograph depicting the transmigrated 33 (yellow arrow) crossing midline (yellow line) located in opposite arch below the roots of right mandibular premolars, congenital agenesis of 38, 48 (blue stars), pronounced notching in the inferior border of the mandible (blue arrow), over-retained 73 (green arrow) and impacted rudimentary maxillary 18, 28 (red arrows).

Discussion

Transmigrated mandibular canines rarely detected unless they become symptomatic as they are always impacted within the alveolar bone. Hence the prevalence studies showing the incidence of canine transmigration among different population across the globe are not found as it requires unnecessary radiographic imaging. Those few studies which documented the prevalence have collected the retrospective radiographic data of the patients using radiographs performed for other dental purpose.<sup>4</sup> In the present case too transmigrated mandibular left canine was detected on incidental radiographic examination. Compared to migration of canine, transmigration is pre-eruptive movement of the tooth across the midline. Maxillary canines rarely show transmigration although they are impacted 20 times more compared to the mandibular canines.<sup>10-12</sup> Panoramic radiographs are essential for identification of tooth transmigration. Recently an advanced image technique like Cone-Beam Computed Tomography (CBCT) scan provides more precise diagnosis as it gives complete picture of the transmigrated tooth and its status like its exact location, relation with adjacent roots,

resorption, calcific metamorphosis, bony ankylosis and adjacent vital anatomic structures. Three-dimensional imaging of transmigrated canine is essential when it becomes symptomatic and associated with any cysts or tumour formation or causing bone erosion as it requires surgical removal in such cases.<sup>4,10</sup> However, in the present case CBCT image could not be done considering cost of the procedure. Sometimes transmigrated canines appear at the lower border of the mandible in close proximity with mandibular canal or foramen and mental foramen. Therefore it is important to study such teeth in detail during surgical removal or orthodontic movement of the tooth.<sup>4</sup> If the transmigrated canine is impinging on the mandibular nerve it causes neurologic complications in a patient. Hence, periodic observation of the transmigrated canine is required to avoid complicated future sequel. In the present case, the transmigrated mandibular left canine found asymptomatic although it was located at the lower border of the mandible.

The exact cause of canine transmigration is not clearly explained in the literature. It is described to result from a combination of factors including crowding, genetic and developmental factors and the presence of local anomalies like odontomas, over-retained primary teeth and cysts. Premature loss or over-retention of primary teeth disrupt the normal path for permanent canines leading to transmigration. The presence of follicular cysts, odontomas or other benign tumours can interfere with the eruption of the canine, pushing it into an abnormal position. Presence of supernumerary teeth can also occupy space in the dental arch and contribute to impaction and transmigration of canines. Additionally, some individuals may have a genetic tendency for this anomaly to occur. Another factor like abnormal tooth germ position like mesio-angular and horizontal rotation being a major contributor. Moreover, certain systemic conditions such as Down's syndrome, cleidocranial dysostosis, and fibrous dysplasia have been associated with impacted and transmigrated teeth.<sup>4-8</sup> Based on orientation of the transmigrated canine with dental midline, Mupparapu has given radiographic classification.<sup>13</sup> According to this, five types of canine transmigration are described and it is given only for mandibular canine (Table 2).<sup>13</sup> Based on this classification, the transmigrated mandibular left canine in the present case was categorized as Type 4 as the impacted canine was located horizontally near the lower border of the mandible, situated below the opposite premolars. In

addition to this pronounced notching of the inferior border of the mandible was observed in relation to the impacted canine. However, there are drawbacks pointed out by other researchers in Mupparapu’s classification such as bilateral occurrence of canine transmigration is not mentioned.<sup>14–16</sup> So a recent research has given new classification system termed MBS classification which classified transmigrated into main five types with its subgroups considering the several criteria like the distance travelled by the transmigrated canine, unilateral or bilateral occurrence and the axial angulation of the canine with

the dental midline (Table 3).<sup>14</sup> Based on this classification, the transmigrated canine of the present case was classified into Group IV as the canine was located distal to the mental foramen and in horizontal position. Precise classification of mandibular canine transmigration helps in planning appropriate treatment protocol. In this case, as the transmigrated canine was asymptomatic and located at the inferior border of the mandible, no treatment was done and only observation was advised.

Table 2 Mupparapu classification of mandibular canine transmigration<sup>13</sup>

Types	Description
Type 1	The canine is impacted in a mesioangular position, with its crown crossing the midline, either labially or lingually to the incisors.
Type 2	The canine is impacted horizontally below the apices of the incisors, near the inferior border of the mandible.
Type 3	The canine is erupting either to the mesial or the distal side of the opposing canine.
Type 4	The canine is impacted horizontally near the inferior border of the mandible, situated below the apices of the opposite premolars or molars.
Type 5	The canine is positioned vertically at the midline, but its long axis crosses the midline.

Table 3 MBS classification of mandibular canine transmigration given by Mohan et al<sup>14</sup>

Types	Description
Group I	Partial crown transmigration. It can be a) Vertical b) Oblique c) Horizontal
	Complete crown transmigration. It can be a) Vertical b) Oblique c) Horizontal
	Complete crown with partial/complete root transmigration: mesial to mental foramen. a) Vertical b) Oblique c) Horizontal
	Transmigration seen distal to mental foramen: Mostly horizontal
Group V	Bilateral transmigration

The important clinical feature exhibited with impacted and transmigrated canines is over-retention of the primary tooth or clinical absence of particular permanent tooth. When a dental practitioner encounters such scenario, the subject should be made to undergo thorough radiographic survey to rule out tooth transmigration. Therefore, it is always better to evaluate the patient between 9 and 11 years during the eruption time of mandibular canine and also to check for the timely exfoliation of the primary canine.<sup>17</sup> This protocol helps in suspecting an impaction and transmigration of tooth and its appropriate diagnosis and timely treatment. Even in the present case the primary mandibular left canine was still stable and over-retained at the age of 24 years clearly indicating some hidden dental pathology. Survival status of the over-retained primary tooth most of the time depends on presence of underlying permanent successor. If the permanent successor is congenitally missing, the retained primary tooth survives stable for long time as the root resorption is slow in such cases.<sup>17</sup> In the case presented here, even at the age of 24 years there was no root resorption observed, and was stable and firm without evidence of tooth mobility as the impacted permanent canine is moved and found in opposite side of the dental arch. Moreover, there are reports showing retention of primary tooth at the age of 55 to 60 years.<sup>17</sup> Treatment of over-retained primary tooth depends on

many factors like the condition of the tooth, presence of underlying permanent successor and age of the patient. If the retained primary tooth is stable only wait and watch protocol is helpful.<sup>17</sup> When the retained primary tooth shows mobility or root resorption, extraction followed by placement of implants is the suggested choice of treatment. If the underlying permanent tooth is found in favourable position, removal of primary tooth followed by orthodontic movement is essential.<sup>17</sup> In the present case, as the retained primary tooth was firm with complete root length without evidence of root resorption or tooth mobility, wait and watch protocol was indicated. The uniqueness of the present case is that transmigrated canine was found very close to the lower border of the mandible leading to notching in the mandible which is not found in previous cases. In addition, agenesis of mandibular bilateral third molars were evident along with rudimentary maxillary bilateral third molars which is not reported in previous published cases of transmigration. Although congenital agenesis of mandibular third molars is most commonly found, it does not require any treatment. Rudimentary maxillary third molars develop due to nature’s evolutionary change in order to accommodate the smaller jaw size. Proper oral hygiene maintenance is indicated to prevent development of dental caries and periodontal disease around the rudimentary molars.<sup>18</sup>

## Conclusion

Dental practitioners can come across incidence of over-retention of primary teeth or delay in exfoliation of primary teeth or clinical missing of any permanent tooth. Therefore, thorough knowledge and awareness about the occurrence of canine transmigration associated with such conditions is mandatorily needed among all clinicians for early prevention and detection of canine tooth transmigration to provide optimal dental care to a patient.

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## Conflicts of interest

The authors declared that there are no conflicts of interest.

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