



## Inversion of impacted mesiodens: Report of Case series with literature review

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### Abstract

Mesiodens are the interesting anomalies among supernumerary teeth and represents those teeth located between two central incisors in the midline. In this article, different variations of mesiodens occurrence like “inversion of mesiodens” are presented in case series found in Indian patients and various classification systems are discussed. Reporting of an uncommon dental anomalies are always great in enhancing the scientific evidence in the web of knowledge.

**Keywords:** Inverted mesiodens; Impaction; Mesiodens; Supernumerary tooth; Surgical Removal

## INTRODUCTION

Mesiodens are the most common type among the all types of supernumerary teeth found in the premaxilla between two central incisors. When mesiodens is located near the premolar it is termed as ‘peridens’ and when it is located near the molar it is called as ‘distodens.’ The term “Inversion” is defined as “the malposition of a tooth in which the tooth has reversed and is positioned upside down” [1]. Among supernumerary teeth, mesiodens tooth is the one which exhibited inversion phenomenon more frequently compared to distodens or peridens. Mesiodens usually occur in the dental midline and shows three types of eruption pattern such as are normal, inverted and horizontal [2]. Among these normal one is the most common pattern of eruption. Inverted mesiodens are characterised by conical shaped crown with a single root. These teeth usually take an abnormal path of eruption or erupt in an ectopic position and remain impacted within the bone. In inverted eruptive path, the crown of the mesiodens is pointing downwards towards the nasal floor and root apex is facing the alveolar crest. The frequency of its occurrence is reported as 9-67% in the general population [1-3]. Most of the time, inverted mesiodens remains asymptomatic; however, sometimes they are usually seen associated with various clinical problems like cyst formation, nasal eruption of the mesiodens, rotation of the central incisors, diastema, root resorption of adjacent teeth, displacement or eruption disturbance of adjacent teeth and recurrent rhinitis [1-5]. Asymptomatic mesiodens are usually diagnosed accidentally on routine radiographic examination. Different radiographs used for diagnosis of impacted mesiodens are intraoral periapical radiograph, occlusal and orthopantomography. Apart from these conventional radiographic techniques, advanced imaging tools used are Computed Tomography (CT) scan or Cone beam computed tomography (CBCT) [2-5]. Author in the previous publications, reported the prevalence and different types of mesiodens occurred in Indian population [6,7]. In this paper, author has made an effort to add some more insight for previous published literature. Therefore, the purpose of this article is to present four cases of inverted mesiodens which were diagnosed in four Indian patients.

## CASE SERIES

The detailed description of inverted mesiodens which were found during routine dental check-up of four Indian patients is mentioned in Table 1 (Figure 1 to 4). The age of the patients ranged from 9 to 11 years. There were two males and two females. All mesiodentes were diagnosed following radiographic examination taken for other reasons using

conventional intra-oral periapical radiographic (IOPA) technique. In all inverted mesiodens, crown appeared conical in shape with a single root. In three patients inverted mesiodens were associated with vertical mesiodens which erupted in normal vertical eruption pattern in the dental midline between two central incisors (Figure 1 to 4). In one case, inverted mesiodens was associated with cyst formation. In all four cases, all mesiodentes including both inverted and vertically erupted were removed surgically under local anesthesia.

**Table 1: Elaborative presentation of case series found with inversion and impaction of mesiodens**

Sl. No.	Age (in years)	Gender	Location of inverted mesiodens	Associated anomalies	Treatment provided
Case No. 1 (Figure 1)	10	Male	At the root apex of left central incisor	Impacted mesiodens (Horizontal type)	Surgical removal
Case No. 2 (Figure 2)	9	Male	Mesial to and at middle third root of right central incisor	Erupted mesiodens (Normal type)	Surgical removal
Case No. 3 (Figure 3)	11	Female	Above right central incisor	Erupted mesiodens (Normal type)	Surgical removal
Case No. 4 (Figure 4)	12	Male	At the root apex of left central incisor	Erupted mesiodens (Normal type)	Surgical removal

**Figure 1: Intra-oral periapical radiograph showing inverted and impacted mesiodens (yellow arrow). Another mesiodens in Horizontal position (blue arrow) can also be seen. [CASE NO. 1]**



**Figure 2: IOPA showing inversed mesiodens with conical shaped crown and single root (yellow arrow). Presence of a vertical erupted mesiodens (blue arrow) can be seen. [CASE NO. 2]**



**Figure 3: Inverted mesiodens located above the right central incisor (yellow arrow). Vertically erupted another mesiodens can be seen (blue arrow). [CASE NO. 3]**



**Figure 4: Inversion of impacted mesiodens located at the root apex of left central incisor (yellow arrow). [CASE NO. 4]**



## DISCUSSION

Mesiodens is a supernumerary tooth usually seen in the maxillary anterior region between two right and left central incisors. The exact etiology behind formation of the mesiodens is not stated. Various theories have been suggested in the literature. Phylogenetic reversion or Atavism theory is based on ancient relic ancestors having three central incisors has changed to mesiodens [8]. According to Dichotomy theory a tooth bud during developmental stage is split into two separate teeth. Hyperactivity of the dental lamina or palatal offshoots occurring in the dental lamina, finally lead to the development of an extra tooth bud which finally transforms into a supernumerary tooth. In inversion of mesiodens, either genetic or environmental factors have been suggested possible etiological factors. They are listed as follows. 1. During developmental stage the tooth associated with an inverted position of the tooth germ, the tooth may further develop and erupt in an inverted position. 2. Due to inversion by contact between the apex of an erupting tooth and the crown of an

impacted supernumerary tooth. 3. Sometimes, external forces like tumors, cysts or traumatic extraction of primary teeth might invert the tooth bud or the developing tooth [8, 9, 10].

Mesiodens are classified into various types by different authors based on their occurrence in type of dentition, their number, their location, their morphology and their orientation (Table 2) [9,10]. Based on this classification, all mesiodentes reported in this paper were classified as conical type as all were having small conical shaped crown with single short root. In 2010, Nagaveni et al, reported a mesiodens having three labial lobes with attached palatal talon cusp which represented a rarest form of mesiodens not mentioned in any of the classification given by different authors [7]. One rarest form like mesiodens having labial talon cusp which also belongs to other forms of mesiodens is also reported by the same author in 2010 [6]. Therefore, in the conventional classification given by Garvey [9] and Primosch [10] regarding morphology of mesiodens, the fourth category is added which represents other forms of mesiodens. All previous reports on mesiodentes showed conical shaped crown with single short and straight root. However, Nagaveni et al in their survey found an unusual mesiodens having dilacerated root which is also not reported so far [6]. In addition to the above conventional classification, recently in 2018, Goksel et al [1] classified mesiodentes in frontal, axial and sagittal planes using CBCT images which is tabulated in Table 3. Based on orientation of mesiodens with respect to midline, Mupparapu et al [4], classified mesiodens into class I to V and their description is mentioned in Table 4.

**Table 2: Various classification of mesiodens given by different authors [9,10]**

A. Based on their occurrence in type of dentition	Primary dentition Permanent dentition
B. Based on their number	Single Multiple
C. Based on their morphology	Supplemental or Eumorphic (have normal shape and size) Rudimentary or Dysmorphic (abnormal shape and smaller in size) Conical Tuberculate Molariform Others – Multi-lobed, Odontomas (complex or composite)
D. Based on their location	Mesiodens (in midline, between two right and left central incisors) Peridens (near premolars) Distodens (near molars) Paramolar (between second and third molars) Distomolar (distally to third molars)
E. Based on their orientation	Normal or vertical Inverted Horizontal or transverse

**Table 3: Mesiodentes classification given by Goksel et al using CBCT images based on frontal, sagittal and axial planes [1]**

Types	Description
In frontal plane Type A Type B Type C	Straight long axis, no inclination Crown in midline, root in distal Root in midline, crown in distal
In sagittal plane Type I Type II Type III Type IV Type V Type VI	Fully erupted Partially erupted Impacted, in contact with the central teeth Impacted, not in contact with the central teeth In contact with nasal cavity In contact with nasal septum
In axial plane Type a Type b Type c Type d Type e	Labial to dental arch In line with dental arch Anterior to naso-palatine canal, in contact with naso-palatine canal Behind naso-palatine canal, in contact with naso-palatine canal Behind naso-palatine canal, not in contact with naso-palatine canal

**Table 4: Albert and Mupparapu's classification of Mesiodens [3]**

Types	Description
Class 1	Impacted mesiodens is parallel or 0 degrees to the normal eruptive pattern of maxillary central incisors.
Class 2	Impacted mesiodens is between 0 and 90 degrees from the normal eruptive pattern
Class 3	Impacted mesiodens is perpendicular or 90 degrees to the normal eruptive pattern
Class 4	Impacted mesiodens is between 90 and 180 degrees from the normal eruptive pattern
Class 5	Impacted mesiodens is inverted or 180 degrees to the normal eruptive pattern.

Inverted mesiodens may be located either palatal or labial position within the alveolar bone of premaxilla or palatal vault. Therefore, localization of inverted mesiodens using appropriate radiographic techniques is highly essential. In the literature, adaptation of SLOB (Same Lingual Opposite Buccal) rule to locate the exact position of the inverted mesiodens using periapical radiographs or occlusal radiographs is suggested [7]. The diagnosis of inverted mesiodens is very important even in planning for its surgical removal. Goksel et al [1], Mohan et al [4] and Omami et al [5] highlighted the importance of three-dimensional analysis of impacted and inverted mesiodens using CBCT scan. Goksel et al [1] found 46.1% of mesiodens anterior to the nasopalatine canal which were in close contact with nasopalatine canal. Mohan KR reported bilateral occurrence of inverted mesiodens extending to the anterior nasal spine and floor of the nasal cavity which were diagnosed by CBCT image [4]. In this case series, the impacted and inverted mesiodens were found in the mid-palatal region or premaxilla and were accidentally found on conventional radiographic examination such as intra oral periapical radiographs taken for some other purpose.

Mesiodens most of time occur unilateral however, bilateral occurrence are also reported [1,4,5]. In the four case series presented here, bilateral mesiodens were found in three patients. Other reports showed bilateral occurrence of about 10.3% [2]. Goksel et al reported 20% of inverted mesiodens [1]. Mesiodens may occur either as single dental anomaly or in association with other developmental disturbances like cleft lip and palate, with various syndromes like cleido-cranial dystosis, Gardner's syndrome, Noonan syndrome or Down's syndrome [11,12]. In the presented cases, all patients were found normal without any associated syndromes diagnosed.

Mesiodens are reported equally in both genders. However, some publications showed more in males compared to females [1,3,6]. In this case series inverted mesiodens showed equal gender distribution. Numerous clinical problems in association with mesiodens have been reported in the literature [1,4]. Nagaveni et al in their survey [6] of mesiodens among 2500 children of Davangere city, India, documented different clinical problems like occlusal interference (14.8%), delayed eruption of permanent incisors (3.7%), root resorption (7.4%) and midline diastema (59.2%). They also reported occurrence of rare anomalies like facial talon cusp in mesiodens in two cases which were also not reported or not mentioned in the mesiodens's classification system [6].

In majority cases of inverted mesiodens, they remain asymptomatic and hence don't require surgical intervention. However, it is also reported that as they are associated with cyst or tumor formation, it is better to remove them surgically once they are diagnosed. In the cases presented here, all inverted mesiodens were surgically removed under local anesthesia along with erupted mesiodens

## CONCLUSION

Mesiodens are the interesting anomalies that need to be investigated in detail regarding their etiology, prevalence among various ethnic group, classification and different variations using advanced diagnostic technology in order to frame new diagnostic, therapeutic, and classification systems about mesiodens. The present article made an effort to add some more light to the existing evidence pertaining to inverted mesiodens occurring in Indian patients.

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