

Transnasal Extraction of Mesiodens and Guided Eruption of Unusual Impacted Central Incisor: A Case Report and Review of Literature

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ABSTRACT

Mesiodens is one of the developmental problems in children and adolescents. Mesiodens is a supernumerary tooth in the midline between two central incisors which eventually causes poor aesthetics, food impaction, malocclusion and cyst formation. Here, authors presents a rare case of a 13-year-old male with unusual impacted inverted permanent maxillary left central incisor and horizontally placed mesiodens lying palatal to the permanent maxillary left central incisor. The patient presented with unerupted permanent upper left central incisor. Although most unerupted teeth require surgical removal, surgical-orthodontic treatment may be needed when maxillary incisors are involved due to the aesthetic impact. Surgical-orthodontic treatment aims at the complete alignment of natural teeth and does not require prosthetic intervention. This case report also reviews current literature on the treatment and multidisciplinary management of this problem. Early diagnosis and treatment are recommended to prevent any orthodontic and pathological complications.

Keywords: Inverted central incisor, Juxta nasal tooth, Platelet rich fibrin, Surgical-orthodontic treatment

CASE REPORT

A 13-year-old male was referred to the Department of Orthodontics and to the Department of Oral and Maxillofacial Surgery. Patient complained of missing tooth in the upper left front tooth region since one year. The patient was apparently normal one year back when he noticed missing tooth in his upper left front tooth region and there was no previous history of trauma. Patient and his parents were concerned about his aesthetic appearance. He had no significant medical history. Intraoral examination revealed missing permanent maxillary left central incisor and there was no labial or palatal bulge for the erupting tooth and all other permanent teeth were present [Table/Fig-1,2]. On palpation there was no tenderness on either labial or palatal side of the missing permanent maxillary left central incisor (21) region.

Orthopantomogram (OPG) and Intraoral Periapical (IOPA) radiograph revealed impacted 21 and a mesiodens in relation to permanent maxillary left central incisor [Table/Fig-3]. So a Cone Beam Computed Tomography (CBCT) was done to identify the location and position of the impacted 21 tooth and the relation of the mesiodens with vital structures such as nasopalatine vessels and nerves in axial, coronal and sagittal planes. Also to confirm the exact position of mesiodens and its close approximation with impacted left maxillary central incisor. CBCT revealed impacted mesiodens which was lying horizontally, mediolaterally and palatal to impacted 21. The impacted 21 was in abnormal, inverted position such as palatal aspect of the 21 was facing labially and its incisal aspect close to anterior nasal spine and nasopalatine vessels and nerves. Thin cortical bone was also

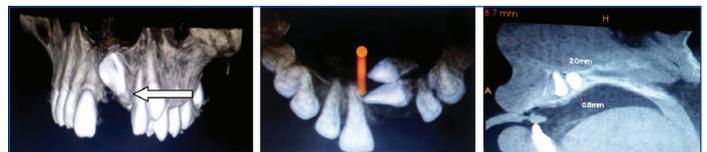


[Table/Fig-1]: Preoperative labial view showing missing 21.

[Table/Fig-2]: Preoperative occlusal view showing missing 21.

[Table/Fig-3]: Orthopantomogram (OPG) revealed impacted permanent maxillary left central incisor (21) and a mesiodens in relation to it. (Black arrow showing central incisor (21) and white arrow showing mesiodens). (Images from left to right)

covering the root of impacted 21 [Table/Fig-4,5]. CBCT also revealed 0.8 mm thickness of palatine bone beneath the horizontal mesiodens and 2 mm distance between nasal floor and the mesiodens, there was less than 1 mm of medullary bone between impacted 21 central incisor and the mesiodens [Table/Fig-6]. A diagnosis of impacted inverted 21 and horizontally impacted mesiodens palatal to impacted 21 was made.



[Table/Fig-4]: CBCT labial view showed, the impacted 21 was obliquely inverted and the palatal aspect of the tooth was facing labially, and its incisal aspect close to anterior nasal spine and nasopalatine vessels and nerve. Thin cortical bone covering labially the root of impacted 21.

[Table/Fig-5]: CBCT palatal view revealed impacted mesiodens which was lying horizontal mediolaterally and palatal to impacted 21 and near to nasopalatine vessels and nerves.

[Table/Fig-6]: CBCT Sagittal view revealed 2 mm distance between nasal floor and the mesiodens, and less than 1 mm bone between 21 and mesiodens is seen. (Images from left to right)

Surgical Procedure

Fixed orthodontic appliance with orthodontic brackets of McLaughlin, Bennett and Triversi (MBT) type and arch wires were placed prior to the surgery.

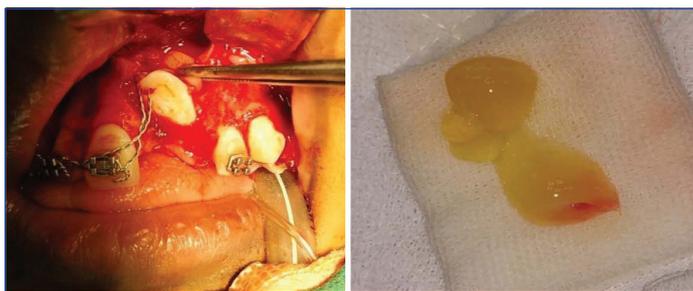
Firstly under local anesthesia with vasoconstrictor (2% lidocaine with 1:2,00,000 epinephrine) palatal approach was tried for removal of the horizontally lying palatally placed mesiodens, but as the root was facing palatally and the crown was lying just 2 mm inferior to the nasal floor, the palatal approach was deferred due to anticipated slippage of the mesiodens during removal and transnasal approach under General Anesthesia (GA), considering the proximity of the mesiodens to the nasal floor.

Oral intubation was decided as transnasal approach was to be performed. After infiltration with local anesthetic with vasoconstrictor (2% lidocaine with 1:2,00,000 epinephrine), crestal incision was placed inside the gingival sulcus from 14 to 24 on the labial side and a full thickness mucoperiosteal flap was elevated on the labial

side exposing the anterior nasal spine. Nasal mucosa was gently elevated and protected with Howarth periosteal elevator to prevent postoperative epistaxis as a complication.

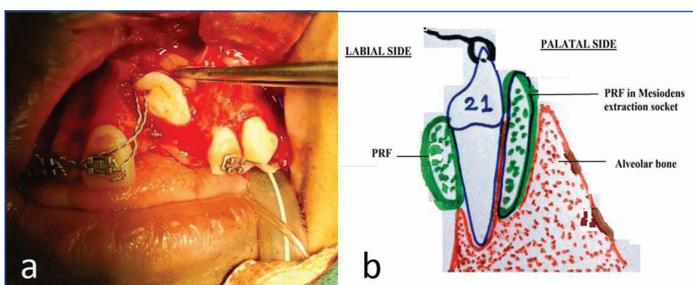
Nasal floor was identified. Deroofing of the mesiodens was done on the nasal floor with the round Tungsten Carbide (TC) bur (Waldent) and the crown of the mesiodens was exposed. Bone guttering around the mesiodens was done and using a purchase point between the mesiodens and central incisor 21, the mesiodens was elevated and removed while the central incisor 21 was stabilised with fingers. Bone guttering was done around the incisal edge and labial, palatal side of upper left central incisor with a round TC bur and the left maxillary central incisor was exposed [Table/Fig-7].

After the extraction of the mesiodens, there was less than 1 mm of inter-radicular bone between impacted 21 tooth and empty tooth socket which consequently lead to grade I mobility of the central incisor 21 intraoperatively. Hence, Platelet Rich Fibrin (PRF) [Table/Fig-8] was prepared to regenerate the alveolar bone support between unusual impacted central incisor and the extraction socket of extracted mesiodens to guide the eruption of impacted 21. Intraoperatively a bur hole was placed distal to the 21 impacted tooth 2 mm from incisal edge for guided orthodontic eruption. Pretwisted ligature wires were passed through the bur hole and twisted and secured to the brackets on 11, 12, 13 [Table/Fig-9a,b]. The surgical site was irrigated with copious amount of betadine and saline. Then PRF was prepared to be placed over the inter-radicular bone between unusual impacted central incisor and the extraction socket of extracted mesiodens before closure.



[Table/Fig-7]: The flap was elevated on the labial side to expose the anterior nasal spine. impacted inverted 21 was exposed, bone guttering was done transnasally to identify mesiodens and removed.

[Table/Fig-8]: Platelets Rich Fibrin (PRF). (Images from left to right)

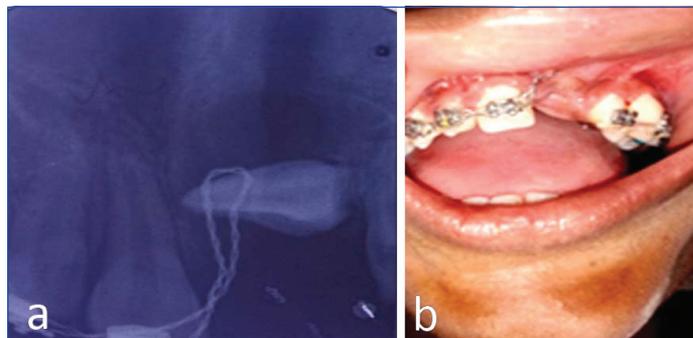


[Table/Fig-9]: a) Bur hole was placed 2 mm from incisal edge of 21, pretwisted ligature wires passed through the bur hole and twisted to the bracket on 11, 12, 13. Placement of PRF labial and palatal to the impacted 21; b) Diagrammatic illustration of placement of PRF in this case. There was only thin bone apical third on 21 and less than 1 mm of inter-radicular bone between 21 and extracted mesiodens socket.

Preparation of platelet rich fibrin: Firstly, 20 mL of blood sample was collected from patient via 18G needle from the superficial veins of the lower limb and was placed in the centrifuge [REMI PRP Centrifuge machine, Dermacell Private Limited, Mumbai] and was allowed to spin immediately (approximately within 2 minutes of blood collection) at 3000 rpm for 10 minutes [1]. The blood sample settled in three layers, the lower fraction of Red Blood Cell (RBC), middle fraction of fibrin clot and upper fraction of straw coloured acellular plasma. The upper fraction of the acellular plasma was removed. The resulting PRF preparation was picked up with forceps and the red thrombus (RBC fraction) was eliminated with scissors

[Table/Fig-8] [2]. The PRF was compressed by dry gauze and it was placed near the root of impacted central incisors labially on the thin bone covering the 21 impacted tooth and palatally in the extraction socket of mesiodens for regeneration of bone to help guided eruption of the impacted 21 tooth [Table/Fig-9a,b]. Closure was done with 3-0 vicryl (Healthium Medtech Private Limited).

On subsequent follow-up visits, postoperative IOPA [Table/Fig-10a] and image [Table/Fig-10b], and OPG [Table/Fig-11] taken around 9 months postoperatively showing bone formation near the central incisor 21 and after 1 year 5 months clinical examination revealed no mobility of the 21 tooth and guided eruption of the central incisor 21 into the oral cavity [Table/Fig-12].



[Table/Fig-10 a,b]: Postoperative radiographic and clinical views of follow-up 9 months showing guided eruption of 21.



[Table/Fig-11]: Postoperative follow-up Orthopantomogram after 9 months.

[Table/Fig-12]: Postoperative follow-up after 1 year 5 months showing 21 tooth (left central incisor) erupted labially by guided eruption.

DISCUSSION

Mesiodens is a frequent disorder of odontogenesis which features the presence of a tooth in addition to the normal series in the midline between the central incisors. The most common type of supernumerary tooth is mesiodens [3]. Most unerupted teeth require surgical removal, but surgical-orthodontic treatment may be needed in case of maxillary incisors due to the aesthetic impact [4-6]. Surgical-orthodontic treatment aims to bring complete alignment of natural teeth and does not require prosthetic intervention [4-6].

In 1917, Balk coined the term mesiodens and mentioned as supernumerary teeth located mesial to both central incisors appeared as peg-shaped crown. The prevalence of mesiodens is 0.15-1.9%. It is more frequently found in males than females in the proportion of 2:1 to 6:1 [5,6]. Mesiodens account for about 80% of all supernumerary teeth which can occur individually or as multiples [mesiodentes], may appear unilaterally or bilaterally, and often remain unerupted. Supernumerary teeth result due to changes occurring in the process of normal epithelial-mesenchymal interactions of tooth development [6]. The theories of formation of supernumerary tooth include the tooth germ dichotomy, overgrowth, or dental lamina hyperactivity, where the pressure induced by the rest of the dentition leads to the proliferation of epithelial rests of dental lamina eventually resulting in outbreaks of supplemental supernumerary teeth [5,6].

Ectopic tooth or intranasal tooth erupts into nasal cavity is a rare occurrence with only 0.1 to 1% patients affected in our community [7]. It appears that mesiodens develops from the floor of the nasal cavity with different aetiologies such as injury, rhino maxillary sinusitis, dental diseases, maxillary blisters, blockage of dental eruption, damage to formative tissue, for example "palatine gap". Intranasal tooth also cause septal perforation, aspergillosis, naso-oral fistula

[8-10]. The possible dental complications include eruption delay of the permanent incisors [38.8%], upper midline diastema [17.6%], axial rotation or inclination of the erupted permanent incisors [16.4%], resorption of the adjacent teeth [4.7%], cyst formation [4-9%] and infection [10]. Impacted mesiodens remain clinically silent or diagnosed as an accidental finding during the radiographic examination or they cause complications and require an immediate treatment. Hyperactivity of the dental lamina is the most widely supported theory to explain the cause of mesiodens [10].

CBCT is an essential investigation as it provides a high resolution 3D representation of the maxillofacial region. It may help in selecting the right surgical treatment option as it mainly depends on the type and location of impacted teeth and its relation to the adjacent vital structures. Consequently, CBCT aids in minimising trauma to the adjacent hard and soft tissues [11].

A cystic alteration is observed in 4-9% of the mesiodens cases, with the anterior maxilla being affected in 90% cases. This indicates surgical removal of the mesiodens [8]. Extraction is indicated for nasally erupting teeth to relieve symptoms and to prevent complications. The ideal time of removal of such teeth should be after the complete formation of permanent teeth roots to prevent any damage during their development [8-10,12].

Treatment options like surgical management of mesiodens or keeping under observation depends on factors such as the child's age concerned with the ability to cope up with a surgical procedure. Early management avoids unpleasant experience that may have psychological impact on the patient [5]. Second is the proximity of the mesiodens to the incisors and the developing dental structures [5]. Developing roots are prone to surgical trauma which may damage the future dental growth. In these cases treatment may be delayed [13]. Finally it is prudent to assess whether mesiodens is labially or palatally positioned. The surgical access to the mesiodens must be considered depending on the amount of bone removal and damage to the incisors [5]. In children, mesiodens mostly partially erupts and complete eruption of mesiodens seldom occurs, and therefore more favorable surgical approach may be decided with time [5].

The literature mentioned in [Table/Fig-13] suggests that those palatally placed impacted inverted mesiodens were removed by palatal approach and those which were near the nasal floor were removed by transnasal approach. Similarly in the present case, for the horizontally lying palatally placed mesiodens, palatal

approach was tried first, but as the root was facing palatally and the crown was lying just 2 mm inferior to the nasal floor, the palatal approach was deferred due to root apex of the mesiodens faced palatally and its crown was faced towards nasal floor. transnasal approach was done considering the proximity of the mesiodens to the nasal floor.

Acharya S reported inverted impacted supernumerary tooth between two central incisor blocking the path of eruption of the maxillary left permanent central incisor which had caused delayed eruption. Similarly in this case, the unusual position of the mesiodens had caused the delayed eruption of 21 which presented clinically as missing 21 and also caused abnormal axial rotation or inclination and unusual inverted position of the impacted 21 tooth [13].

Sujlana A et al., reported transnasal approach in a case of inverted impacted mesiodens and Hauer L et al., in 2018 reported modified maxillary vestibular approach with intranasal dissection in a case of inverted impacted mesiodens positioned near the nasal floor [14,15]. Similarly in the present case, authors have selected the transnasal approach to remove the impacted mesiodens positioned mesiolaterally behind the impacted left permanent central incisor 21 because authors could not approach the mesiodens palatally due to its inverted abnormal anatomic position as the the crown was positioned near nasal floor and the root was towards palatal side.

Mesiodens was an accidental finding after taking an OPG. As per literature evidence, mesiodens occurs most commonly in the midline [15,16] and it was the same in the present case, so it was advised for extraction of mesiodens followed by guided eruption of 21 was planned. CBCT for this particular case was a very useful tool for determining the tooth position of the 21 and abnormal position of mesiodens and selecting the right surgical approach. As per the literature available, the ideal time for mesiodens removal is after complete root formation of permanent central incisor [8-10,12]. In the present case, the patient age was 13 years suggesting complete root formation of 21, so that during extraction any injury to the developing root of the 21 tooth could be avoided.

Alzahrani AA et al., demonstrated that the use of PRF accelerates socket wound healing after tooth extraction as noticed by increased bone fill and reduced alveolar bone width resorption using clinical and radiographic methods [17]. In this case Platelet rich Fibrin [PRF] was used at the surgical site which is a gel like biomaterial that

| Authors and year of publication | Age | Supernumerary teeth | Position | Approach |
|---------------------------------|--------------------------|--|------------------------------|---|
| Jindal R et al., 2012 [3] | 9 years | Two mesiodens-one was erupted and another was unerupted | Erupted one- Palatal visible | Erupted one- Extraction, Unerupted one- Surgical extraction Palatal |
| | 10 years | Mesiodens | Palatal | Palatal |
| | 9 years | Two impacted supernumerary with incompletely developed roots of central incisors | Not mentioned | Wait and watch |
| Cosme-Silva L et al., 2016 [4] | 10 years | Impacted supernumerary missing central incisor tooth 11 | Palatal | Palatal |
| Sachin AG et al., 2017 [5] | 10 years | Impacted mesiodens | Palatal | Palatal |
| | 10 years | | | |
| Jayakaran TG et al., 2017[6] | 8 years | Inverted impacted mesiodens | Palatal | Palatal |
| Reza S et al., 2021 [11] | 9 years | Bilateral deeply impacted mesiodens | Unerupted | Intraoral transnasal |
| Acharya S, 2015 [13] | 9 years | Inverted impacted supernumerary | Palatal | Palatal |
| | 13 years | Two supernumerary- one erupted and another unerupted | Palatal | Palatal |
| | 13 years | Two supernumerary- unerupted | Palatal | Palatal |
| Sujlana A et al., 2017 [14] | 12 years | Two mesiodens | One palatally erupted, and | Palatally erupted- Extraction |
| | | | Other inverted unerupted | Inverted unerupted- Transnasal |
| Hauer L et al., 2018 [15] | Mean age: 11.7±3.1 years | Inverted impacted mesiodens | Near nasal floor | Modified maxillary vestibular approach with intranasal dissection |

[Table/Fig-13]: Review of Literature [3-6,11,13,14,15].

contains high concentration of growth factors like platelet derived growth factor, transforming growth factor, vascular endothelial growth factor and endothelial growth factor; all of which are secreted by platelets. PRF stimulates and accelerates tissue healing and bone regeneration, decreases postoperative pain, oedema and prevents infection [18].

In the present case, after the extraction of the mesiodens, there was less than 1 mm of inter radicular bone between impacted 21 tooth and empty tooth socket which consequently led to grade I mobility of the central incisor 21 intraoperatively. Hence, PRF was placed on the labial and the palatal aspects of the impacted 21 tooth for bone regeneration for the purpose of guided tooth eruption which needs proper periodontal ligament formation, alveolar bone support for successful guided eruption. At the end of 1 year and 5 months of follow-up the central incisor 21 was successfully guided to erupt with good bone support.

CONCLUSION(S)

The abnormal nasal position of the impacted mesiodens and the unusual impacted left permanent maxillary central incisor makes this case a peculiar and a challenging one. CBCT proved to be a useful diagnostic tool in determining the relationship of the unusual impacted 21 teeth to the vital structures and the amount of available bone and position of mesiodens there by deciding best surgical approach for tooth removal. Transnasal approach was used for the removal of impacted supernumerary teeth proximal to the nasal floor. The use of Platelet Rich Fibrin as a bone regenerating agent at the surgical site has shown best results for guided impacted tooth eruption which is suggested by the absence of mobility of the central incisor 1 year 5 months postoperatively after erupting into the oral cavity. Hence, early diagnosis, relevant investigations, multidisciplinary approach are vital for framing the treatment plan and also to prevent complications.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: May 26, 2021
- Manual Googling: Feb 07, 2022
- iThenticate Software: Feb 26, 2022 (15%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **May 24, 2021**
Date of Peer Review: **Jul 28, 2021**
Date of Acceptance: **Feb 21, 2022**
Date of Publishing: **Mar 01, 2022**