Decoding CBCT of Inverted Impacted Mesiodens for its intervention and Surgical Considerations: A Case Report

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ABSTRACT

Impacted mesiodens in an inverted position near the nasal cavity, pose unique challenges due to their anatomical proximity to critical surrounding structures. Confirmatory diagnosis, radiographic approach and surgical management of such mesiodens is crucial for minimizing post operative complications. Timely intervention prevents aesthetic and occlusal complications such as crowding, displacement of tooth, root resorption and cyst formation thereby preserving both functional and cosmetic outcomes for the patient.

This case report showcases two conical supernumerary teeth, erupted one diagnosed as Conical vertical mesiodens and the other as Conical vertical impacted mesiodens subgroup class 5 based on its position within maxilla after Cone Beam Computed Tomography (CBCT) review and Mupparapu's classification of mesiodens. An indepth analysis with CBCT for thorough planning for surgical management of the impacted and inverted mesiodens has been emphasized in this report. It also highlights the critical considerations that must be addressed both preoperatively and intraoperatively to minimize potential complications.

Keywords: *Cone beam computed tomography, inverted mesiodens; impaction; supernumerary teeth, surgical management.*

INTRODUCTION

Inverted and impacted mesiodens may remain asymptomatic and are often discovered incidentally during radiographic examinations.[1] Radiographic evaluation, particularly through Cone Beam Computed Tomography (CBCT), is essential for precise assessment and surgical planning required for the removal of impacted and inverted mesiodens.[2] Proximity of inverted and impacted mesiodens to the nasal cavity increases the risk of intranasal eruption, which can lead to clinical manifestations such as recurrent rhinitis and sinusitis.[3] Several complications can be avoided by its timely intervention.[4,5] This case report presents an inverted impacted mesiodens in a 13 year old male with considerations carried out during its surgical removal.

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CASE REPORT

A 13-year-old male patient reported to the Department of Pedodontics and Preventive Dentistry with the chief complaint of irregular teeth in the upper front region of mouth which revealed permanent dentition−with the presence of palatally erupted conical shaped supernumerary tooth with respect to 21 causing its anterior proclination (Figure 1). An Orthopantomogram (OPG) was performed to rule out the possibility of multiple supernumerary teeth and extension of root of erupted supernumerary tooth. OPG showed the presence of radiopacity superimposed in the periapical area of 11 and 12 suggestive of odontoma or additional supernumerary tooth thus further CBCT investigation was advised (Figure 2).

CBCT revealed presence of another inverted conical mesiodens in relation to normal eruptive pattern of 11(Figure 3). CBCT's sagittal view revealed impacted mesiodens 1mm from the nasal floor and close proximity of 0.5mm with root of adjacent tooth (Figure 4). Bone covering the tooth from labial aspect and palatal aspect

till the mesiodens was seen to be 2.8 mm and 1.5mm respectively (Figure 4). Coronal view shows the distance of impacted tooth from nasal canal to be 1.4 mm (Figure 5). Thus, final diagnosis of supernumerary teeth wrt 11 and 21 was made as conical vertical inverted impacted mesiodens and along with CBCT categorization within maxilla subgroup as class 5 impacted mesiodens from Mupparapu's classification (Table 1).[2,5]

Treatment planning of surgical extraction was done and the procedure with expected outcomes were explained to the patient and his father after which written consent was obtained.

Surgical extraction of the mesiodens was planned using the palatal approach. Infraorbital and nasopalatine nerve block were given using 2% lignocaine hydrocholoride with 1:200,000 epinephrine. Using a maxillary anterior extraction forcep, the supplemental supernumerary tooth palatal to 21 was extracted (Figure 6). With a no. 15 bard parker blade, a crevicular incison was made from 12 to 23 and no releasing incision was given. The bone covering the mesiodens was revealed and visualized using a full thickness flap (Figure 7). Bone was guttered just enough to expose the apex of the mesiodens (Figure 8). The mesiodens was carefully luxated with a periosteal elevator in order to prevent it from slipping into the nasal cavity and was extracted using a maxillary root forcep (Figure 9). The flap was re-approximated and secured with vertical mattress sutures (3-0 vicryl). Patient was kept under oral antibiotic (Amox-clav, Metron) and analgesics.

Patient was asymptomatic at 7 days postoperative follow up day. The healing of the extraction site was satisfactory and the tooth adjacent to impacted mesiodens showed no mobility but on clinical examination a slight discoloration

Figure 1: Maxillary palatal view showing mesiodens palatal to 21

Figure 2: OPG revealing radioopacity apical to 11 and 21

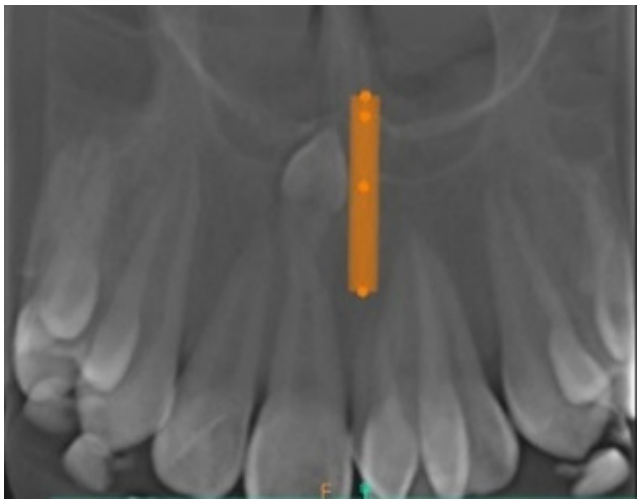

Figure 3: CBCT revealing position and proximity of supernumerary teeth to nasal canal

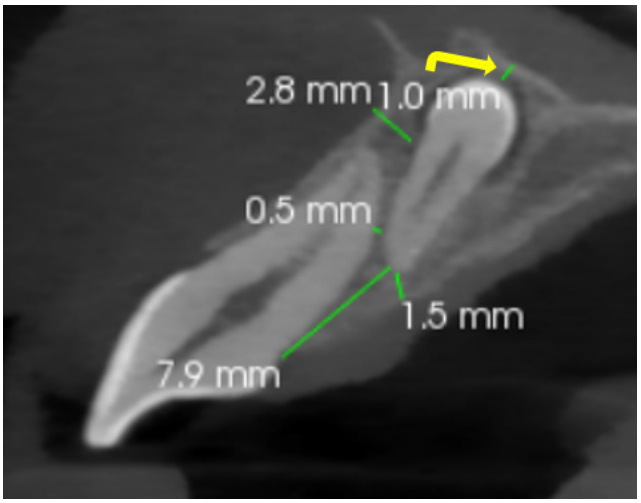

Figure 4: CBCT from sagittal plane showing inverted mesiodens at 1mm distance from floor of nasal cavity

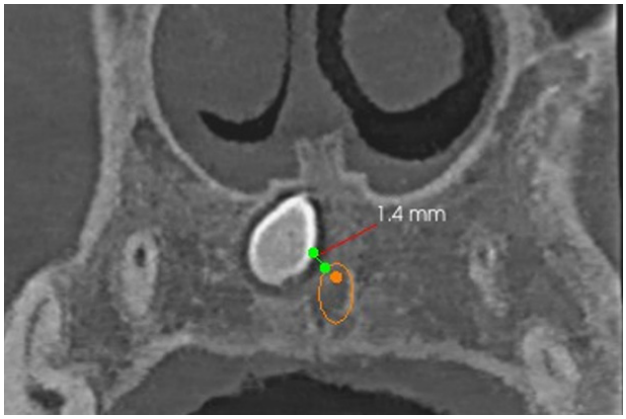

Figure 5: Coronal view showing its proximity to nasal canal

Figure 6: Extraction of erupted mesiodens

Figure 7: Flap raised after incision

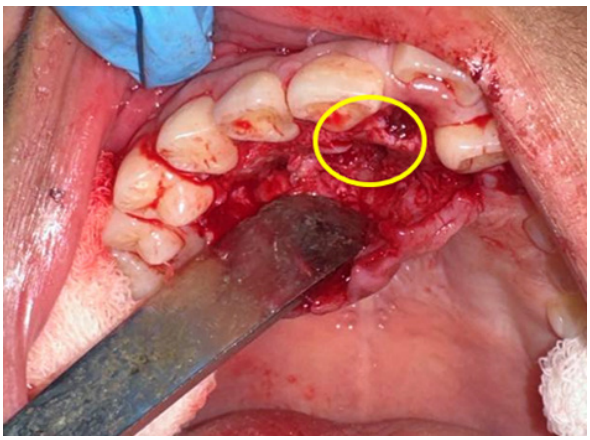

Figure 8: Exposed apex of mesiodens after bone guttering (yellow circle)

Figure 9: Extracted mesiodens

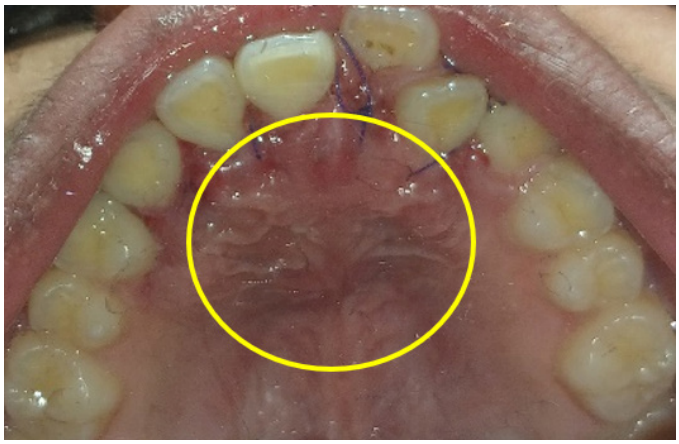

Figure 10: Hematoma seen in 1 weeks follow up visit (yellow circle)

and swelling were observed on the anterior hard palate, indicating a postoperative hematoma (Figure 10). This was managed by draining the hematoma through a small incision. Antibiotics were continued for 3 more days and healing progress photograph was updated via teledentistry after 2 weeks. At 3 months follow up intraoral examinations and investigations involving radiograph showed satisfactory wound and bone healing. The tooth adjacent to impacted mesiodens showed positive vitality test (Figure 11,12). The patient was advised for monthly follow ups to evaluate further healing process.

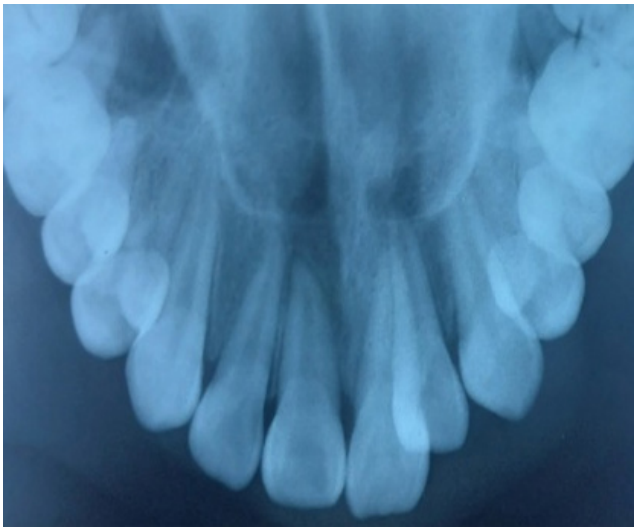

Figure 11: Occlusal radiograph showing bone healing after 3 months wrt 11

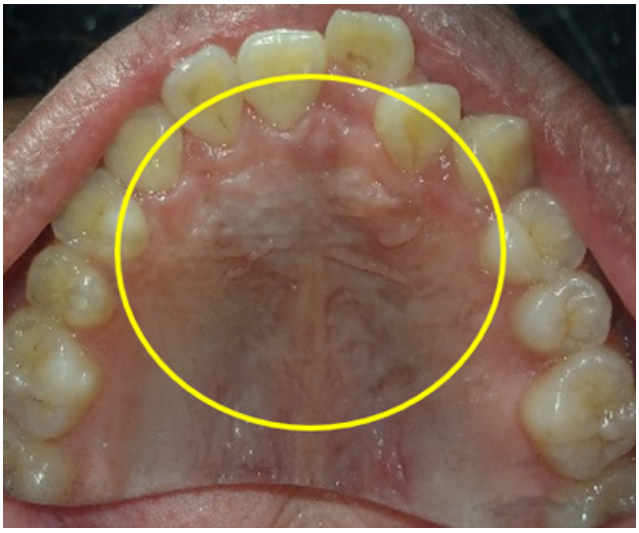

Figure 12: Healing of wound seen in 3 months follow up visit (yellow circle)

Table 1. Mupparapu's classification of mesiodens [2] / Categorization of mesiodens and relevant tooth positioning within the maxilla[5]

CLASS OF MESIODENS	DESCRIPTION OF MESIODENS
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

DISCUSSION

The CBCT acts as a valuable diagnostic tool in assessing inverted and impacted mesiodens due to its ability to predict complications like nasal floor perforation when intervention is delayed.[5] A cautious approach is advised for inverted and impacted supernumerary teeth as their proximity to the nasal cavity increases risk of nasal perforations or infection.[5] The present case of class 5 impacted mesiodens[5] has a high chance of encountering such complication. Therefore, a conservative surgical approach was carried out. The most common surgical approach is the palatal approach with full-thickness mucoperiosteal flaps.[6] However, labial approach and apically repositioned flaps with releasing incisions are also practiced.[6] A modified maxillary vestibular approach with subperiosteal intranasal dissection is done for impacted mesiodens within the floor of the nasal cavity.[6] In this case the surgical site approached was via palatal cortical bone as the exposure of the tooth would be closer from this aspect.

Impacted inverted mesiodens maybe in close proximation to the base of the nasal cavity or the nasal septum and in rare cases have been reported to erupt into the nose.[7] Traditionally extraction is done via intraoral approaches-transpalatal or vestibular.[7] The endoscopically assisted trans nasal approach is often done to remove inverted mesiodens found under the nasal mucosa or inside the nasal cavities.[8] In the present case a surgical approach

via the palatal side was considered as the tooth was closer to the palatal bone than that with labial bone. The considerations that have to be taken during the surgical management are - shortest linear distance to the mesiodens to be taken, clear surgical field, prevention of extensive osteotomy, protection of neighboring teeth, prevention of neurovascular injury to the nasopalatine nerve, avoidance of a prolonged operation time, and limited postoperative discomfort for the patient.[9] To satisfy all these criteria, a thorough CBCT for precise localization and surgical planning must be done. The type of impaction and capacity of inverted mesiodens to perforate nasal floor can be detected by timely intervention with CBCT.[5] The timing of surgical removal of supernumerary teeth is contentious and two alternatives exist; first, to remove the supernumerary as soon as it has been diagnosed and second, to leave the supernumerary as such till the root development of adjacent teeth is complete in order to prevent damage to their root apices.[9] For the best care of mesiodens based on its features and problems, it is critical to assess the condition from all angles, including clinical, radiological, and patient factors.[10]

CONCLUSIONS

Early detection of the inverted orientation of mesiodens is essential, and extraction should be carefully planned with three-dimensional imaging modalities like CBCT. Conventional 2D radiograph, such as orthopantomographs (OPGs), have some limitations regarding lack of clarity in the midline region. Thus, decoding of Cone–beam computed tomography (CBCT) allows for an accurate 3D localization of impacted teeth and plays an essential role in choosing the treatment plan for optimal surgical approach.

The intraoral approach for removal of inverted mesiodens is predictable, safe, and time-efficient technique, however, its success depends on proper guidance by the CBCT imaging and the surgical team's skill. When performed timely and correctly, this method minimizes intra- and postoperative complications like reduction in postoperative swelling and pain. The mixed dentition age is the period in which impacted mesiodens are most commonly diagnosed thus Pediatric dentist should be aware about it as they play an important role in diagnosing and planning treatment of such inverted mesiodens cases.

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Conflict of Interest: None

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