International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Dens Invaginatus: A Case Report)

Dr. Sumita Bhagwat[1], Dr. Lalitagauri Mandke[2], Dr. Nikita Topriani[3], Dr. Aranya Ray[4], Dr. Pauravi Hegde[5], Dr. Monica Panjwani[6]

[1,2]BDS, MDS, Professor, Department Of Conservative Dentistry And Endodontics, DY Patil University School Of Dentistry, Nerul, Navi Mumbai, Maharashtra, India.
[3]BDS, MDS, Senior Lecturer, Department Of Conservative Dentistry And Endodontics, DY Patil University School Of Dentistry, Nerul, Navi Mumbai, Maharashtra, India.
[4]BDS, Post Graduate Resident, Department Of Conservative Dentistry And Endodontics, DY Patil University School Of Dentistry, Nerul, Navi Mumbai, Maharashtra, India.
[5]Lecturer, Department Of Conservative Dentistry And Endodontics, DY Patil University School Of Dentistry, Nerul, Navi Mumbai, Maharashtra, India.
[6]BDS, Post Graduate Resident, Department Of Conservative Dentistry And Endodontics, DY Patil University School Of Dentistry, Nerul, Navi Mumbai, Maharashtra, India.

Abstract
Dens Invaginatus is a rare developmental anomaly resulting from the invagination of enamel epithelium into the dental papilla during tooth formation. It often presents diagnostic and treatment challenges due to its complex internal anatomy and risk of pulpal pathology. The most frequently affected teeth are the maxillary lateral incisors. This case report discusses the diagnosis and endodontic management of a Type III-b Dens Invaginatus in a 19 year-old patient, who presented with a chief complaint of fractured tooth. Radiographic and CBCT evaluation confirmed the anomaly. Non-surgical endodontic treatment was successfully carried out using bioceramic materials to ensure a three-dimensional seal of the complex canal system. This case highlights the importance of early detection, radiographic assessment, and a tailored treatment approach in managing dens invaginatus.

Keywords: Dens Invaginatus, dental anomalies, Type III-b, Oehlers classification, CBCT, bioceramic sealers

1. INTRODUCTION

Dens invaginatus is a developmental anomaly characterized by an infolding of the enamel organ into the dental papilla during the morpho-differentiation stage of tooth development. This results in the formation of a “tooth within a tooth” configuration. First described by Ploquet in 1794 and later classified radiographically by Oehlers in 1957, the condition is also referred to as dens in dente or dilated composite odontome.[1]

The exact aetiology remains unclear, though proposed causes include focal growth retardation, pressure changes during tooth development, trauma, and genetic predisposition.[2] The anomaly is most frequently seen in permanent maxillary lateral incisors, with a prevalence ranging from 0.04% to 10%, and a male predilection has been noted.[3]

Clinically, dens invaginatus may be asymptomatic or present with signs of pulpal or periapical pathology, especially when the invagination allows bacterial ingress. Radiographically, the condition may mimic other lesions, and CBCT proves invaluable for accurate diagnosis and treatment planning. Oehlers' classification categorizes dens invaginatus into three types based on the extent of enamel-lined invagination. This report presents a case of Type IIIb dens invaginatus with associated periapical pathology in a maxillary lateral incisor, managed successfully using contemporary endodontic techniques and materials.

Table 1: classification of dens invaginatus

Type	**Description**	**Communication with Periodontium**	**Pulp Involvement**	**Clinical Implication**
Type I	Invagination is enamel-lined and confined to the crown, not extending beyond the cementoenamel junction (CEJ).	None	No	Often asymptomatic; may not require treatment unless complicated by caries or infection.
Type II	Invagination extends beyond the CEJ into the root as a blind sac. It may or may not involve the pulp.	None	Possible communication with pulp chamber	Risk of pulpal involvement; requires careful monitoring or endodontic intervention.
Type IIIA	Invagination extends through the root and communicates laterally with the periodontal ligament via a pseudo foramen.	Lateral communication with periodontium	Typically does not involve the pulp	Can lead to periapical pathology even if the pulp remains vital; complex to manage.
Type IIIB	Invagination extends through the root to the apex and communicates with the periodontal ligament at the apical foramen.	Apical communication with periodontium	May or may not involve the pulp	Often associated with apical pathology; may necessitate advanced endodontic or surgical care.

Case report

A 21-year-old female reported to the Department of Conservative Dentistry and Endodontics, D.Y. Patil School of Dentistry, Navi Mumbai, with the chief complaint of a fractured upper right front tooth, along with intermittent pain. Her medical history was non-contributory, with no systemic illness, syndromic associations, or family history of similar dental conditions.

The dental history revealed that approximately six months earlier, the patient sought treatment from a local dentist for the same tooth. Endodontic therapy was initiated but subsequently discontinued due to the complexity of the canal anatomy, and the access cavity was left unrestored. Extraoral examination showed no facial swelling, asymmetry, or lymphadenopathy. Intraorally, a badly was noted on the right maxillary lateral incisor. The tooth showed tenderness on vertical percussion. Pulp sensibility test (cold test) using Endo frost was done for right maxillary central incisor gave a normal response while lateral incisor gave no response suggestive of non-vital tooth. There was no significant lymphadenopathy noted. The patient was advised for radiographic investigations i.e.., radiovisiograph.

Radiographic examination revealed a well-defined periapical radiolucency associated with the right maxillary lateral incisor. Additional findings included widening of the periodontal ligament space and loss of continuity of the lamina dura in the affected region. The lateral incisor also exhibited an anomalous internal morphology that differed distinctly from the adjacent central incisor, raising suspicion of a developmental anomaly (Figure - 1).

Cone-beam computed tomography (CBCT) was advised for confirmatory diagnosis. The scans revealed a periapical radiolucency involving the right maxillary lateral incisor. Detailed analysis of the internal morphology suggested the presence of dens invaginatus Type III-b, characterized by an invaginated tract extending to the apex and communicating with the periodontium(Figure - 2). Based on these findings, a provisional diagnosis of chronic apical periodontitis with pulpal necrosis in a lateral incisor exhibiting dens invaginatus Type III-b was made. Given the patient's age, adequate oral hygiene, and the complexity of the root anatomy, a non-surgical endodontic approach was planned as the treatment of choice.

Root canal treatment was initiated in the maxillary right lateral incisor. Access opening was refined using an ultrasonic tip (E3D, Woodpecker) for precise access and enhanced visualization.

Upon careful exploration, three canal orifices were identified, one of which exhibited a C-shaped configuration (Figure - 3). The dentinal walls were meticulously preserved to maintain structural integrity and optimize fracture resistance.

Following access, canal patency was established using a #10 K-file (Mani), and working length determination was performed with a #15 K-file (Mani) using a generation IV apex locator (JW Morita). The working lengths were subsequently confirmed radiographically (Figure - 4).

Fig.1-rvg of 12

Fig.2- CBVI(sagittal section) of 12

Fig 3- Access opening

Fig. 4 working length determination using radiograph

Fig. 5 master cone selection

Fig. 6- obturation done using bioceramic sealer

Fig. 7- post obturation restoration

Cleaning and shaping of all three canals were performed individually, following an ideal irrigation protocol. Irrigation was carried out using 3% sodium hypochlorite (NaOCl), 0.9% normal saline, and 17% ethylenediaminetetraacetic acid (EDTA), with activation of irrigants achieved using a sonic agitation device to enhance debridement efficacy. The canals were prepared up to size #25, 0.04 taper using rotary nickel–titanium files (Endostar Azure).

An inter-appointment dressing of calcium hydroxide was placed twice at 10–15 day intervals. At the third appointment, the patient was asymptomatic, and clinical evaluation revealed dry canals with resolution of signs and symptoms, indicating favourable healing.

Obturation was completed using a bioceramic sealer, ensuring a three-dimensional seal of the complex canal anatomy (Figure - 6). At the two-week follow-up visit, a definitive post-obturation composite restoration was placed to reinforce coronal seal and structural integrity (Figure - 7).

Discussion

Dens Invaginatus represents a complex developmental anomaly resulting from the invagination of the enamel organ into the dental papilla prior to calcification.[1] The incidence is highest in maxillary lateral incisors, and the anomaly is classified radiographically into three types by Oehlers, with Type IIIb being the most severe form—characterized by invagination extending through the root and communicating with the periapical tissues via the apical foramen.[2] This anatomy predisposes the tooth to early pulpal necrosis and persistent periapical infection, often in the absence of caries or trauma.[3]

In the present case, the invagination extended to the apex, establishing a direct route for microbial ingress into the periapical region, consistent with Type III-b. The diagnosis was initially supported by radiographic and clinical findings and confirmed using CBCT, which remains the imaging modality of choice in assessing complex canal morphologies.[4]

Management of Dens Invaginatus Type III-b is particularly challenging due to canal complexity, the presence of multiple orifices, and often an open apex. In this case, a non-surgical approach was adopted, as studies have shown success with conservative endodontic treatment when aided by CBCT diagnostics, bioceramic sealers, and proper disinfection protocols.[5]

Use of a conservative access cavity design and ultrasonic tips allowed for precise canal identification while preserving tooth structure. Irrigant activation played a crucial role in effective debridement of the invaginated canal system. Calcium hydroxide was used as an inter-appointment medicament to reduce microbial load, and bioceramic obturation provided a hermetic seal, even in the presence of an open apex, due to its bioactivity and dimensional stability.[6]

This case reinforces the importance of advanced imaging, individualized treatment planning, and the use of contemporary biomaterials in managing complex endodontic cases.

Conclusion

Dens invaginatus, particularly of Type III-b morphology, presents significant diagnostic and therapeutic challenges. Accurate diagnosis using CBCT, combined with meticulous canal disinfection and obturation using bioactive materials, can lead to predictable outcomes even in cases with open apex and complex anatomy. Early recognition and a tailored, minimally invasive approach are critical for long-term success.

References

1. Hulsmann M. Dens invaginatus: aetiology, classification, prevalence, diagnosis, and treatment con-

siderations. Int Endod J. 1997;30(2):79–90.
2. Oehlers FA. Dens invaginatus (dilated composite odontome). I. Variations of the invagination process and associated anterior crown forms. Oral Surg Oral Med Oral Pathol. 1957;10(11):1204–1218.
3. Alani A, Bishop K. Dens invaginatus. Part 1: classification, prevalence and aetiology. Int Endod J. 2008;41(12):1123–1136.
4. Patel S, Durack C, Abella F, Shemesh H, Roig M, Lemberg K. Cone beam computed tomography in Endodontics—a review. Int Endod J. 2015;48(1):3–15.
5. Vier-Pelisser FV, Pelisser A, Recuero LC, Só MV, Borba MG, Figueiredo JA. Use of cone beam computed tomography in the diagnosis, planning and follow-up of a type III dens invaginatus case. Int Endod J. 2012;45(2):198–208.
6. Koch KA, Brave DG, Nasseh AA. Bioceramic technology: Closing the endo-restorative circle, part I. Dent Today. 2010;29(3):100–105.