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CASE REPORT- DENS IN DENTE'

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ABSTRACT Dens invaginatus is a developmental anomaly that arises from invagination of enamel organ into dental papilla during bell stage. The invagination begins at the crown and extends into root before its mineralization. Most common tooth affected by dens invaginatus is maxillary lateral incisors followed by maxillary central incisor, maxillary canine, mandibular lateral incisors, mandibular canine and mandibular central incisor. A classic case of Oehlers' type IIIA dens invaginatus is presented here.

KEYWORDS : *Dental anomalies, Dens invaginatus, Dens in dente, dilated composite odontome.*

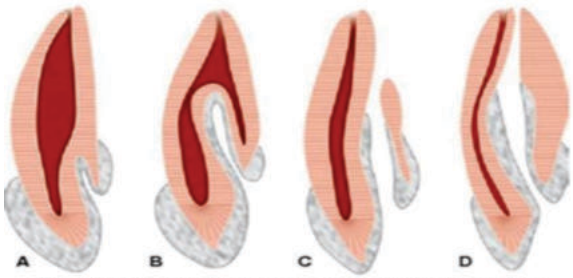
INTRODUCTION:

Dens invaginatus is a developmental abnormality that occurs when the enamel organ invaginates into the dental papilla during the bell stage1. This invagination begins at the crown and extends into the root before the tooth mineralizes. The condition is also known by various terms, including dens in dente, dentinoid in dente, telescopic tooth, pregnant woman anomaly, deep foramen caecum, tooth inclusion, and tooth within a tooth. The term "dens invaginatus" was introduced by Hallett in 19531. Hunter later referred to the condition as "dilated composite odontoma" due to the abnormal enlargement of the dental papilla, while Colby described it as a "gestant anomaly."2 The first report of this tooth anomaly dates back to 1794 when Ploquet discovered the malformation in a whale's tooth. It was first described in humans in 1856 by the dentist Socrates.2

The exact cause of dens invaginatus remains uncertain, and many theories have been proposed over the years.3 Alani and Bishop concluded that the condition is caused by a localized group of cells or by the proliferation and growth of cells from the enamel organ into the dental papilla during development.4 They also suggested that external forces on the tooth germ, or forces from neighbouring tooth germs, infections, or trauma, may contribute to the anomaly. There is some evidence that familial and genetic factors may play a role in its development.4,5 Recent theories propose that degeneration of the dental lamina leads to fusion, gemination, or agenesis.

The incidence of dens invaginatus ranges from 0.04% to 10.00%. While it rarely affects deciduous teeth, it is commonly found in permanent dentition.4,5 The condition most often affects maxillary lateral incisors, followed by maxillary central incisors, maxillary canines, mandibular lateral incisors, mandibular canines, and mandibular central incisors. Conklin documented a case of dens invaginatus in mandibular incisors.6 On radiographs, the condition appears as a radiopaque invagination with the same density as enamel, extending from the cingulum into the root canal.6,7 Oehlers' classification system is widely recognized for its clinical value. He divided invaginations into three types based on how far they extend radiographically into the crown and root (fig.1):1,7

- **Type I:** The invagination is minimal, enamel-lined, and confined to the crown, not extending beyond the cementoenamel junction.
- **Type II:** The invagination is enamel-lined and extends into the pulp chamber, staying within the root canal without connecting to the periodontal ligament.
- **Type III:** The invagination extends throughout the root to the apical foramen and communicates with the periodontal ligament, but typically does not connect with the pulp.



Figs 1A to D: Classification of dens invaginatus by Oehlers

Fig.1 ohler's classification system

Case Report:

A 21-year-old female reported to the department of conservative and endodontics D.Y. Patil school of dentistry, Navi Mumbai with the chief complaint of pain and sinus tract formation in upper right front tooth region since past 1 month.

Patient noticed a small, soft sinus opening in the buccal vestibule between the right maxillary central and lateral incisors. She reported occasional pain and pus discharge from the periodontal pocket of the right maxillary lateral incisor, accompanied by a bad taste and halitosis. Her medical history was unremarkable, with no family history of similar conditions and no associated syndromic features. Though she gave a dental history of successful completion of orthodontic treatment before 3 years and started experiencing draining sinus post the treatment completion. Extra-oral examination yielded no significant findings. Intra-oral examination revealed a 2mm sinus opening in the buccal vestibule between the right maxillary central and lateral incisors.

Fig.2,3- sinus tract formation on the buccal vestibule of lateral incisors.

This presentation is suggestive of a dental sinus tract, which typically results from a chronic periapical infection due to pulpal necrosis, majorly due to continuous tipping forces during orthodontic treatment leading to pulpal pathosis.

Fig.4 radiovisual graph wrt 11,12

There was no localized increase in temperature however sinus opening was painful. There was no associated bleeding but sometimes pus discharge noted. The Vitality 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. The same was confirmed using an electric pulp tester (EPT). There was no significant lymphadenopathy noted. The patient is further advised for radiographic investigations like radio-visual graph. (fig 4)

On radiographic examination a peri apical radiolucency involving the middle third of the central and lateral incisor was observed. There is a widening of periodontal ligament associated with the lateral incisor and loss of lamina dura. A vivid anatomical difference of the lateral incisor was noted as well. Gutta percha tracing of the sinus was done for the confirmation of the concerned tooth. (fig 5). A CBCT is advised for the confirmatory diagnosis. According to the readings of the CBCT, the periapical lesion was seen involving the right lateral incisor and the anatomy was suggestive of dens in dente' type III with the invaginatus having open apex which is communicating with the lesion. Hence, the provisional diagnosis is chronic periapical abscess with pupal necrosis in lateral incisor having dens invaginatus type III with open apex and the suggestive treatment is a non-surgical endodontic treatment followed by apexification considering factors like age and oral hygiene of the patient.

Fig:5,6(a,b) - Gutta Percha Tracing, CBCT Findings, Respectively

Fig:7 Access Opening And Orifice Enlargement

A root canal treatment is initiated in the right lateral incisor. Access opening is done using a conservative approach small round diamond bur (Mani.Inc, Japan) and ultrasonic tip E3D (woodpecker)(fig.7).8

2 orifices were located and the dentinal wall was preserved for the fracture resistance and strength of the tooth, there after patency filing was done and working length determination was done using a #15K file (Mani) using apex locator generation IV (JW Morritas) and confirmed radiographically. (fig 8)

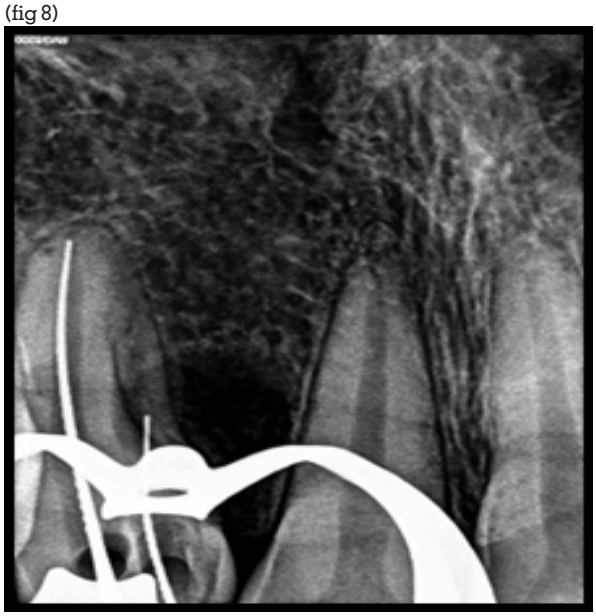


Fig.8: working length determination using radiographic technique

Pulpal extirpation and cleaning and shaping was done of the two canals separately using an ideal irrigation protocol with sodium hypochlorite (3% NaOCl), normal saline (0.9%w/v) and ethylene diamine tetra-acetic acid (17% EDTA). The canal is prepared till #25.06% rotary file (Endostar, azure) and circumferential hand filing is done in the invaginatus using #30k (Mani.inc, Japan) file. An inter-appointment calcium hydroxide dressing was given twice for 10-15 days twice. The signs and symptoms suggest dry canals and healing of the opening of the sinus, obturation is carried out. Apexification was done using MTA (Prevest-Denpro) plug of 3mm and thermoplastic obturation was carried out. the primary canal was obturated using a lateral condensation technique with usage of a resin-based sealer (Densply-AH plus). (fig.9,10) After a follow up of 2 weeks a post obturation restoration was done using composite restoration. (3M ESPE Filtek Z350 XT composite). (fig.11)

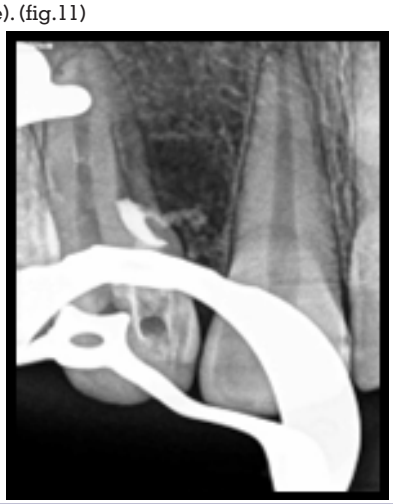


Fig-9,10,11 MTA apexification , obturation of the primary canal, post obturation restoration using composite, respectively.

Fig-12,13 follow up after 6 months and 12 months

Fig- 14,15 clinical pictures of follow up after 6 months and 12 months

DISCUSSION:

Dens invaginatus (DI), also known as "tooth within a tooth," is a developmental anomaly resulting from the invagination of the enamel organ into the dental papilla during tooth development.1,9,10 This condition leads to a deep invagination of enamel and dentine, starting from the foramen cecum or cusp tips and potentially extending into the root. The maxillary lateral incisors are most commonly affected, with bilateral occurrences not uncommon.10

Classification:

DI is primarily classified into three types:

Type I (Coronal Type): An enamel-lined cavity confined to the crown, not extending beyond the cementoenamel junction.11

Type II (Radicular Type): An enamel-lined cavity extending into the root beyond the cementoenamel junction, ending in a blind sac; there may or may not be communication with the pulp.11

Type III: An invagination extending beyond the cementoenamel junction, perforating laterally (Type IIIa) or apically (Type IIIb) at a foramen; it is usually lined by enamel, and in rare instances, by cementum.11

The prevalence of DI varies across populations, ranging from 0.25% to 10%.12 Maxillary lateral incisors are the most frequently affected, with bilateral occurrences reported in up to 43% of cases. The exact cause of DI remains uncertain, but genetic factors are believed to play a significant role.13 The anomaly results from the invagination of the enamel organ into the dental papilla during tooth development. Teeth affected by DI are predisposed to pulp and peri-radicular diseases due to the potential for pulp exposure through the invagination.14 Early detection is crucial, as the condition can lead to pulp necrosis and complicate endodontic treatments due to the complex root canal anatomy.

Diagnosis involves thorough clinical examination and radiographic imaging to assess the extent of the invagination and associated pulp involvement.15 Management strategies may include preventive sealing of the invagination, regular monitoring, and, if necessary, endodontic therapy tailored to the unique anatomy of the affected tooth.16 Peri-invaginatus periodontitis is a condition in which the tissue within an invagination becomes infected.17

Treatment of a tooth with peri-invaginatus periodontitis requires root canal treatment of the invagination.10,17,18 Schwartz and Schindler reported a case in which invagination was treated with a root canal separate from the main canal.12,19

Other cases in which invagination had close proximity to the main canal used root canal treatment of the whole root canal system even when the tooth showed a positive response to a vitality test.9,10,19 If the invagination communicates with the PDL space or the blunderbuss opening to the PDL space, root canal filling with mineral trioxide aggregate can be useful.20,21,23 Chaniotis et al. reported a similar case and thus concluded that a minimal approach is required for an endodontic treatment to be successful and for the longevity of the treatment.25

CONCLUSION:

In conclusion, dens in dente' is a rare developmental anomaly that can lead to significant dental complications if not promptly identified and managed. Early detection through vigilant clinical and radiographic examinations is crucial to prevent pulp necrosis and periapical pathosis. Treatment strategies should be tailored to the specific type and severity of the invagination, emphasizing conservative approach, when possible, to preserve tooth structure and function. Continued research and documentation of such cases are essential to enhance our understanding and management of this unique dental condition.

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