



## Non-Surgical Endodontic Treatment of Oehler's Type II Dens Invaginatus with Dens Evaginatus in a Maxillary Lateral Incisor: A Case Report

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### Abstract

Dens invaginatus is a developmental dental anomaly that results in an enamel-lined cavity in-folding into the crown or root. It happens before the mineralization phase. It is usually found in permanent maxillary lateral incisors, central incisors, and premolars. This paper describes the root canal treatment of Oehlers' type II Dens invaginatus with evaginatus in maxillary left lateral incisors. A 16-year-old boy presented to the Department of Conservative Dentistry and Endodontics, Government Dental College, Jaipur with chief complaint of pain and pus discharge in upper left anterior region. During examination, an intraoral sinus with relation to upper left lateral incisor was found. On electric pulp testing upper left lateral incisor gave negative response. Radiographic along with clinical examination confirmed the diagnosis of chronic periapical abscess and Oehler's type II Dens Invaginatus and evaginatus with relation to upper left lateral incisor. Non-surgical treatment was planned for the same and executed. We decided not to remove the dens from the main canal and to treat the dens tract with the main canal. Non-surgical root canal treatment of the invaginated canal along with the pulp canal proved successful in promoting the healing of an associated peri-radicular lesion.

**Keywords:** Oehler's Type II Dens Invaginatus; Dens Evaginatus; Maxillary Lateral Incisor

### Introduction

Dens invaginatus (DI) is a rare malformation in which the affected teeth radiographically show an in-folding of enamel and dentine. This invagination can extend deep into the pulp cavity and into the root or root apex sometimes. The malformation was first described by Ploquet in 1974 who discovered this anomaly in a whale's tooth [1,2]. In a human tooth was first described by a dentist named 'Socrates' in 1856 [3]. After that a numerous case reports has been published on Dens invaginatus. This condition most commonly occurs in permanent maxillary lateral incisors, followed by maxillary central incisors, premolars, canines and less frequently in the molars [4-8]. Cases of bilateral and multiple occurrence have also been reported [6-9]. Synonyms for this malformation are: Dens in dente, invaginated odontome, dilated gestant odontome, dilated composite odontome, tooth inclusion, dentoid in dente.

Dens evaginatus (DE) [10-12] is a relatively rare developmental anomaly characterized by the presence of an accessory cusp-like structure projecting from the cingulum area or cemento-enamel junction (CEJ) of the maxillary or mandibular anterior teeth in both the primary and permanent dentition. Premolars are the most commonly affected posterior teeth.

Concurrence of DE and DI within the same tooth is a rarity. It is important to recognize these anomalies and to be knowledgeable about their management.

### Etiology

The etiology of dens invaginatus malformation is controversial. Several theories have been proposed to explain the aetiology of dental coronal invaginations which are as follows:

1. Growth pressure of the dental arch results in buckling of the enamel organ [9,13].
2. Kronfeld [14] suggested that the invagination results from a focal failure of growth of the internal enamel epithelium while the surrounding normal epithelium continues to proliferate and engulfs the static area.
3. Rushton [15] proposed that the invagination is a result of rapid and aggressive proliferation of a part of the internal enamel epithelium invading the dental papilla. He regarded this a 'benign neoplasma of limited growth'.

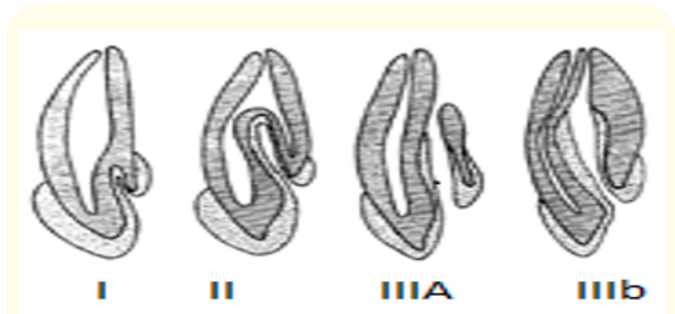
4. Oehlers [16,17] considered that distortion of the enamel organ during tooth development and subsequent protrusion of a part of the enamel organ will lead to the formation of an enamel-lined channel ending at the cingulum or occasionally at the incisal tip. The latter might be associated with irregular crown form.
5. The 'twin-theorie' [18] suggested a fusion of two tooth-germs.
6. Infection was considered to be responsible for the malformation [19,20].
7. Gustafson and Sundberg [21] discussed trauma as a causative factor, but could not sufficiently explain why just maxillary lateral incisors were affected and not central incisors.
8. Ectomesenchymal signaling system between dental papilla and the internal enamel epithelium can affect tooth morphogenesis [22]. These signals have specific roles such as tooth morphogenesis and the folding of enamel organ [23].

Although the aetiology of DE is still not well understood, it does appear that both genetic and environmental components exist. Similar to other abnormalities of tooth shape, the DE originates during the morpho-differentiation stage of tooth development [24]. It may occur as a result of the outward folding of the inner enamel epithelial cells and the transient focal hyperplasia of the peripheral cells of mesenchymal dental papilla.

### Classification

The first classification of invaginated teeth was published by Hallet [25]. But the most commonly used classification is Oehler's classification (Figure 1) [16]. He described three forms of Dens invaginatus:

- **Type I:** An enamel-lined minor form occurring within the confines of the crown not extending beyond the amelocemental junction.
- **Type II:** An enamel-lined form which invades the root but remains confined as a blind sac. It may or may not communicate with the dental pulp.
- **Type III:** A form which penetrates through the root perforating at the apical area showing a 'second foramen' in the apical or in the periodontal area. There is no immediate communication with the pulp. The invagination may be completely lined by enamel, but frequently cementum will be found lining the invagination.



**Figure 1:** Oehler's classification of Dens invaginatus (Source: Thakur Narbir S Thakur Seema. Dens Invaginatus (Tooth Within Tooth). A Review Of The Literature And Diagnostic And Management Guidelines For Practicing Dentists. Indian Journal of Dental Sciences. September 2012 Issue 3, Volume 4.

Oehlers [16,17] also described different crown forms:

- Normal with a deep lingual or palatal pit,
- Conical, barrel-shaped,
- Peg-shaped with an incisal pit.

### Case Report

A 16-year-old boy presented to the department of Conservative Dentistry and Endodontics, Government Dental College, Jaipur with chief complaint of pain and pus discharge in upper left anterior region (Figure 3). During examination, an intraoral sinus with relation to upper left lateral incisor was found. Morphological alteration was observed with a sign of fracture of Talon's cusp on the palatal side of lateral incisor (Figure 2). It was tender on percussion and on electric pulp testing gave negative response. Sinus tracing with a gutta percha showing its relation with the lateral incisor in the intra oral periapical radiograph (Figure 4). The lateral incisor appears as a tooth within a tooth in the radiograph with the extension of the Dens invaginatus within the middle third of root communicating with the main root canal (Figure 4). Radiographic along with clinical examination confirmed the diagnosis of chronic periapical abscess and Oehler's type II Dens Invaginatus and evaginatus with relation to upper left lateral incisor.

The left infraorbital nerve was anesthetized using 2% Lignocaine with 1:80,000 adrenaline (Lignox, Indoco Remedies Ltd, India). The tooth was isolated using a rubber dam and an endodontic access cavity was established. The opening of invaginatus was found along with two openings of main root canal (Figure 5).



**Figure 2:** Photograph showing evagination on the palatal aspect of upper left lateral incisor.



**Figure 5:** Access opening of the tooth showing opening of invagination and two openings of the main root canal.



**Figure 3:** Intraoral sinus just above the upper left lateral incisor.

Canals were negotiated with small size k-files (Mani, Inc; Tochigi, Japan). The invaginated canal was debrided thoroughly and prepared using the step-back technique to apical size 40 and mesial and distal root canals to size 25 under abundant irrigation (Figure 6) with 3% sodium hypochlorite solution and EDTA (Glyde, Maillefer, Dentsply, Ballaigues, Switzerland). The root canals were dried with paper points (Maillefer, Dentsply, Ballaigues, Switzerland) and obturated (Figure 7) with thermoplastic gutta percha (Calamus dual, Maillefer, Dentsply, Ballaigues, Switzerland) and AH+ sealer (Maillefer, Dentsply, Ballaigues, Switzerland). The final restoration of the tooth was completed using composite. The follow-up 3 month radiograph shows periapical healing, and the patient has remained asymptomatic.



**Figure 4:** Periapical radiograph of tooth showing the sinus tracing with gutta percha and invagination extending till the middle third of the root canal. Note the periapical translucency.



**Figure 6:** Working length radiograph.



**Figure 7:** Obturation radiograph.



**Figure 8:** 3 month recall.

## Discussion

Endodontic treatment in teeth with Dens invaginatus generally involves complicated procedure that require accurate diagnosis and appropriate treatment planning [16,17,26]. The case reported in this article is an Oehler's type II Dens invaginatus, and its clinical appearance was of dens invaginatus with an associated talon cusp. While the aetiology of accessory cusps is unknown, it is known that they are commonly found in mandibular premolars and can affect anterior teeth. Mitchell [27] first described the accessory cusps, DE, in Dental Cosmos in 1892. A DE can occur as an isolated finding or in association with other dental anomalies such as peg-shaped lateral incisors, agenesis of canines, mesiodens, complex odontomas, megadont, DE of posterior teeth, shovel-shaped incisors, DI and exaggerated cusp of carabelli [28-30]. In its typical shape, the DE has a close resemblance to an eagle's talon [26] but it could also be presented as a pyramidal, conical or teat-like [27,31,32]. According to some studies [33,34] the prevalence of talon cusp varies from 0.06 per cent to 7.7 per cent.

Fukuta, *et al.* [35] described a somewhat similar case of a lateral incisor with DI. In that case, the authors described a tubercle rather than a true DE on the lingual surface of an upper lateral incisor. Clearly, careful clinical and radiographic examination is beneficial for optimal treatment planning. Endodontic implications of case seen by Fukuta, *et al.* include prophylactic endodontic therapy, if recontouring or physiologic reconstruction of the DE is anticipated to prevent intra-operative pulpal exposure [35].

In this case communication between the evagination and the oral environment was there may be because of trauma during function and a periapical radiolucency had developed. In this type of dens invaginatus, the invagination may or may not communicate with the pulp [36] but as the communication was present in this case so it became essential to debride the main canal also.

## Conclusion

Conventional endodontic therapy, which may include prior microscopic removal of the dens, is usually the treatment of choice in such cases. Non-surgical root canal treatment of the invaginated canal along with the pulp canal proved successful in promoting the healing of an associated peri-radicular lesion.

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