Contemporary Pediatric Dentistry

Case Report
Contemp Pediatr Dent 2022:3(1)35-40
DOI: 10.51463/cpd.2022.101

# Retreatment of a maxillary lateral incisor with type II dens invaginatus: One-year follow-up

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## Highlights

- Miss-diagnosis of teeth with dens in vaginatus leads to failure of root canal treatments.
- One-year follow-up of a non-surgical endodontic retreatment of Oehlers Type II Dens Invaginatus in the permanent maxillary left lateral is presented in this case report.
- This case report underlines the significance of precise diagnosis and classification of dens in vaginatus for less invasive and successful treatments.

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**Received:** 22 Feb 2022
**Accepted:** 28 Apr 2022
**Online First:** 25 May 2022

## Abstract

Dens invaginatus is a developmental dental anomaly that occurs when the enamel organ is folded into the dental papilla prior to calcification of dental tissues. Endodontic treatment of the teeth with dens invaginatus can be challenging and due to atypical and complex anatomy. This case report presents non-surgical endodontic treatment of maxillary lateral incisor with Oehlers Type II Dens Invaginatus. The anamnesis revealed that the maxillary left lateral incisor had root canal treatment in the past; however the symptoms remained. Radiographic and clinical examination revealed an inadequately filled accessory canal and a necrotic unfilled main canal surrounded by a large periapical lesion. Subsequently, endodontic treatment of the main and retreatment of the accessory canal was completed. One year of clinical and radiographical follow-up demonstrated an asymptomatic tooth with a healing periapical lesion.

**Keywords:** Dens in Dente; Incisor; Invaginatus, Retreatment

## INTRODUCTION

Dens invaginatus, also known as 'dens in dente,' is a developmental dental anomaly characterized by invaginations of enamel-surrounded surface at the crown or root prior to mineralization phase of tooth formation.[1] The etiology of this dental anomaly is still unclear; however, it is assumed that early or delayed stimulation of focal growth in some parts of the dental germ, insufficient bone development, traumas, infections, genetic factors, or combination of these factors may play a role.[2,3] The incidence reported in the literature ranged from 0.04% to 10% and was observed most frequently in maxillary permanent lateral incisors.[2]

Although there are different classifications, the most widely used one is the classification made by Oehlers[4] which is grouped as Type I, II, and III.[2,3,5] In type I, the invagination is limited to the crown of the tooth, whereas type II extends beyond the enamel-cementum junction, which may/may not be associated with the pulp; however, it remains unassociated with the periradicular tissues. Oehlers Type II shows complex anatomy and is often associated with incomplete root and apex formation.[2, 3] In type III, the invagination extends into the root and perforates the root from the apical or lateral surfaces without pulp involvement creating a second foramen in the apical or periodontal region.[3-7]

The diagnosis of dens invaginatus is based on clinical and radiographic examinations.[2] The clinical appearance of the tooth may be normal, or it may have unusual forms with increased buccolingual width informing of a wedge, cylinder, or a cone.[8, 9] The 'tooth-within-a-tooth' radiographic appearance is specific for diagnosis.[2]

Dens invaginatus facilitates plaque accumulation on the teeth, leading to caries' rapid formation and progression, which results in pulpal/periapical pathology.[2,6]

Early diagnosis of such malformations is important to avoid caries formation and pulpal infections.[9] Clinicians must consider the possibility of dens invaginatus in teeth showing signs of pulpitis without dental caries and trauma history.[10] The treatment approach varies depending on the degree of malformation and at what stage the diagnosis is made. Thus, treatment options range from a simple prophylactic and restorative procedures to root canal treatment or surgical procedures.[10] In case of an asymptomatic tooth with dense in vaginatus, good oral hygiene is vital to prevent dental caries formation that may occur due to plaque accumulation.[2] Early diagnosis, together with preventive applications, makes the treatment adequate.[10] In case of a caries formation, restorative care is given, and restorations are checked at regular intervals for their marginal adaptation. On the other hand, endodontic treatment must be the first choice for pulpal/periapical infection.[2]

Treatment options include non-surgical endodontic treatment, apexification, endodontic surgery, a combination of these techniques, and replantation. [3, 9] However, endodontic treatment of teeth with dens invaginatus can be quite difficult due to the above-mentioned anatomical factors.[3] Extraction should be considered the last treatment option in teeth with complex anatomy unless endodontic care or periapical surgery can be applied.[5]

The aim of this case report is to present the non-surgical endodontic retreatment of a permanent maxillary left lateral with Type II dens invaginatus with a periapical lesion. This study shows that retreatment with injectable bioceramic- based sealants can be a succesful way to treat a miss-diagnosed teeth with dens invaginatus before considering the surgical procedures.

## CASE REPORT

A 12-year-old female patient with the complaint of pain and swelling in her left maxillary lateral incisor was referred to Istanbul Aydın University Faculty of Dentistry, Department of Pedodontics. Medical anamnesis revealed no systemic disease and history of trauma. In her dental anamnesis, it was stated that tooth 22 was root canal treated, yet patient's complaints of pain and swelling remained. Intraoral examination revealed that tooth morphology was normal and no caries or discoloration. However, 22 responded positively to percussion and negative to electrical pulp test. There was no pathological mobility noted.

In the radiographic examination, an invagination was detected in the mesial of the main canal extending beyond the enamel-cementum junction to the middle third of the root. The invagination had no pulp involvement and was classified as Oehlers Type II Dens Invaginatus (Figure 1). The apex formation was complete; however, a periapical lesion was observed. Radiographically, it was observed that the endodontic treatment of the canal in the mesial did not reach the apical foramen, whereas the main canal was empty, showing no sign of root canal treatment. Subsequently, the periapical lesion was planned to be treated conservatively with orthograde endodontic treatment. The access of the main canal was positioned laterally while the opening of invagination was located in mesial. After the isolation of the tooth with a rubber-dam in the first session, the endodontic access cavity was prepared, and the pulp tissue in the main canal was extirpated. Then the gutta-percha in the invaginated canal was removed. (Figure 2a) The access to the main canal was accomplished thereafter necrotic the pulp tissue was extirpated. Both canals were biomechanically prepared, and the working length of the canals was determined by apex locator and periapical radiography (Figure 2b). 5% NaOCl was used as an irrigation solution. After shaping, the root canals were filled with calcium hydroxide paste, and the tooth was temporarily restored with glass ionomer cement (Ketac Molar Easymix, 3M ESPE, 3M Deutschland GmbH, Neuss, Germany). The patient was called for the second session two weeks later.

Figure 1. Oehlers Type II Dens Invaginatus in maxillary left lateral incisor on panoramic x-ray

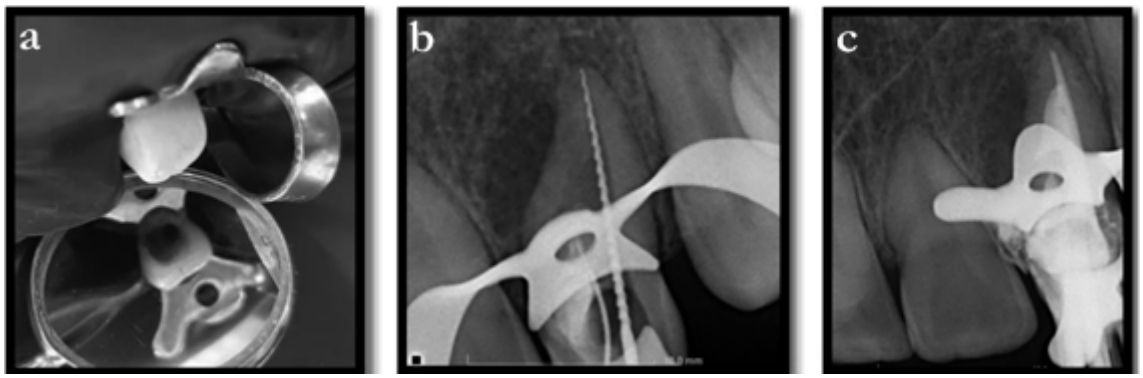


Figure 2. a) Access cavity showing two different canal entrances; b) Determination of working length; c) Completion of endodontic treatment

One year of follow-up appointments revealed that the tooth was asymptomatic with no pain and swelling. There was no mobility detected, and the response to percussion was negative. Periapical radiograph showed trabecular bone formation, indicating the periapical lesion's healing after 3 months (Figure 3) and one year (Figure 4). One year follow-up radiography revealed a formation of lamina dura as well.

## DISCUSSION

Invagination usually originates from the folding of the foramen caecum during odontogenesis.[6] This anomaly is most frequently seen in maxillary permanent lateral incisors as in this case.[2,3,6] In the dental literatüre, bilateral dens invaginatus cases have been reported. [3,5] Therefore, the contralateral lateral incisor was checked for clinical and radiographic findings, but no evidence was detected.

The clinical appearance of this anomaly may be normal, or it may have unusual forms with increased buccolingual width, such as wedge, cylindrical, or conical shapes [8,9]. In this case, the form of the tooth was normal. Dens invaginatus is usually diagnosed with distinctive features on radiographic examination.[3] The present case was diagnosed with Oehlers Type II Dens Invaginatus based on radiographic examination.


Figure 3. Periapical radiography after three months showing reduction of periapical lesion

Figure 4. One-year follow-up periapical radiography demonstrating a healing of periapical lesion and presenting a lamina dura formation

In dental literature, it is reported that invagination is located mainly on the palatal/lingual side[6]; however, in this case, invagination was located in the mesial. In the presence of pulpal/periapical infection, the complex anatomy of teeth with Type II and III dens invaginatus obstructs endodontic treatment. These hardships hinder disinfection and filling of the root canal system. [2] Hence, it is crucial for the clinician to be aware of these variations and develop a treatment plan for successful endodontic treatment.[3] The success of endodontic treatment depends on the accessibility, disinfection, and shaping of the root canal.[5,11] The possibility of infected pulp tissues in inaccessible parts of the root canal system complicates the endodontic treatment of teeth with dens invaginatus.[1] In the present case, sodium hypochlorite with antibacterial properties was used to disinfect the canals. In the clinical studies, sodium hypochlorite with varying concentrations of 0.5-5.25% is preferred as an irrigation solution.[8, 11] Due to the irregularities of the root canal system, the canals were abundantly irrigated with 5% NaOCl.

Calcium hydroxide was used as a temporary root canal dressing. Calcium hydroxide paste was preferred as it stimulates the accumulation of mineralized tissue in addition to its anti-bacterial properties the studies.[8, 11.] It has beneficial effects on the healing of the periradicular lesion by increasing the pH of the periapical environment and providing calcium ions for the repair process. On the other hand, it has a denaturation effect on proinflammatory mediators such as IL1 and TNF.[1] In the last session, the root canals were filled with gutta-percha and injectable bioceramic-based canal sealer using the cold lateral condensation technique. Filling the canals with an injectable bioceramic-based canal sealer was preferred since this technique is effective in clogging canal irregularities in teeth with dens invaginatus. In reported cases, traditional endodontic treatment was found to be successful and sufficient in eliminating infection and providing periapical healing. [2]

This case report presents a one-year follow-up of a non-surgical endodontic treatment of Oehlers Type II Dens Invaginatus in the permanent maxillary left lateral with necrotic pulp and periapical lesion.

## CONCLUSIONS

This case report of Type II dens invaginatus, demonstrated the significance of clinical radiographical examination for precise diagnosis, which is the key factor for successful endodontic treatment without surgical intervention.

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**How to cite this article:**

Ozge Irem Can Kolcu, Esra Pamukcu, Berk Senguller, Aslı Topaloglu Ak. Retreatment of a maxillary lateral incisor with type II dens invaginatus: One-year follow-up. Contemp Pediatr Dent 2022:3(1):35-40

## Declarations

**Acknowledgements:** *Not applicable*

**Conflict of Interest Statement:** *Authors disclose no potential conflicts of interest.*

**Ethics Statement:** *The procedure was explained to the legal guardian and written consent was obtained for the treatment and publication of the case report.*

**Informed Consent:** *Informed consent was taken from parents.*

**Author contributions:** *Conception and design: All Authors; Acquisition of data: OICK, EP; Interpretation of data: EP; Drafting article: BS, ATA; Revision artice: OICK, EP, ATA; Final approval: All Authors*

**Funding:** *This work is not finantiated.*

**Data Availability**: *The data used to support the findings of this study can be made available upon request to the corresponding author.*

**Peer-review:** *Externally double-blinded peer-reviewed.*