Journal of
Oral Health and Oral Epidemiology

https://johoe.kmu.ac.ir
10.34172/johoe.2412.1701
JOHOE. 2025;14:2412.1701

Case Report

A unique case of Oehler's type IIIB dens invaginatus in a mandibular premolar: A case report and comprehensive literature review

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Abstract

Background: Dens invaginatus (DI) is also known as dilated composite odontome, dilated gestant odontome, dens in dente, invaginated odontome, and dents telescopes. Although DI most commonly affects the permanent maxillary lateral incisors, it can also affect the molars. The cause is unknown; nevertheless, one possible explanation is focal growth retardation or localized external pressure on certain areas of the tooth bud, which causes the enamel organ to invade the dental papilla during the morphodifferentiation stage. The invagination of enamel organ is hypothesized to enhance the risk of caries, pulpal pathology, and inflammation of periodontium. Traditional conservative endodontic therapy can be attempted successfully in mild invagination. DI with pulpal or periapical pathologies typically entails periapical surgery with a retrograde filling, and extraction is indicated in complicated cases. The purpose of this study was to report a unique case of Oehler's type IIIB DI in a premolar, accompanied by a comprehensive literature review.

Case Presentation: An 11-year-old female child visited the Pedodontics clinic with the chief complaint of swelling on the left side of the jaw. The left mandibular region was tender on palpation and firm in consistency upon extraoral examination. Intraoral examination revealed a decayed, discolored tooth in the second premolar region with intraoral sinus and pus discharge on the buccal side. Radiographic examination revealed incomplete root formation with invagination and radicular dilation, along with an indistinct canal anatomy indicative of Oehler's type IIIB DI.

Conclusion: Extraction was the treatment of choice in this case due to chronic periapical abscess with poor prognosis of the tooth. Dental practitioners should evaluate the case thoroughly for proper diagnosis and treatment.

Keywords: Dens in dente, Premolar, Teeth abnormalities

Citation: Alruwaili SR, Yadiki JV. A unique case of Oehler's type IIIB dens invaginatus in a mandibular premolar: a case report and comprehensive literature review. *J Oral Health Oral Epidemiol*. 2025;14:2412.1701. doi: 10.34172/johoe.2412.1701

Received: December 22, 2024, **Accepted:** May 13, 2025, **ePublished:** August 4, 2025

Introduction

Developmental anomalies of teeth are serious dental problems that deviate from normal tooth morphology and stage of development. These anomalies can affect either primary or permanent teeth and are caused by both local and systemic causes. These irregularities impact the aesthetic appearance of the teeth and cause complications during dental treatment. Different forms of morphological tooth irregularities have been described by the World Health Organization (WHO) classification of tooth development and eruption disorders in the International Classification of Diseases version 10 (WHO-ICD-10).[1] Dens invaginatus (DI), also known as dens in dente or dilated odontoma, is a developmental abnormality in which enamel folds or invaginates into dentin. The invagination of the crown before calcification results in developmental defects of the tooth.[2] Although the etiology is unknown, the possible causes may include delayed or stimulated development in specific parts of the tooth germ, dental papilla invaginated excessively by the enamel organ, increased external pressure during the growth of the tooth germ, external trauma, infection, or nutritional factors. In a few cases, genetic factors are also responsible for dental anomalies.[3]

There are different classifications to describe dens invaginatus. It was initially classified by Hallet in 1953. Oehler's classification (Figure 1) proposed in 1957 is the most commonly used one in which there are three forms of DI depending on the depth of the invagination.[4,5] Type I: The invagination is not reaching beyond the cemento-enamel junction (CEJ), but is limited to the crown. This type is not an uncommon variant. Type II:

The invagination extends beyond the CEJ with or without having communication with the pulp tissue. Type III: The invagination reaches the root surface by extending apically beyond the CEJ to create a second lateral foramen. There is no communication with the pulp. Type IIIB: The invagination perforates the root surface by extending apically beyond the CEJ and connects with the periodontal ligament in the apical foramen without involving the pulp.

In the proposed type IV dens invaginatus, the invagination reaches the pulp chamber over the cementoenamel junction, communicating with the dental pulp, displacing the main root canal laterally and connecting apically and laterally with the periodontium through a pseudo foramen. Additionally, there is a lateral canal arising from the main root canal.[6] The prevalence of DI affecting adult teeth has been reported to range from 0.3% to 10%, with the condition detected in 0.25 to 26.1% of persons. Studies report that the overall prevalence of DI in the Saudi population is 7.3% and affects 1.6% of maxillary anterior teeth. The most commonly involved tooth is the permanent maxillary lateral incisor, but it can occur in any tooth.[7] This study aimed to report a unique case of Oehler's type IIIB DI in an 11-year-old female child. Due to the susceptibility of caries and incomplete root formation with invagination, various treatment options were explained in this article.

Case Presentation

An 11-year-old female child visited the Pedodontics section of the College of Dentistry, Jouf University, complaining of swelling on the left side of the jaw for four months. The patient reported occasional dull, aching pain, which was associated with the swelling. There was no relevant history of trauma to the jaw region. The patient never consulted the dentist, and there was no relevant medical history. A unilateral extraoral swelling that was tender on palpation and firm in consistency was noticed in the left mandibular region. The extraoral examination revealed palpable and tender submandibular lymph nodes on the same side. Intraoral examination revealed a discolored and decayed tooth #35 with an intraoral sinus and pus discharge on the buccal side (Figure 2).

Although tenderness to percussion of the tooth was noted, thermal and electric pulp tests were negative, and the tooth was tender to percussion, confirming the pulpal necrosis. On radiographic examination, the tooth revealed an incomplete root formation with invagination and radicular dilation with loss of lamina dura. A radiolucency extending through the enamel, dentin, and pulp was observed with an indistinct canal anatomy (Figure 3). The diagnosis was made as a type IIIB DI and the affected tooth was extracted due to poor prognosis, followed by the placement of a removable partial denture (Figure 4).

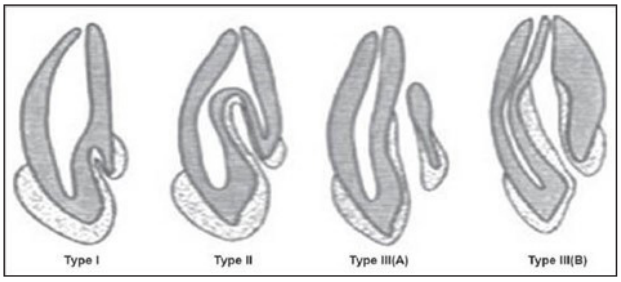

Figure 1. Oehler's classification of dens invaginatus

Discussion

Generally, dental anomalies are not frequently detected during routine clinical examination and are occasional

Figure 2. Intraoral clinical picture showing dens invaginatus in tooth #35

Figure 3. Intraoral periapical radiograph showing radiolucency extending the pulp with indistinct canal anatomy confirming type IIIB dens invaginatus

Figure 4. Gross specimen showing the dilated root surrounded by the connective tissue

complaints of patients.[8] Salter characterized DI as a "tooth within a tooth" in the year 1855, and Socrates described the first instance of DI in a patient's tooth in 1856.[9] According to the literature, infraocclusion can cause dental changes, with the most common being agenesis of all permanent teeth, followed by DI and taurodontism.[10] DI is expected to affect the posterior teeth less often, with the permanent maxillary lateral incisors being the most commonly affected. Literature shows that second mandibular premolars are less likely to be affected by DI. The current case had unilateral DI in a second mandibular premolar.

The diagnosis of DI requires an accurate radiographic examination. A tooth with DI exhibits a variety of canal morphologies, including concavities, intracanal connections, apical ramifications, and other areas that tools cannot reach. The intricate structure of DI impacts the tooth's prognosis. One clinical management strategy may not be applicable for all cases of DI. Failing to recognize these anomalies can result in modifications in the pulp within a short period after eruption. Pulp necrosis frequently occurs early in the process, typically earlier than the closure of the root. These anomalies are prone to infection and pulp degeneration, making early diagnosis critical for establishing preventive practices and avoiding pulp necrosis and periapical inflammation.

The preventative approach for these situations should be less intrusive. If the pulp is vital and caries are present on the coronal aspect without involving the periapical region, restoring the teeth with fissure sealant conservatively is the treatment of choice, with regular clinical and radiographic follow-up. The initial step should be to try a nonsurgical root canal therapy. Managing the tooth surgically is the next alternative and is advised only when there is failure of conservative root canal treatment and in teeth that cannot be managed by nonsurgical treatment due to anatomical changes or inaccessibility of the root canal system.[11] Hulsmann mentioned that strict observation is advised without any treatment in situations where there is no clinical or radiographical indication of invagination and no obvious pathosis.[11]

In the present case, the lower second premolar showed signs of pathology clinically and radiographically. The possible treatment options include prophylactic or preventive therapy for the invagination, root canal treatment, endodontic apical surgery, intentional replantation, and extraction of the tooth. The choice between them is determined by the nature and degree of the invagination. The clinical case presented in this study was Oehler's type IIIB DI in the second mandibular premolar with a periapical lesion. In the present case, extraction was performed due to chronic periapical abscess and poor prognosis of the tooth. After the extraction, the patient and her mother were advised for the removable functional appliance with regular follow-up until she becomes 18 years old for definitive treatment, which is an implant or fixed partial denture.

Conclusion

Dens invaginatus (DI) is always a difficult condition for endodontic therapy since such teeth have complex root canal anatomy. Early diagnosis and treatment of DI are possible for practitioners by knowing the classification and anatomic variations of teeth. However, practitioners can apply modern technological advancements in dental radiography and techniques to manage dental anomalies in the future.

Acknowledgments

We would like to acknowledge the patient and her parents for their cooperation.

Authors' Contribution

Conceptualization: Shahad Alruwaili, Josna Yadiki.
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Competing Interests

The authors declare no competing interest.

Data Availability Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethical Approval

Not required.

Funding

This research received no specific grant, funding, equipment or supplies from any funding agency in the public, commercial, or not-for-profit sectors.

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