

Dens Invaginatus on a Geminated Tooth: A Case Report

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Abstract

Aim: To present a case of a concomitant occurrence of dens invaginatus (DI) and gemination in a mandibular left lateral incisor.

Background: DI is a developmental anomaly resulting from the invagination of a portion of a crown in the enamel organ stage of odontogenesis. It is commonly found in the maxillary lateral incisors but also occurs in the central incisors, premolars, canines, and molars in descending order of frequency. The occurrence of DI in the mandible is extremely rare. Gemination results from one tooth bud attempting to split into two. Geminated teeth present with a single root structure and rarely occur in mandibular teeth.

Report: A 13-year-old girl presented with a chief complaint of spontaneous nocturnal pain in the mandibular left lateral incisor tooth. Intraoral examination revealed the tooth was enlarged with a notch on the incisal edge extending to the coronal 1/3 of the crown. The radiological examination revealed a Type 2 DI in a Type 1 geminated mandibular left lateral incisor.

Summary: DI is clinically significant due to the possibility of the pulpal involvement; pulpitis, necrotic pulps, and chronic periapical lesions are often associated with this anomaly without clinical symptoms. Clinicians should be mindful of the possibility of DI when a tooth presents pulpitis without history of trauma or caries and examine the suspicious tooth and the periodontium radiographically.

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Introduction

Dens invaginatus (DI) is a developmental anomaly resulting from invagination of a portion of crown (enamel organ) during odontogenesis.¹⁻³ The invagination ranges from a slight pitting (coronal type) to an anomaly occupying most of the crown and root (radicular type).⁴ While the coronal type of invagination is lined with enamel, the radicular type of invagination is lined with cementum.¹

Although a clinical examination may reveal a deep fissure or pit on the surface of an anterior tooth, radiographic examination is the most realistic way to diagnose the invagination.^{1,4}

The term “double tooth” is often used to describe gemination and fusion. The etiology of double teeth has been attributed to factors such as trauma, heredity, local metabolic interferences, localized external effects, as well as focal growth retardation or focal growth stimulation in certain areas of tooth bud during its development.^{2,3}

Gemination occurs when one tooth bud attempts to split into two, while fusion results from the conjoining of two tooth buds. Geminated teeth present a single root structure while fused teeth have separate pulp canals.⁵⁻⁷

Ohlers is the most popular system used to classify DI. Invaginations are classified as follows:

- **Type 1** - Cases are those in which invagination ends as a blind sac within the crown.
- **Type 2** - The invagination extends apically beyond the cemento-enamel junction.
- **Type 3** - The invagination extends beyond the cemento-enamel junction and a second “apical foramen” is evident.^{1,2,4}

Aguilo et al.⁷ classified gemination according to morphological formation as follows:

- **Type I** - Bifid Crown with a Single Root (The crown is larger than normal with a notch on the incisal edge and a bifid pulp chamber. The root and pulp chamber are of normal size.)
- **Type II** - Large Crown with a Large Root (The crown is larger than normal and has n+o groove or notch. The pulp chamber is single and large. The root is wider than normal and has one large root canal.)
- **Type III** - Two Fused Crowns with a Single Root (There are two crowns with a vertical groove. The cervical portion of both crowns may be joined. The pulp chamber may be separate. The root is conical shaped and larger than normal.)
- **Type IV** - Two Fused Crowns with Two Fused Roots (There are two crowns with a vertical groove. The cervical portion of both crowns are joined along with the pulp chambers.)

The objective of this case presentation is to report a rare concomitant occurrence of two dental anomalies in a single tooth.

Case Report

A 13-year-old girl presented with a chief complaint of spontaneous, severe, and a nocturnal pain in her mandibular incisor teeth. There was no significant medical or dental history. Extraoral examination revealed no abnormalities except for a chronic submandibular lymphadenopathy.

Intraoral examination revealed a mandibular left lateral incisor larger than normal (Figure 1). There was a notch on the incisal edge extending to the coronal 1/3 of the crown. The tooth was sensitive to vertical and horizontal percussion. There was also horizontal and vertical mobility. The adjacent gingiva was edematous, hyperemic, and sensitive to palpation.

Panoramic and periapical radiographs were taken. The panoramic radiographic examination



Figure 1. The mandibular anterior teeth with a large crown on the left incisor with a notch in the incisal edge. The adjacent gingiva is hyperemic and edematous.



Figure 2. A panoramic radiograph indicating a normal tooth count; a mandibular left lateral incisor with a large crown and root; a single pulp chamber and multiple periapical radiolucencies.



Figure 3. Periapical radiographs indicating a unilateral geminated/invaginated mandibular left lateral incisor and a radiolucency around the apices.

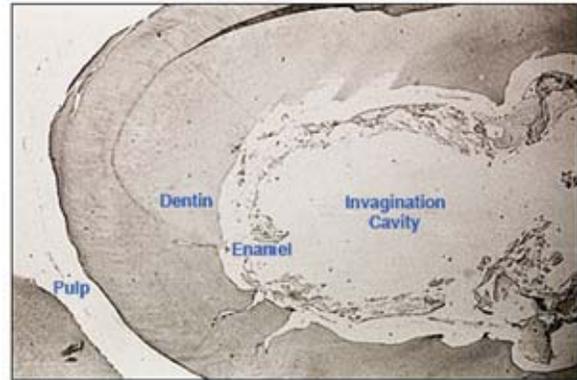


Figure 4. Histopathological appearance of the invagination in the pulpal region. Thin and irregular enamel and dentin tissues are apparent in the area of invagination (HEX25).

verified the number of mandibular teeth to be normal (Figure 2).

Periapical radiographs of the mandibular anterior teeth also revealed an invagination extending beyond the cemento-enamel junction toward the apex of the mandibular left lateral incisor (Figure 3).

The tooth had a large crown and a large root and was classified as a Type 2 DI and a Type II double tooth. The pulp extended from the apical foramen to the cervical region of the tooth then split just below the cemento-enamel junction. A periapical radiolucency with an ill-defined border

was present around the apex and lateral aspect of the root. Because of the existing patient status and difficulties in accessing the canals, the tooth was extracted.

After the removal of the tooth, it was horizontally sectioned and examined histopathologically. The specimen revealed invagination in the pulpal region of the relevant tooth with irregular and thin enamel and dentin tissues within the invagination region (Figure 4).

Discussion

There have been reports about the concomitant presence of DI with other dental anomalies such

as taurodontism, microdontia, supernumerary teeth, and short roots. However, the presence of gemination and DI in the same tooth is extremely rare. To our knowledge only three cases have been reported in the English dental literature. Although the teeth in the reported cases were in the maxilla, the present case was found in the mandible.⁹⁻¹¹

Embryologic timing of these two anomalies is different. Gemination occurs during the initial stage of tooth development, and DI occurs somewhat later during morphodifferentiation.⁸

DI occurs rarely in the primary teeth but frequently in the permanent dentition and has a general prevalence of 0.04-10%. There is a 3:1 female predilection.¹⁻⁴

DI commonly affects the maxillary lateral incisors. It also affects central incisors, premolars, canines, and molars in decreasing order of frequency.^{1,2,4,8} DI in the mandible is extremely rare. To date approximately 12 cases have been reported. Bilateral occurrence is a typical scenario,^{1,2,4} but in the present case the invaginated tooth was a mandibular lateral incisor and the invagination was unilateral.

The prevalence of double teeth is reported as less than 1% occurring predominantly in incisors and canines involving one tooth or two adjacent teeth and usually unilateral with equal distribution between the two jaws and more common in deciduous teeth.^{5,6}

The results of an investigation carried out by Knezevic et al.¹² on 3517 patients was aimed to find the prevalence of double teeth (fusion or gemination) among the persons tested according to gender, distribution in the maxilla or mandible, and whether the anomaly occurred bilaterally or unilaterally. Their study reported the prevalence of double teeth to be 0.2%; 57.2% of which were fused and 42.9% were geminated.

Gemination is also usually found in the maxilla and predominantly occurs in incisors and canines. It usually occurs unilaterally, but there are some reports of bilateral presence.⁵⁻⁷

Though located in the mandible, the tooth in the present case was considered to be unilateral gemination due to the presence of clinical and radiographical properties such as a normal tooth count, a notch on the incisal edge, increased mesiodistal width, and only one pulp chamber and canal in a single tooth.⁶⁻⁸

According to the Ohlers's system, the tooth was classified as a Type 2 DI along with a Type II germination in accordance with Aguilo et al.⁸

In DI the invagination area is separated from the pulpal tissues with a thin layer of dentin and frequently communicates with the oral cavity. This allows the entry of irritants and microorganisms, which usually leads to infection and necrosis of the pulpal tissue and then to a periodontal or periapical abscess with continuous ingress.

Gemination is generally asymptomatic and does not require treatment except to correct poor esthetics, periodontal destruction, or caries. Treatment ranges from conservative procedures, non-surgical root canal therapy, or extraction.^{1-4,5-7} The tooth in the present case was extracted because of the presence of a periapical abscess, and the pulpal morphology was not suitable for endodontic treatment.

Summary

DI is clinically significant due to the possibility of the pulpal involvement and pulpitis, necrotic pulps and chronic periapical lesions are often associated with this anomaly without clinical symptoms. Clinicians should be mindful of the possibility of DI when a tooth presents pulpitis without a history of trauma or caries and examine the suspicious tooth and the periodontium radiographically.

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