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Case Report

Dens Invaginatus of Mandibular Premolars and Maxillary Anterior Teeth: A Case Report in Three Brothers

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Abstract

Dens invaginatus (DI), also known as dens in dente, is a developmental anomaly of teeth with enamel and dentin layers folded into the pulp cavity. This case report is about three brothers without any systemic diseases or syndromes. They all have DI on the permanent mandibular premolars and permanent maxillary anterior teeth. Several teeth needed root canal treatment due to this dental anomaly. Some DI can be difficult to detect and can progress to severe cavities and periapical abscesses without notice. Most of these diseases were detected unexpectedly through radiographic examination.

Introduction

Dens invaginatus (DI), also known as dens in dente, is a developmental anomaly of teeth with enamel and dentin layers folded into the pulp cavity. This folding creates a small pocket for bacteria, food particles, and other debris that can invade the pulp and cause cavities, infections, and other dental diseases. Synonyms of DI are dens in dente [1] and dilated composite odontome [2]. Hallet [3] coined the name DI in 1953. DI can be seen in any tooth but is most commonly in the upper lateral incisors. It presents as a small pit or may be detected through a dental radiograph. Shafer and Hine [4] explained that DI appears to be the folding of enamel and dentin on radiographs, and can extend to the pulp cavity, root, and even the root apex. Recent studies [5-7] show how effectively CBCT is used for DI diagnosis compared to conventional radiographs, and report that it is very helpful for treatment with accurate diagnosis.

Hallet [3] introduced the first classification based on clinical and radiographic criteria, but the classification by Oehlers [8] is the most widely used. Oehlers [8] categorized DI into 3 types by how far they extend into the root radiographically; Type I is enamel lined and limited to the crown portion, Type II is enamel lined but invades the root, and Type III perforates the root and shows second foramen with or without pulp communication. The prevalence of DI is 0.25~12% of patients [9], usually detected in maxillary lateral incisors [9]. The difference in race group, geographic factors, and diagnostic devices may make these variations. For gender, most [10] reports have no gender differences, but some [11,12] suggested different results. DI is rarely reported in primary teeth, mandibular teeth, premolars, and molars. On the other hand, Kottoor et al. [13] reported DI is the most common dental anomaly in first premolars.

This case report is about three brothers without any systemic diseases or syndromes. They all have DI on the permanent mandibular premolars and permanent maxillary anterior teeth. Usually, DI is challenging to detect in the clinic, especially if it is located in premolars. Patients can suffer from unknown reasons, which could make patients difficult to get appropriate treatment at the right time. If so, some DI can progress to severe cavities and periapical abscesses without notice.

Case Report

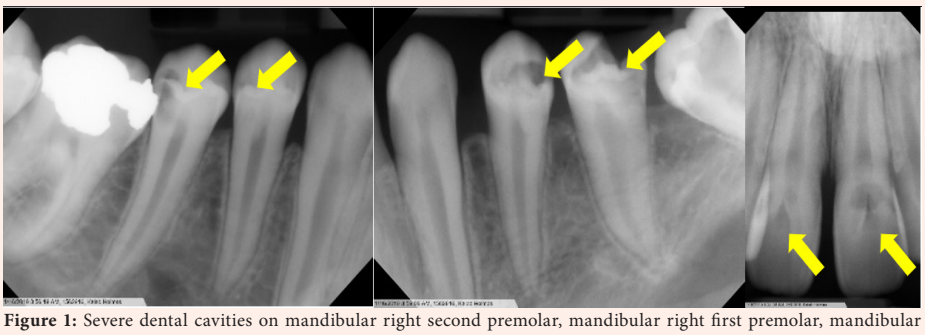

Figure 1: Severe dental cavities on mandibular right second premolar, mandibular right first premolar, mandibular left first premolar, and mandibular left second premolar, which were suspected as DI and DI on maxillary right central incisor and maxillary left central incisor is evident of patient 1.

Case 1: 15 years 8 months old patient, the eldest brother, came for a new patient exam. Clinical and radiographic examination revealed the possibility of DI on permanent mandibular right second premolar, permanent mandibular right first premolar, permanent mandibular left first premolar, and permanent mandibular left second premolar (Figure 1). We could not confirm DI on mandibular premolars since the patient had already severe cavities on mandibular premolars. Clinical and radiographic evidence of DI was clear in permanent maxillary right central incisor and permanent maxillary left central incisor (Figure 1). For the treatment, we followed the current treatment protocols of DI, such as preventive sealing, composite resin restoration, root canal treatment, and extraction. The patient needed root canal treatment on permanent mandibular left first premolar for a periapical abscess because of recurrent decay after 3 years and 8 months. Other teeth with DI were treated with composite resin.

Case 2: 14 years 9 months old patient, the middle brother, visited for a new patient exam. Clinical and radiographic examination confirmed DI on permanent mandibular right first premolar and permanent mandibular left first premolar (Figure 2). Also, patients had DI on permanent maxillary right lateral incisor, permanent maxillary right central incisor, permanent maxillary left central incisor, and permanent maxillary left lateral incisor (Figure 2). Caries were not detected in these teeth with anomalies. The patient did not come back for treatment until he needed root canal treatment on permanent maxillary left lateral incisor for dark discoloration and pulp necrosis 17 months later.

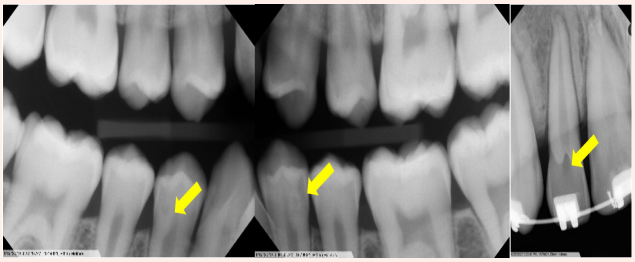

Figure 2: DI on mandibular right first premolar, mandibular left first premolar, and maxillary left lateral incisor of patient 2.

Case 3: 20 months after two older brothers visited, the youngest brother age, 12 years 8 months, presented for pain in the lower left mandibular area. Clinical and radiographic examination showed DI on permanent mandibular right first premolar, permanent mandibular left first premolar, permanent maxillary right lateral incisor, permanent maxillary right central incisor, permanent maxillary left central incisor, and permanent maxillary left lateral incisor (Figure 3). The patient received root canal treatment on permanent mandibular left first premolar due to a periapical abscess. 8 months later, the patient needed root canal treatment on permanent maxillary right central incisor for a periapical abscess. We planned to treat other DI teeth with sealants and composite resins depending on defects, but the patient has not had all treatment completed.

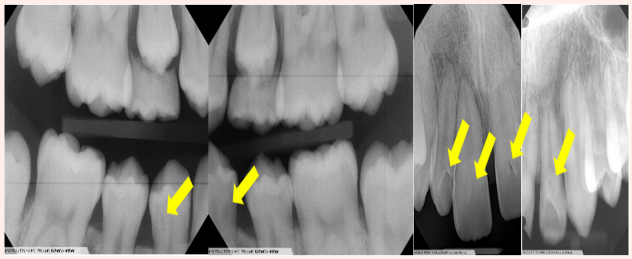

Figure 3: DI on mandibular right first premolar, mandibular left first premolar, maxillary right lateral incisor, maxillary right central incisor, maxillary left central incisor, and maxillary left lateral incisor of patient 3.

Discussion

This case report is about the DI of permanent mandibular premolars and permanent maxillary anterior teeth in three brothers. In our patient, DI could not be found in some of the teeth. Nevertheless, we suspected that DI might be more on the basis of severe caries and apical abscess. According to Ricucci et al. [14], they treated an unusual case of maxillary third molars causing severe symptoms of irreversible pulpitis, but DI was not detected by clinical and radiographic examination; DI was found after extraction and sectioning. The exact etiology of DI has yet to be fully understood, but it is thought to be related to environmental and genetic factors. Certain environmental factors and genetic factors can contribute to developing DI. Our patients did not show any systemic diseases or syndromes. However, they are all males and show similar DI in permanent mandibular premolars and permanent maxillary anterior teeth. It could be consistent with genetic-related dental anomalies in previous studies. Genetic factors for DI often run in families. Regarding developmental dental anomalies, some reported consanguinity association, and most consanguinity-related dental abnormalities were reported in Turkish [15,16] or Indian [17] people. This consanguinity relationship could not be clarified in this family. Some studies have suggested that DI may be associated with mutation of MSX1 [18], lacking chromosome 7q32 [19], missense variations in KIF4A [20], or mutations of RUNX2 [21]. These genes are involved in the development of teeth and have been linked to other dental anomalies. Several dental anomalies, such as microdontia, taurodontism, and supernumerary teeth, were usually related to bilateral DI [22]. To support this tendency, Vinuth et al. [23] reported an unusual case of nonsyndromic familial oligodontia combined with multiple DI. Besides, the syndromic relation between DI with Ekman-Westborg-Julin syndrome, Williams syndrome, and Nance Huran syndrome has been reported [24]. On top of that, a higher prevalence of DI in cleft lip and palate patients has been found [25,26]. Recently, Memis and Bas reported that DI was detected in bilateral bimaxillary primary and permanent molars in Wilson's disease patient's case report. Recently, Memis and Bas [27] reported that DI was detected in bilateral bimaxillary primary and permanent molars in Wilson's disease patient's case report.

DI can easily be overlooked because there are no significant clinical signs of malformation. Most patients can discover this anomaly after having an acute dentoalveolar abscess or sinus tract except for routine dental radiographs [9,28,29]. However, early detection and sealing of pits can effectively prevent possible complications. Introduction of Cone beam computed tomography (CBCT) contributed to the diagnosis and treatment of DI since a complete understanding of the anatomy of this developmental anomaly can induce predictable and successful outcomes. These siblings came for examination and dental treatment without previous information about DI. We found this anomaly through routine radiographic imaging. Treatment for DI [30-33] includes preventive treatment, restoration after removing the affected portion of the tooth, root canal treatment, extraction, or intentional replantation depending upon severity. Recently, successfully treated immature DI cases by pulp revascularization were reported [34-36]. Depending on the severity, our patient received preventive sealant, resin restoration, or root canal treatment for the affected teeth.

Conclusion

Some DI can be difficult to detect and can progress to severe cavities and periapical abscesses without notice. If this dental anomaly is seen, it is crucial to complete an oral examination considering the possibility of having more DI in the contralateral or other teeth. Most of these diseases were detected unexpectedly through radiographic imaging. If we suspect this dental anomaly, using CBCT can increase the diagnosis rate and treatment success. The exact etiology of DI is still being studied, and more research is needed to understand the role of environmental and genetic factors.

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