Nonsurgical Endodontic Treatment of Dens Invaginatus in a Mandibular Premolar with Large Periradicular Lesion: A Case Report

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Abstract

This case report describes the treatment of a dens invaginatus in a mandibular premolar with large periradicular lesion. A nonsurgical endodontic treatment was performed to tooth #28. During the treatment procedure, calcium hydroxide and a triple antibiotic paste were separately used for intracanal dressing. The apical third of the canal was obturated with mineral trioxide aggregate (MTA), and the remaining canal space was obturated with gutta-percha and AH 26 root canal sealer, using a lateral condensation technique. At follow-up examination after 1 year, the tooth was asymptomatic and radiographically showed repair of the lesion. Healing was achieved without any need for further endodontic surgical intervention. *(J Endod 2007;33: 322–324)*

Key Words

Case report, dens invaginatus, endodontic treatment

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Dens invaginatus (DI) is a developmental malformation resulting from invagination of the crown or root before calcification has occurred. The condition has been alternatively called dens in dente, invaginated odontome, dens telescopes, dilated gestant odontome, tooth inclusion, and dentoid dente (1). Several theories have been proposed for this phenomenon, but the etiology of DI remains unclear. Kronfeld (2) proposed that DI is caused by a focal failure of growth of the internal enamel epithelium leading to proliferation of the surrounding normal epithelium with eventual engulfment of the static area. Oehlers (3) proposed that distortion of the enamel organ occurs during tooth development and results in protrusion of a part of the enamel organ. Other theories include infection (4), trauma (5), and genetics (6) as possible contributing factors.

The reported incidence of DI ranges from 0.04 to 10% (7). The condition may occur in any tooth, including supernumerary and deciduous teeth. Maxillary permanent lateral incisors are the most commonly affected teeth; less frequently affected are the central incisors (1) and, rarely, the mandibular teeth (8). Cases of bilateral and multiple occurrence of DI have also been reported (9). In addition, DI may appear together with other abnormalities comprising taurodontism, microdontia, germination, and dentinogenesis imperfecta (10). To characterize the degree of malformation associated with DI, the classification by Oehlers (3) is widely used. Type I represents an enamel-lined invagination, confined to the coronal part of the tooth; type II describes the extension of the invagination into the root, beyond the cementoenamel junction, ending as a blind sac. The latter type may or may not communicate with the dental pulp. Type III includes penetration of the root by the invagination to form an additional apical or lateral foramen; usually there is no communication with the pulp.

The following case report describes the nonsurgical endodontic treatment of DI in a mandibular first premolar with a large periradicular lesion.

Case Report

A 17-year-old girl attended the clinic for orthodontic treatment. During routine radiographic examinations, DI and a large periradicular lesion were detected in the right mandibular first premolar (tooth #28) (Fig. 1). The medical history was noncontributory. The oral hygiene condition was good, and the intraoral soft tissues were free of pathological signs. The occlusion was normal with no missing teeth, and the patient had no caries. The teeth (#27, 28, and 29) were slightly tender to percussion and exhibited normal mobility. Electronic pulp testing (Electric pulp tester, Parkell, Farmingdale, NY) and cold application (ice stick) were negative for tooth #28 and positive for the other two teeth. Clinically, no anatomical malformation of the right mandibular premolar crown was detected and no DI in the contralateral mandibular premolar. Based on these findings, the patient was diagnosed as having a DI with a necrotic pulp and chronic periradicular periodontitis in the right mandibular first premolar. Afterwards, the patient was informed of the long-term prognosis of the tooth, and a decision was made to perform conventional root canal treatment.

At the same appointment, root canal treatment was initiated on tooth #28. The access cavity was prepared and a rubber dam was applied. Necrotic pulp tissue was extirpated, and the working length was estimated as being 1 mm short of the radiographic apex. The canal was instrumented with size 15-110 K-files (Dentsply-Maillefer,



Figure 1. Preoperative periapical radiograph shows the right mandibular premolar with a DI and an apical radiolucency.

Ballaigues, Switzerland) using a step-back technique. The invagination was eliminated until a wide canal was obtained. During the instrumentation the canal was irrigated copiously with 2.5% sodium hypochlorite (NaOCl) solution using a 27-gauge endodontic needle after each instrument. The final irrigation was accomplished with 2.5% NaOCl and 15% ethylenediaminetetraacetic acid (EDTA) solutions. The canal was dried with sterile paper points and initially filled with calcium hydroxide paste, which was changed every 2 weeks for a period of 3 months. The access cavity was sealed with zinc oxide–eugenol (ZOE) cement (Austenal, Harrow, UK) after each visit. A periapical radiograph at this time revealed enlargement of the periradicular lesion (Fig. 2). For this reason, treatment procedure was changed. A triple antibiotic paste was selected for intracanal dressing. A mixture of ciprofloxacin, metronidazole, and minocycline paste (0.5 mg of each) as described by Takushige et al. (11) was prepared into a creamy consistency and spun down into the canal with a lentulo spiral instrument. The paste was further condensed using sterile cotton pellets before sealing the coronal access. It was changed every month for a period of 3 months. When the patient returned, the tooth was asymptomatic and a radiographic control revealed significant healing, with the previous radiolucent lesion almost absent and formation of trabecular bone (Fig. 3). Clinical examination showed no sensivity to percussion or palpation and the soft tissues were healthy; therefore, the tooth was reopened and the antibiotic paste removed. After irrigation with 2.5% NaOCl, the apical part of the root canal was obturated with mineral trioxide aggregate (MTA) (Dentsply, Tulsa,



Figure 2. Radiograph 3 months after the calcium hydroxide paste was placed.



Figure 3. Radiograph 3 months after the antibiotic paste was placed.

OK), and it was left with a cotton pellet moistened with distilled water for 24 hours. The access cavity was sealed with temporary filling material ZOE. At the following appointment the cotton pellet was removed, and after verifying the setting of MTA, the remaining pulp space was obturated with gutta-percha (Sure-Endo, Seoul, Korea) and AH 26 (Dentsply/DeTrey, Konstanz, Germany) using a lateral condensation technique (Fig. 4). The access cavity was sealed with a composite resin (Solitaire 2, Heraeus Kulzer, Wehrheim, Germany). A 12-month recall radiograph showed complete healing (Fig. 5).

Discussion

Dental treatment is commonly indicated for teeth with invagination. Such teeth are susceptible to caries, because deep pits act as places of stagnation, leading to the initiation of caries, and structural defects exist in the depth of these pits. In these defects, the enamel is often malformed or absent and may have numerous fine canals that lead to a communication with the pulp. Thus, microorganisms and their products, desquamated epithelial cells, or other foreign material may easily obtain access through such communications. This continuous threat usually gives rise to infection and necrosis of the pulp (12). For this reason, DI requires early diagnosis and treatment. In most cases a DI is detected by chance on the radiograph. Clinically, unusual crown morphology or a deep foramen coecum may be important hints of its existence (1). However, these patients often seek out a dentist because of acute pain. Various techniques and approaches to treating DI have been reported in the literature. With early diagnosis, fissure sealants and conservative restorative procedures can be performed effectively in these cases. When pathosis exists, conventional root canal treatment (13), apical surgery (14, 15), intentional replantation (16), and ex-



Figure 4. Radiograph showing root filling of dens invaginatus.

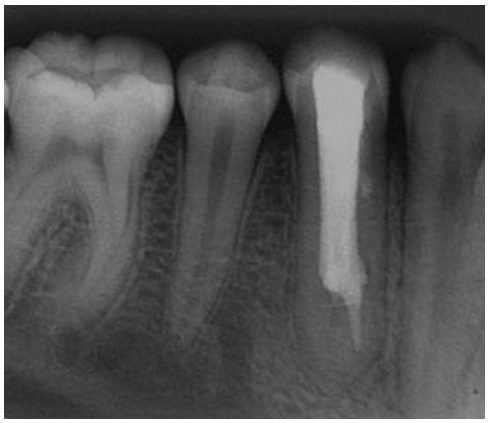


Figure 5. Radiograph after 1 year showing a satisfactory healing of the lesion.

traction are the suggested treatment methods. Extraction of DI is indicated only in supernumerary teeth or when endodontic therapy and apical surgery have failed or are not possible. In the present case, the tooth appeared to be an Oehlers class II with an invagination that invaded the root but remained confined within it as a blind sac, and it was treated successfully with nonsurgical endodontic treatment.

The requirement for successful endodontic treatment is the complete removal of all irritants from the root canal system followed by its obturation with a biocompatible material. It is known that teeth with DI demonstrate a variety of canal morphologies with dips, concavities, intracanal communications, inaccessible fins, apical ramifications, and other regions that instruments cannot reach (17). For these reasons, the endodontist should master a variety of techniques or materials and choose the most appropriate one for the removal of necrotic tissue and bacteria.

In the present case, after biomechanical preparation with hand instruments and copious irrigation with NaOCl, calcium hydroxide paste was first chosen for the intracanal dressing. The continued enlargement of the periradicular lesion after 3 months suggested the need for additional treatment. A triple antibiotic paste was chosen as an alternative to calcium hydroxide. It gave excellent clinical results. Previous studies (11, 18–20) have clearly demonstrated that this combination is capable of eliminating bacteria from infected dental tissues. After disinfection of the canal, MTA was placed in the apical third of the tooth to fill irregular canal spaces in this area.

Conclusions

This case illustrates that a tooth with DI and an associated large periradicular lesion can be managed with nonsurgical endodontic treatment, which can result in satisfactory periradicular healing. Furthermore, the use of a triple antibiotic paste as an intracanal medicament may provide an alternative to the use of calcium hydroxide.

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