International Journal of Enhanced Research in Medicines & Dental Care (IJERMDC),
ISSN: 2349-1590, Vol. 6 Issue 8, August 2019, Impact Factor: 3.015

Endodontic Treatment of a Maxillary Lateral Incisor with Type 3 Dens Invaginatus and Large Periradicular Lesion: A Case Report

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ABSTRACT

Dens invaginatus type 3 is an anomaly characterized by an infolding of enamel and dentin that can extend up to the root apex and might present difficulties with respect to its diagnosis and treatment because of canal morphology. This article describes an unusual case of the maxillary lateral incisor having a type 3 dens invaginatus, necrotic pulp, and an associated large periradicular lesion treated by conventional root canal therapy. After gaining access to the pulp chamber, the primary canal and the invagination were localized, negotiated, enlarged, and filled with calcium hydroxide. Three weeks later the canal and the invagination were obturated with gutta-percha and restored. At 12-month recall satisfactory bone healing had occurred.

Keywords: Dens invaginatus, maxillary lateral incisor.

INTRODUCTION

Dens invaginatus (dens in dente) is a developmental anomaly caused by an invagination in the surface of the tooth crown before calcification has occurred. This defect appears mainly in maxillary permanent lateral incisors; other groups of teeth affected, in decreasing order of frequency, are central incisors, premolars, canines, and molars (1). The occurrence of dens invaginatus is rare in mandibular teeth and in the primary dentition. Hülsmann (2) presented a number of theories that have been proposed to explain the mechanisms of dental coronal invagination: growth pressure of the dental arch, focal failure of growth of the internal enamel epithelium, rapid and aggressive proliferation of a part of the internal enamel epithelium, distortion of the enamel organ, fusion of 2 tooth germs, infection, and trauma.

The most popular and commonly used classification of invaginated teeth is the classification of 3 types proposed by Oehlers (3): type 1, invagination confined within the crown; type 2, invagination as a blind sac extending beyond the cement-enamel junction but not reaching the periodontal ligament; and type 3, invagination extending beyond the cementoenamel junction, with the second foramen extending into the periradicular tissues or into the apical area.

During the last few years a small number of cases of dens invaginatus involving permanent maxillary lateral incisors have been reported in the literature (4 –11). This article presents a successful nonsurgical endodontic treatment of a maxillary lateral incisor with necrotic pulp, type 3 dens invaginatus, and an associated large periradicular lesion.

CASE REPORT

An 18-year-old male patient with a noncontributory medical and familial history was referred to the Department of Endodontics and Conservative dentistry, PGIDS, Rohtak from a general practitioner for endodontic treatment of the maxillary left lateral incisor. The reason was unsuccessful endodontic therapy of the extended periradicular radiolucency that could be observed on the radiograph. On presentation the tooth was symptom-free. The clinical crown was larger, compared with the lateral incisor on the right side, especially the mesiodistal diameter. Vitality tests showed no response to cold and electric pulp testing. Radiographic examination revealed a mature tooth with dens invaginatus and extended periradicular radiolucency on the apical area of the root (Fig. 1). A clinical diagnosis was established of dens invaginatus Oehlers type 3 and chronic apical periodontitis. The patient received no local anesthesia, rubber dam was placed, and adequate access to the pulp chamber was made. The orifice of the primary root canal, C-shaped, was immediately localized at the pulp chamber floor slightly below the level of the gingival margin. This canal was partially instrumented by the referring dentist. After a careful examination with a size 10 K-file, poorly visible and narrow second canal (invagination) was detected mesially to the primary canal (Fig. 2).


Figure 1 Figure 2

The primary canal and the invagination were negotiated, working length was established by using apex locator Root ZX (J. Morita Mfg Corp, Kyoto, Japan), and radiograph with files in the canals was taken. The primary canal was prepared to working length by step-back technique to a size 45 (MAF) and to a size 60 (final file); the canal was then flared by using Gates-Glidden drills. The invagination was instrumented to working length to a size 35 (MAF), with step-back performed to a size 50 (final file). The canal and the invagination were instrumented with copious irrigation with 2% sodium hypochlorite solution, tap water, and 2% chlorhexidine solution after each file change. The last irrigation of the canals with NaOCl was supported by the use of the ultrasonic unit (Piezon Master 400; EMS, Nyon, Switzerland). Sodium hypochlorite was delivered in each canal by using a syringe, and ultrasonic passive irrigation was performed for 1 minute. The finish flushing was performed with 2mL of 15% ethylenediaminetetraacetic acid and 5mL of tap water for each canal. The canals were than dried with standard paper points and temporarily dressed with $Ca(OH)_2$ and the access was sealed with a glass-ionomer cement Ketac-fil (ESPE, Seefeld, Germany). After 3 weeks the calcium hydroxide was removed, and the canals were obturated with gutta-percha cones by using a standard lateral condensation technique and AH Plus (Dentsply/ DeTrey, Konstanz, Germany) as a sealer. A radiographic control revealed correctly obturated canals (Fig. 3). The access cavity was restored with a light-cured composite resin by using the acid-etch technique. At 12-month recall the periradicular lesion showed satisfactory healing radiographically (Fig. 4).

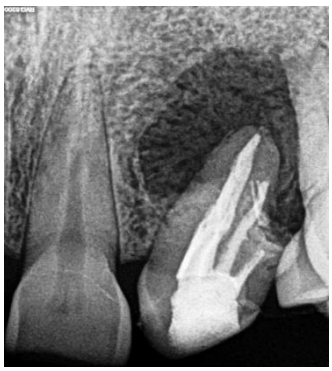


Figure 3 Figure 4

DISCUSSION

The presented case of dens invaginatus was classified as Oehlers type 3. This type of invagination allows the entry of irritants into the periapical area, which can result in periradicular pathosis (12, 13) and, if there is communication between the invagination and the tooth cavity, pulp pathosis (12, 14). However, pulp pathosis by retrograde infection cannot be excluded, especially when no communication with invagination exists (7, 13). Depending on the degree of malformation and on the clinical symptoms, there are different methods of therapy, as preventive and restorative treatment, root canal treatment, surgical treatment, intentional reimplantation, or extraction in teeth with severe anatomic irregularities that cannot be treated nonsurgically or by apical surgery (2). Because of the complex anatomy of dens invaginatus, conservative endodontic treatment is difficult and usually complicated, especially when large apical lesions exist. Regardless of the size of the periradicular lesion, surgical treatment should be performed only when nonsurgical endodontic treatment has failed, and the size of the periradicular lesion should not dictate the treatment procedure (15).

During endodontic treatment, preparation of the invaginated canal might present technical difficulties. In the case presented here, the invagination probably had been lined with an enamel or enamel-like structure. This structure appeared to be harder than dentin. The enlarging of invaginated canal with hand K-files was possible but time-consuming and required more attention of the operator. In our opinion, the use of a lubricant agent was necessary because of the possibility of file blockage in the invagination.

This case illustrates that even in a tooth with type 3 dens invaginatus and associated large periradicular lesion, careful nonsurgical endodontic treatment might result in satisfactory periradicular healing.

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