Management of Dens Invaginatus Type 2 and Internal Resorption Using a Nonsurgical Endodontic Treatment: Case Report

Cerrahi Olmayan Endodontik Tedavi ile Tip 2 Dens İnvajinatus ve İç Rezorpsiyonun Tedavisi

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ABSTRACT This case report describes the treatment of dens invaginatus type 2 and internal resorption using a nonsurgical endodontic treatment in a maxillary lateral incisor tooth. The root canal preparation was completed with hand files and thorough irrigation. Calcium hydroxide was placed as a temporary dressing for 15 days. At the second visit, the root canal with resorption lacuna was filled with mineral trioxide aggregate (MTA). The remaining canal space was filled with gutta-percha and AH Plus sealer, using a warm vertical compaction technique. The coronal access was restored with composite resin. The tooth was in function with satisfactory clinical and radiographic results after 12-month follow-up. Healing was achieved without any need for further endodontic surgical intervention. This case shows that a tooth with dens invaginatus and internal resorption lesion can be managed with nonsurgical endodontic treatment, which can result in satisfactory periradicular healing. Also, treatment of the defect with MTA was considered successful as evidenced by clinical and radiographic findings. This may be due to biological properties of the MTA. Finally, the use of more advanced imaging modalities such as cone beam computed tomography, which can help the clinician in making a more accurate diagnosis.

Key Words: Mineral trioxide aggregate; dens in dente; root resorption

ÖZET Bu olgu raporunda bir maksiller lateral kesici dişte bulunan tip 2 dens invajinatus ve iç resorpsiyonun cerrahi olmayan endodontik yaklaşımla tedavi edilmesinden bahsedilecektir. Kök kanal hazırlığı el aletleri ile bol yıkama yaparak tamamlandı. Kalsiyum hidroksit, kök kanal ilacı olarak 15 günlüğüne kanal içerisine yerleştirildi. İkinci seansta, kök kanallarındaki rezorbsiyona bağlı oluşan boşluk mineral trioksid agregat (MTA) ile dolduruldu. Kalan kanal boşluğu ısıyla vertikal kompaksiyon tekniği kullanılarak güta-perka ve AH Plus kök kanal patı ile dolduruldu. Giriş kavitesi rezin kompozit dolgu maddesi ile restore edildi. On iki ay sonra yapılan klinik ve radyografik kontrollerde diş fonksiyonda idi. İyileşme cerrahi bir müdahaleye gerek kalmadan başarıldı. Bu vakada, dens invajinatus ve iç rezorpsiyonlu bir dişte, cerrahi olmayan endodontik tedavi ile başarılı bir periradiküler iyileşme sağlanabileceği gösterilmiştir. Ayrıca, klinik ve radyolojik bulgular incelendiğinde MTA'in bu tip defektlerin tedavisinde başarılı olduğu gözlenmiştir. Bu MTA'in biyolojik özelliklerine bağlı olabilir. Son olarak, bilgisayarlı tomografi gibi ileri görüntüleme sistemlerinin kullanılması klinisyenin daha doğru teşhisler koymasına yardımcı olabilir.

Anahtar Kelimeler: Mineral trioksid agregat; dens in dente; kök rezorpsiyonu

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Dens invaginatus 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 inclu-

sion, and dentoid dente.[1] Several theories have been proposed for this phenomenon, but the etiology of dens invaginatus remains unclear. It has been related to focal growth retardation, growth pressure of the dental arch, localized external pressure in certain areas of the tooth bud, infection, trauma, and genetics.[2-7] The reported incidence of dens invaginatus ranges from 0.04 to 12%.[8,9] 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.[10] Cases of bilateral and multiple occurrences of dens invaginatus have also been reported.[11] In addition, dens invaginatus may appear together with other abnormalities comprising taurodontism, microdontia, germination, and dentinogenesis imperfecta.[12] To characterize the degree of malformation associated with dens invaginatus, the classification by Oehlers is widely used.[13] Type I represents an enamellined 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.

Internal root resorption is a pathologic condition associated with internal root structure loss caused by transformation of normal pulp tissue into granulomatous tissue with clastic cells, which resorb dentin. This transformation is resulted from chronic inflammation and bacterial invasion of the pulp tissue.[14] Trauma, caries, restorative procedures, and idiopathic dystrophic changes have been suggested to be other predisposing factors.[15,16] Internal resorption is usually asymptomatic and discovered by chance on routine radiographs or by the clinical sign of a 'pink spot' on the crown. Pain or discomfort may be the chief complaint if the granulation tissue has been exposed to oral fluids.[17] The radiographic appearance is often a uniform radiolucency with disrupted outline of the root canal. The progression of internal resorption depends on vital pulp tissue. Therefore, nonsurgical root canal therapy should be initiated as soon as possible to arrest the destructive process.[18] Also, surgical endodontic treatments can be choice when the root perforation has occurred due to excessive resorption.

The aim of the present case report is to describe the clinical management of a maxillary lateral incisor tooth presenting dens invaginatus and internal resorption and to discuss the treatment decisions and outcomes.

CASE REPORT

A 15-year-old girl was referred to the Department of Endodontics at the Faculty of Dentistry, Karadeniz Technical University because of localized mild swelling and pain in her left maxillary anterior region. The medical history was noncontributory. The patient's history included an old composite resin restoration on the palatinal aspect of the left maxillary lateral incisor (tooth #10). Extraoral evaluation revealed normal soft tissue structures with no apparent pathosis. The oral hygiene condition was good, and there was a mild swelling of the vestibule mucosa in the left maxillary anterior region. A discomfort was noted on percussion to tooth #10. The tooth responded negatively to electric pulp vitality testing (Electric pulp tester, Parkell, Farmingdale, NY, USA) and cold application with a carbon dioxide snow (Odontotest, Moyco Union Broach, York, PA) in that region. On the mesiobuccal aspect of the crown, the probing depth measured 4 mm, whereas the mobility of the tooth was within normal limits. Periapical radiographs and cone beam computed tomography (CBCT) scans were analyzed (Figures 1,2). A dens invaginatus (type II) and a large uniform radiolucent lesion in the middle third of the root canal were seen in views (Figures 1,2). Besides, radiolucency was detected in distal periradicular region. Based on these findings, the patient was diagnosed as having a dens invaginatus and a large internal resorption lesion in the left maxillary lateral incisor tooth. Afterwards, the patient was informed of the long-term prognosis of the teeth, and a decision was made to perform conventional root canal treatment.

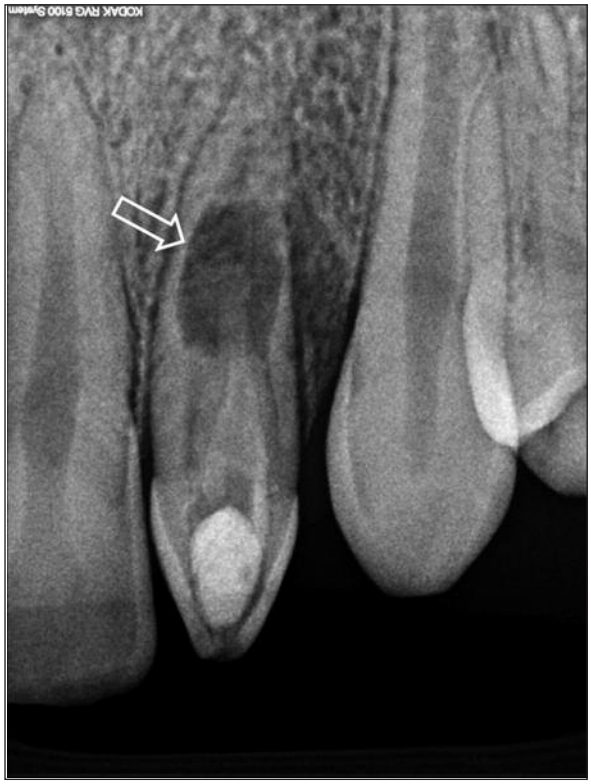

FIGURE 1: Radiographic appearance of dens invaginatus and internal resorption in left maxillary lateral incisor tooth.

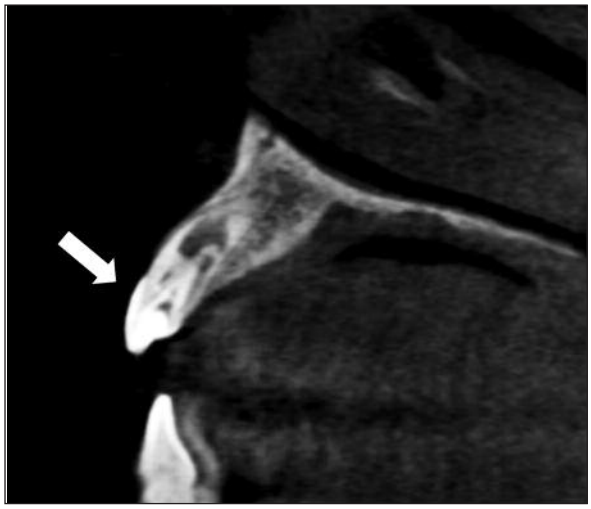

FIGURE 2: Cone beam computed tomography (transverse view) appearance of the case.

At the same appointment, root canal treatment was initiated on tooth #10. The old resin composite restoration was removed. An access cavity was prepared and a rubber dam was applied. Pulp tissue was extirpated, and the working length was estimated as being 1 mm short of the radiographic apex. The tooth #10 root canal was instrumented with size 15-90 K-files (Dentsply-Maillefer, Ballaigues, Switzerland) using a step-back technique. The persistent seeping of blood through the root canal diminished gradually with instrumentation. The root canal was frequently irrigated with 2.5% sodium hypochlorite (NaOCl) solution followed by a final rinse with 5 ml of sterile saline using a 27-gauge endodontic needle. Subsequently, calcium hydroxide (Sultan; Englewood, NS, USA) was placed as a temporary dressing to control bleeding. The access cavity was temporarily sealed with zinc oxide-eugenol (ZOE) cement (Austenal, Harrow, UK). After 15 days, the root canal was reopened and irrigated alternately with 2.5% NaOCl and sterile saline to remove the temporary dressing; 17% EDTA solution was left flooded in the cavity for 3 minutes, which was later rinsed with 5 ml of sterile saline and dried with sterile paper points. After that, the apical part and resorption lacuna of the root canal was filled with mineral trioxide aggregate (MTA) (Dentsply, Tulsa, OK, USA). MTA was prepared according to the manufacturer's recommendations by mixing with the proportion of one third. An endodontic plugger adequate for the length of the canal was used and the stopper was fixed 1 mm behind the working length. MTA was inserted into the canal with a messing gun (Dentsply-Maillefer) and further pushed with a plugger. A cotton pellet moistened with distilled water was placed over the MTA, and the access cavity was sealed with a temporary filling. After 24 hours, the temporary filling material and cotton pellet were removed. Then, the remaining pulp space was filled with warm vertical compaction of gutta-percha combined with AH Plus sealer (Dentsply). Glass ionomer cement (Ketac-Molar Easymix; 3M ESPE, Seefeld, Germany) was used as a coronal plug. After that, the restoration of this tooth was accomplished with a composite resin (Z250; 3M ESPE, St. Paul, MN, USA). Radiography was taken to ensure the control of the filling (Figure 3). After six-month recall radiograph showed further bony healing (Figure 4). After 12-month recall radiograph showed no pathology (Figure 5). Clinical examination showed no sensitivity to percussion or palpation and the soft tissues were healthy.

FIGURE 3: Radiograph after root canal filling.

DISCUSSION

Teeth with invaginations are more susceptible to caries, because deep pits and irregularities act as a place for microorganism colonization and substrate stagnation.[19] 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, bacteria and by 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.[20] Sometimes, chronic inflammation and bacterial invasion of the pulp tissue can be triggered clastic cells and initiated internal root resorption. For this reason, dens invaginatus and internal resorption require early diagnosis and treatment to arrest the destructive process. In most cases they are detected by chance on the radiographs. However, in this case, the patient recognized the localized mild swelling and pain in her left maxillary anterior region, which prompted her to seek treatment. In images, a type II dens invaginatus, internal resorption, and periradicular lesion were detected.

Wedenberg and Lindskog reported that internal root resorption lesions could be a transient or a progressive event.[21] The progressive nature of this type of root resorption has been associated with an ongoing inflammation from a source of infection.[17] In this case, a dens invaginatus pathosis and an old composite restoration were present, which could be regarded as a pathway for entrance of microorganisms to pulp.

Various techniques and approaches to treating either dens invaginatus or internal resorption have been reported in the literature. In dens invaginatus cases, fissure sealants and conservative restorative procedures can be performed effectively at early diagnosis. When pathosis exists, conventional root canal treatment, apical surgery, intentional replantation, and extraction are the suggested treatment methods.[10,22-24] Extraction of dens invaginatus is indicated only in supernumerary teeth or when endodontic therapy and apical surgery have failed or are not possible. In internal resorption cases

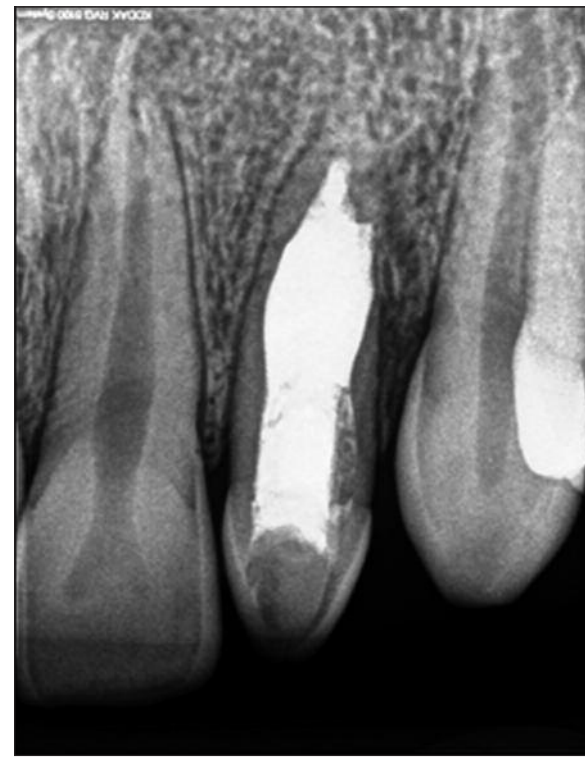

FIGURE 4: 6-month follow-up radiograph.

FIGURE 5: 12-month follow-up radiograph.

without a perforation, the removal of the granulation tissue and the blood supply to the resorbing cells by root canal treatment should be sufficient. However, in cases in which a pathway between the pulp canal space and the periodontal tissues is present, root canal treatment should be followed by repair of the perforation site with a suitable sealing material.[17] Dens invaginatus and internal resorption in a tooth is a rare one in literature. Because of this complexity, selected treatment procedures are very important. The endodontist should master a variety of techniques or materials and choose the most appropriate one. This case report showed successfully treatment of an Oehlers class II dens invaginatus and internal resorption using a non-surgical endodontic treatment in a maxillary lateral incisor tooth.

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. After disinfection of the root canal, MTA was placed in the apical part and resorption lacuna of the root canal to fill irregular canal spaces in this area. MTA has been shown to be biocompatible and can be used safely when placed adjacent to pulp and periradicular tissues.[25,26] It can also provide an environment that supports cementum regrowth.[26] Good sealing property, low solubility, the ability to set in the presence of blood and bactericidal products are some of the other properties of MTA. Thus, MTA appears to be a most promising material for use in a variety of clinical applications, including vital pulp treatments, apexification, repair of root, furcal perforations, and root-end fillings.[10,25,27-30] But prolonged setting time and manipulation difficulties are major disadvantages of MTA. Several case reports have described successful treatment of dens invaginatus and internal resorption by using MTA to treat these pathosis.[16,17,28,30]

This case illustrates that a tooth with dens invaginatus and internal resorption lesion can be managed with non-surgical endodontic treatment, which can result in satisfactory periradicular healing. Finally, treatment of the defect with MTA was considered successful as evidenced by clinical and radiographic findings after 12-month.

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