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Case Report Olgu Sunumu

Multidisciplinary Treatment of Traumatised Maxillar Central Incisor Associated With Open Apex

Açık Apeksli ve Travma Geçirmiş Bir Üst Keser Dişin Multidisipliner Tedavisi

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ABSTRACT

This case report aims to present the management of a tooth with open apex and periradicular lesion with Mineral Trioxide Aggregate (MTA) apexification and indirect restoration using CAD-CAM technique.

A 9-year-old girl was referred to our clinic with fracture of her tooth #11. Following endodontic access cavity preparation, the root canal was prepared with hand files up to #120 K-file. 2 weeks later the tooth was asymptomatic. MTA apical plug was placed to the apical third of the root canal. One day later, the tooth was restored with fiber post, composite core and reconstructed with CEREC. At 24th month, the tooth showed good periodontal health, marginal adaptation and periapical view at clinical examination and radiographic control.

This case report indicates that MTA apexification technique and CAD-CAM restorations are safe and effective treatment options for the management of traumatized teeth with open apex following root canal treatment.

Key words: MTA, Dental trauma, Pedodontics, CEREC, CAD-CAM.

ÖZ

Bu olgu sunumu, açık apeks ve periradiküler lezyonlu bir dişin Mineral Trioksit Agregat (MTA) kullanılarak apeksifikasyonu ve CAD-CAM tekniği ile indirekt restorasyonunu sunmayı amaçlamaktadır.

9 yaşındaki kız çocuğu 11 numaralı dişindeki kırık şikayeti ile kliniğimize başvurdu. Endodontik giriş kavitesinin açılmasından sonra, kök kanalı 120 K tipi eğeye kadar genişletildi. 2 hafta sonra diş asemptomatikti ve MTA apikal tıkaç olarak kök kanalının apikal üçte birine yerleştirildi. Bir gün sonra, dişe fiber post ve kompozit kor uygulandı ve CEREC ile restore edildi. 24. ayda, klinik ve radyografik kontrollerde diş iyi bir periodontal sağlık, marjinal adaptasyon ve periapikal görünüme sahiptir.

Bu olgu sunumu, travmaya uğramış kök ucu açık dişlerin kök kanal tedavisinde MTA apeksifikasyonunun ve CAD-CAM restorasyonların etkili ve güvenli tedavi seçenekleri olduğunu göstermektedir.

Anahtar sözcükler: MTA, Dental travma, Pedodonti, CEREC, CAD-CAM.

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INTRODUCTION

Injuries to young permanent teeth due to orofacial trauma are a frequent finding in children. The majority of these incidents occurs before root formation is completed and may result pulpal inflammation or necrosis. Because of these complications, root development might be interrupted and apical closure couldn't be completely finish (1,2). Usually endodontic treatments in these teeth with wide-open apex and necrotic pulp are challenging. Because of endodontic treatment techniques rely on presence of an apical closure, it is essential to create an apical plug for an excellent root canal filling. Calsium hydroxide (CaOH) is commonly used for this purpose (3). Recently, MTA has taken the place of CaOH. MTA has several good properties such as eliminating the length of apexification procedure, promoting periapical healing, biocompatibility and good sealing (4).

In the past, when restoring severely damaged teeth, a metal post and core is used to provide the retention for suitable restoration (5). Nowadays, prefabricated glass fiber posts have good mechanical and biocompatibility properties and an acceptable color shade (6). With increasing demand for aesthetics in dentistry, CAD/CAM approach has been introduced as a precise, efficient, accurate and error-free tool to produce high-quality dental restorations (7). The first commercially available CAD/CAM system has been CEREC (Sirona Dental Systems GmbH, Bensheim, Germany), which allows the clinicians in private offices to independently design and also produce dental ceramic restorations in matter of hours, enabling reconstruction during single visit (8).

This case report aims to present the management of a tooth with open apex and periradicular lesion with MTA apexification and indirect restoration using CAD-CAM technique.

Figure 1: Initial photo of the patient.

Figure 2: The first orthopanthogram of the patient.

CASE REPORT

A healthy, 9-year-old female patient was referred to our clinic with the chief comlaint of tooth fracture of her tooth #11. Patient history revealed that she had traumatic injury to the same tooth when she was 7. Clinical examination revealed complicated crown fracture and tenderness to percussion (Figure 1). Electric pulp test confirmed that the tooth had nonvital pulp. Radiographic examination revealed an immature apex and periapical radiolucency (Figure 2 and 3). The tooth

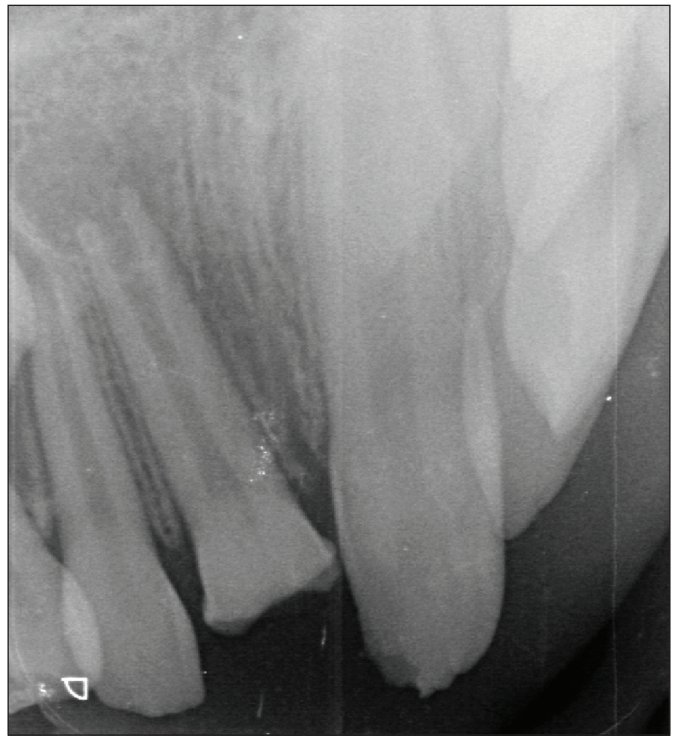

Figure 3: The first periapical radiogram of the patient.

was diagnosed to have chronic apical periodontitis and immature apex and root canal treatment was initiated.

Following endodontic access cavity preparation rubber dam was applied. The working length was determined with electronic apex locator and periapical radiographs. The root canal was prepared with hand files up to #120 K file. The root canal was irrigated with 2.5% NaOCl between each file change. In the end, final irrigations were made with 2% chlorhexidine and sterile salin. No pus drainage was detected during preparation. The root canal was dried with sterile paper points and dressed with calcium hydroxide paste. The access cavity was restored temporarily with Cavit (Espe GmbH, Seefeld, Germany).

2 weeks later the tooth was asymptomatic. MTA (ProRoot MTA, Dentsply Tulsa Dental, Tulsa, OK, USA) apical plug was placed to the 1/3 of the root canal. Sterile moist pellet was placed upon MTA and the tooth was restored temporarily . One day later, setting of MTA was checked and the tooth was restored with fiber post (RelyX Fiber Post size 2, 3M-ESPE, St. Paul, MN, USA) and composite core (Gradia Direct™ GC Corp. Tokyo, Japan) (Figure 4 and 5). Digital impression was obtained for crown restoration and reconstructed with CEREC (Sirona Dental Systems GmbH, Bensheim, Germany) using CEREC InLab 3D 3.03 software. The crown restoration was luted with Panavia F 2.0 resin cement (Panavia F 2.0, Kuraray, Tokyo, Japan) (Figure 6).

Patient's tooth was controlled after 1 and 3 weeks and at 3, 6, 12, 18 and 24th months respectively. During the control after first week, tooth had no tenderness to percussion or palpation. At the 3rd month control session, periapical lesion was healed (Figure 7). At the end of 24th month, the tooth showed good periodontal health, good marginal adaptation and good periapical view at clinical examination and radiographic control (Figure 8 and 9). And it's seen that the tooth was in function normally.

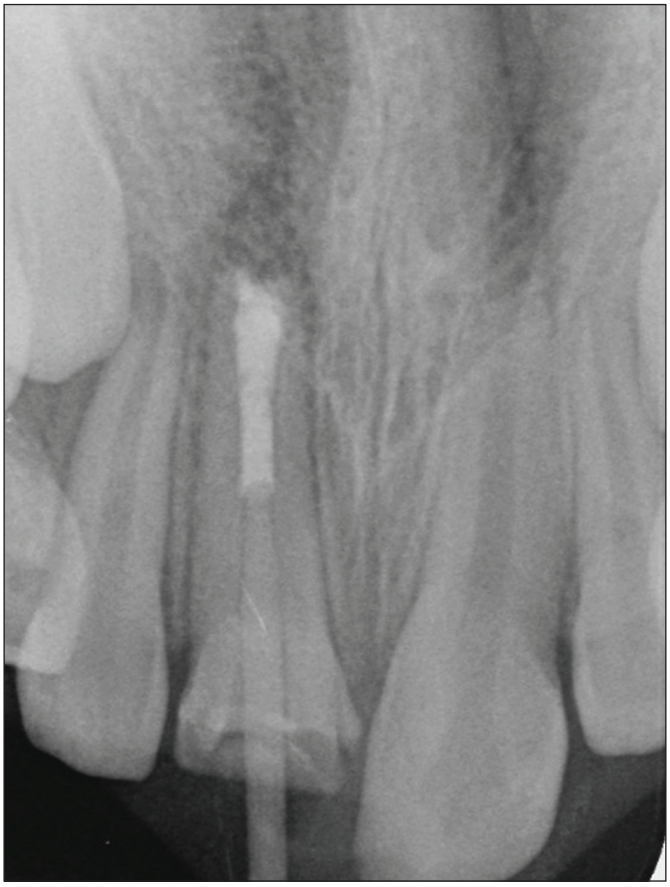

Figure 4: The periapical radiogram of the patient with MTA and fiber post.

Figure 5: The photo of the tooth with composite core.

Figure 6: The photo of the tooth after the cementation of the crown.

DISCUSSION

The incidance of dental injuries in children is about to 1%-3% in the population (9). In these types of injuries, crown fractures of the permanent dentition comprise the most frequent form. Restoration of crown fractures is important both for aesthetics and function. To accomplish an optimal aesthetic result, the most important issue is preservation of the pulp vitality (10). In the present case, the tooth had nonvital pulp with an open apex. Because of endodontic treatment techniques rely on presence of an apical closure, it is essential to create an apical plug for an excellent root canal filling. To promote the formation of a calcified barrier, the traditional apexification technique requires to apply long-term intracanal calcium hydroxide paste (3,11). Despite its popularity, the treatment method with calcium hydroxide has some disadvantages including variability of treatment time (3-21 months), unpredictable apical closure, difficulty in patient follow-up and delayed healing (3,12). Therefore, MTA was created as an alternative for apexification treatment (4,13). MTA is an optimal apical barrier material with good sealing ability (4), good marginal adaptation, a high degree of biocompatibility and a satisfactory setting time (about 4 h) (12).

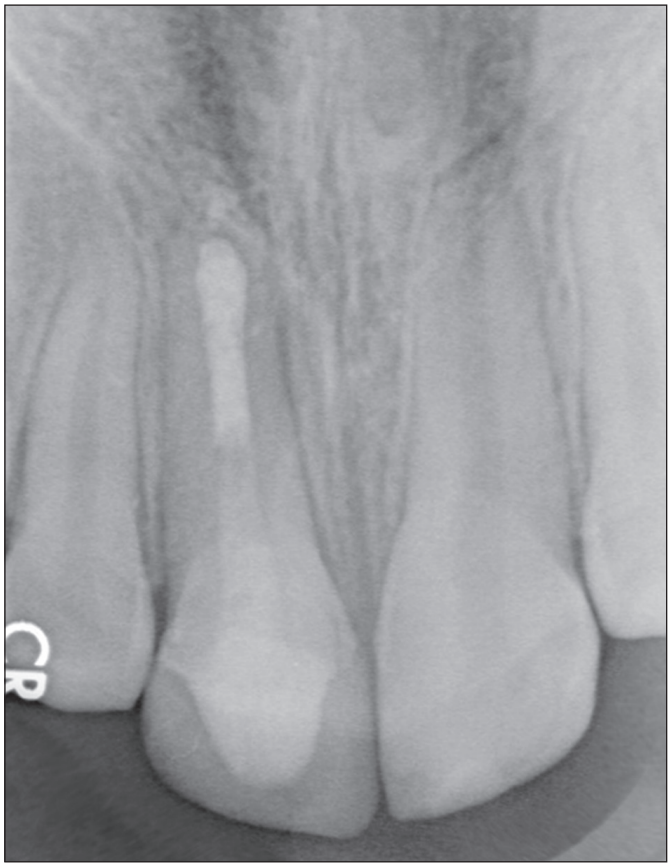

Figure 7: The radiogram of the tooth after the cementation of the crown.

Figure 8: The photo of the tooth at 24 months.

In this case, MTA apical plug was applied after a temporary calcium hydroxide dressing in order to limit bacterial infection in the tooth. At 6 months, 1 year and 2 years follow-up periods, the tooth showed the calcified tissue had been occured and the periapical lesion was resolved.

Post-and-core restorations are often used to restore endodontically treated teeth with extensive loss of hard tooth tissue. In the past, metal post and core used to be chosen to restore the teeth even at anterior, but nowadays, prefabricated metal or nonmetal posts

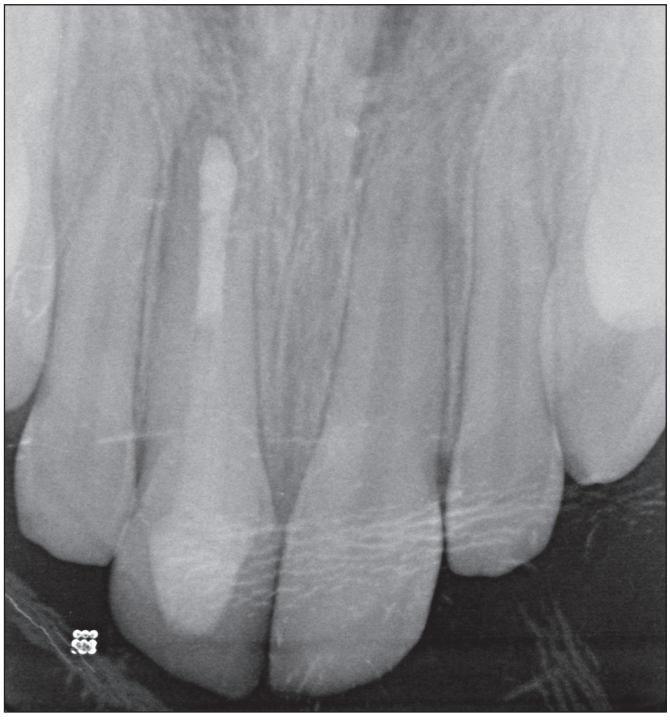

Figure 9: The radiogram of the tooth at 24 months.

combined with resin composite cores are considered as precious alternatives (14). In this case, the tooth was fractured from the cervical area, for this reason we used a prefabricated glass fiber post due to its aesthetic properties to build-up a core.

All ceramic crowns have become more popular as a result of increasing demand for aesthetic corrections (15). CAD/CAM glass ceramic (porcelain) crowns are promising because of their aesthetics and easy manipulation without technically sensitive buildup processes (16). Several reports have been published on this system, showing satisfactory long term results (17,18).

The advantages of using CAD/CAM technology for the fabrication of crowns and fixed partial dentures (FPDs) can be summerized as 1)aplication of new materials, 2) reduced labor, 3)cost effectiveness, 4)quality control (7). Providing a tooth-colored restoration in single visit appointment is the main goal of the chair-side concept with CAD/CAM technology (19). For this purpose Cerec systems can be used that restorations which are done with Cerec have an acceptable marginal adaptation and clinical longevity along with reduced chairtime and improved esthetics (20). The ceramics used in this system have also excellent structural reliability (21). In the present case, considering all the advantages of Cerec systems, we decided to restore the tooth with Cerec and we followed the patient up for 24 months.

After following up the patient for 24 months, this case indicates that MTA apexification technique is a safe and effective treatment option for the management of teeth with open apex following root canal disinfection. In pediatric dentistry, for an acceptable aesthetic and durability CAD-CAM restorations can be used safely to increase the survival rate of tooth and restoration material.

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