academicJournals

Vol. 7(4), pp. 40-43, April 2015
DOI: 10.5897/JDOH2014.0142
Article Number: FF7234551510
ISSN: 2141-2472

http://www.academicjournals.org/JDOH

Journal of Dentistry and Oral Hygiene

Case Report

Three-year follow-up: Healing of a large periapical lesion related to a maxillary central incisor and two canalled lateral incisor after a single visit root canal treatment

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Received 27 February, 2015; Accepted 12 March, 2015

In this study, a patient with a large periapical lesion related to the maxillary left central incisor and two canalled lateral incisors was presented. A single visit non-surgical root canal treatment was performed for both teeth. A three-year follow-up radiograph revealed complete healing of the periapical lesion. This report confirms that the large size of a periapical lesion neither mandates surgical removal nor the placement of intra-canal dressing and that such a lesion can heal following a conservative single visit endodontic treatment. Furthermore, familiarity with the variations of root canal morphology is essential for successful endodontic treatment. Maxillary lateral incisors usually have a single canal; however, this case report describes endodontic treatment of maxillary lateral incisor with two buccopalatal root canals.

Key words: Healing of large periapical lesion, single visit root canal treatment, two canalled maxillary lateral incisor.

INTRODUCTION

Dental pulp gets infected mainly as a result of caries, operative dental procedures and trauma. Pulp infection usually involves a mixed, predominantly Gram-negative, anaerobic bacterial flora (Sundqvist, 1994). This infection leads to pulp necrosis, which subsequently stimulates an immune reaction in the periapical area that creates what is commonly known as a periapical lesion (Stashenko, 2002). Identifying whether the periapical lesion is a cyst or granuloma is notoriously difficult using radiography. However, lesions exceeding 200 mm are most probably periapical cysts (Natkin et al., 1984). Additionally, it is also necessary for a lesion to present a straw-coloured fluid produced upon aspiration or on drainage, which contains cholesterol crystals as well as the relation of the lesion with a tooth with pulp necrosis to establish a provisional-“clinical” diagnosis of periapical cyst (Eversole, 1984).

Treatment of such large periapical lesions ranges from

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non-surgical root canal treatments and/or apical surgery to extraction. However, the current treatment philosophy lies in the first place on non-surgical root canal treatment. If such treatment does not lead to resolution of the periapical lesion, additional treatment options should be considered (Caliskan, 2004). These treatment options might include non-surgical retreatment to rule out morphological abnormalities or treatment inadequacies. Surgical intervention might occasionally be required, in which curettage and apical resection are frequently performed. However, simpler approaches such as marsupialization or tube decompression may be alternatives for the treatment of large cystic lesions (Hoen et al., 1990).

Awareness of the complexity of root canal systems among dentists has increased, which has led to the development of newer techniques, instruments and materials. This awareness remarkably enhances the practitioner's ability in dealing with such cases (Regan and Guttmann, 2004). An awareness of root canal morphology in general, and possible complexity in particular, is essential for adequate endodontic therapy.

Although, Vertucci's (1984) study reported that 100% of the maxillary lateral incisors have one root and one canal; it seems that this generalization is not totally correct as case reports showed maxillary lateral incisors with more than one canal and/or root (Walvekar and Behbehani, 1997; Pereira et al., 2000). Most of these cases involve instances of germination, fusion, concrescence, or dens invaginatus, since maxillary lateral incisors are often located at the site of high embryological risk. This is attributed to the fact that the mesial nasal process and maxillary process fuse during the fourth and sixth weeks of human embryonic development medial to the lateral incisor or at the medial or middle one-third of the lateral incisor to form the maxilla (Mohan et al., 2012; Lim et al., 2012).

This report discusses root canal treatment of a maxillary central incisor and two canalled maxillary lateral incisors associated with a large periapical lesion.

CASE REPORT

A 21-year-old male patient visited the dental clinics of Riyadh Colleges in Riyadh, KSA, having no complaint and only for a check-up. Initial examination in the screening clinic and periapical radiographs demonstrated a large radiolucent lesion around the apices of the left maxillary central and lateral incisors with a well-defined margin, mainly related to the central incisor. The size of this lesion as digitally measured using Kodak-RVG software (USA) was 2.3 cm. Clinically, these two teeth were restored with proximal mesial composite restorations. Next, the patient was referred to the endodontic clinic. Upon investigating the history of these two teeth, the patient mentioned that he was exposed to trauma 3 years ago. Response to the cold vitality test for both the central and lateral incisors was negative. Response to percussion and palpation tests was also negative. Radiographically, a slight internal resorption defect was found in the apical third of the central incisor in addition to the previously described large periapical lesion. The two teeth were diagnosed as having necrotic pulp associated with chronic apical periodontitis.

After local anesthesia and rubber dam isolation for the central and lateral incisors, root canal treatment was initiated for both teeth together. The two canals of the maxillary lateral incisor were detected depending on the tactile sensation of the operator, the furcation in the mid-root was felt and detected using K-file size 15. The working length was determined using an apex locator (Root ZX II Apex Locator, J.Morita, USA). For all the canals, preparation was completed using Easy Race instruments (FKG Dentaire, La Chaux-de-Fonds, Switzerland) with copious irrigation with sodium hypochlorite 2.5%. The master apical file was size 40 taper 6% in the central incisor and size 35 taper 6% in the two canals of the lateral incisor. Apical patency was maintained in all canals by pushing K-file size 15 beyond the apex. Ethylenediaminetetraacetic acid (EDTA) 17% solution (EDTA solution, Pulpdent, USA) was used as a final rinse to remove the smear layer.

No pus or exudate was found, and canals were properly dried using paper points (SybronEndo, Orange, CA, USA), then obturated in the same visit with Gutta percha (SybronEndo, Orange, CA, USA), and AH26 sealer (Dentsply, UK). The technique employed was continuous wave compaction by System–B and Obtura II (SybronEndo, Orange, CA, USA). The access cavities for both teeth were then temporarily restored by Cavit (3M ESPE, UK and Ireland). Figure 1 shows the teeth immediately after obturation. No postoperative pain was found, and then the teeth were restored by composite (3M ESPE, UK and Ireland) two days after obturation. A periapical radiograph taken three years later showed complete healing of the lesion (Figure 2). The patient could not come earlier than this due to unforeseen circumstances.

DISCUSSION

The consequences of dental trauma might include pulp necrosis, tooth resorption, calcific metamorphosis and tooth ankylosis (Haapasalo et al., 2007).

In this case, the trauma led to pulp necrosis in both teeth and little internal resorption in the apical third of the maxillary central incisor. Necrotic pulps provide a good nutritional supply for pathogenic bacteria, which must be present for the development of a periapical lesion. The main objective of root canal treatments for infected cases is based primarily on the removal of microbial infection from the root canal space, which is achieved by mechanical preparation of the canal and chemical disinfection (Seltzer, 1988). Root canal irrigant helps reduce the number of microorganisms inside the infected canals, and if a tissue-solvent solution is used, it can help to dissolve the necrotic tissue. Sodium hypochlorite was used in this case as it is an effective antimicrobial agent and has tissue-dissolving capabilities. Additionally, it has low viscosity, allowing easy introduction into the canal architecture (Spencer et al., 2007). In this case, neither pus nor inflammatory exudate was coming out of the canals; additionally, all canals were totally dried. Therefore, root canal treatment for both teeth was finished in one visit.

The antimicrobial effect of calcium hydroxide as an intra-canal medicament is well known, particularly in cases of infection associated with periapical lesion

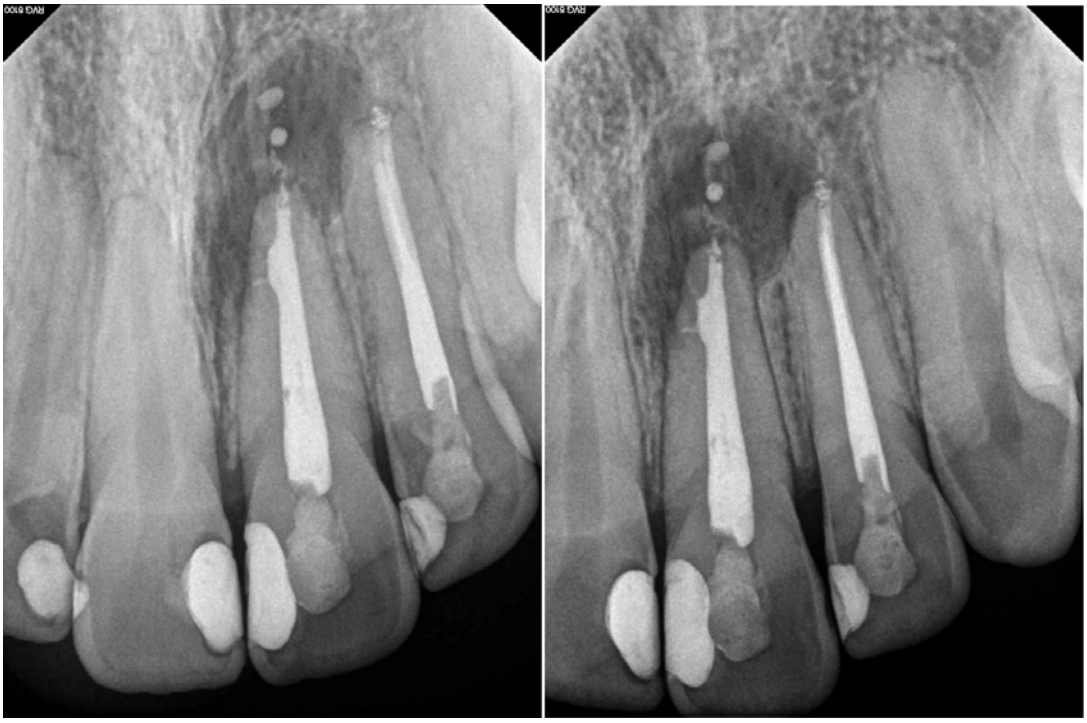

Figure 1. Periapical radiographs with two different angulations taken immediately after obturation and temporization.

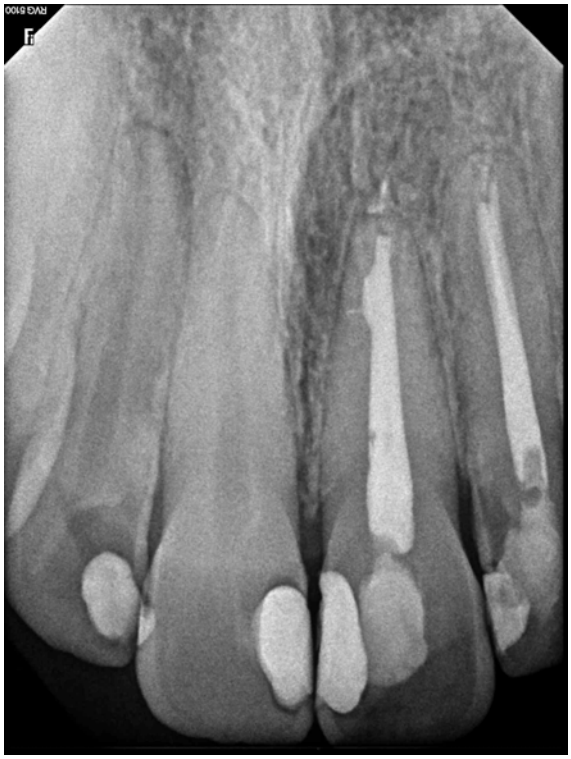

Figure 2. Periapical radiograph taken three years after obturation showing complete healing of the periapical lesion.

(Mohammadi and Dummer, 2011). However, studies have shown that one-visit root canal treatment can create favorable environmental conditions for periapical repair similar to the two-visit therapy when calcium hydroxide was used as antimicrobial dressing (Weiger et al., 2000; Figini et al., 2008). The findings of this report support this as total healing occurred after a single visit root canal treatment despite the presence of a large periapical lesion.

Maxillary incisors usually have single canals; however, in cases where a maxillary incisor has two canals, they are usually located mesiodistally (Thompson et al., 1985; Hosomi et al., 1989; Michanowicz et al., 1990; al-Nazhan, 1991; Lambruschini GM, Camps, 1993). In this case, the lateral incisor had a single root containing two buccopalatal root canals that started as a single canal in the coronal half, then separated to leave the root via two apical foramina, thereby having type V according to Vertucci's classification (Vertucci, 1984).

Continuous wave compaction was the obturation technique of choice for this case. For this technique, gutta percha is softened and vertically compacted. Using this technique helped fill the internal resorption defect in the central incisor three dimensionally.

Conclusion

This reported case proved that single visit non-surgical root canal treatment can successfully lead to the complete healing of a large periapical lesion. Additionally, and although rare, the clinician should expect a maxillary incisor with more than one canal.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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