

Radiographic Evaluation of a Single Visit Non-Surgical Root Canal Treatment of Infected Anterior Teeth: Report of two Cases

Mohammed J Abu Illah¹, Abdulaziz Yahya Thubab¹, Halah Mohammed Huthan¹, Asayil Khalid Juraybi¹, The-Anoon Abdo Baggash², Mohammed M Al Moaleem^{3*}

¹Dental Intern, College of Dentistry, Jazan University, Jazan, Saudi Arabia

²Al-Shifa College for Technical and Medical Science, Al Hodaydah, Yemen

³Department of Prosthetic Dental Science, College of Dentistry, Jazan University, Jazan, Saudi Arabia

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*Corresponding author: Mohammed M Al Moaleem

Department of Prosthetic Dental Science, College of Dentistry, Jazan University, Jazan, Saudi Arabia

Abstract

This case report describes the non-surgical root canal treatment (RCT) of two cases with a periapical lesion associated with maxillary and mandibular anterior teeth of male patients who complained of swelling associated with pus drainage and pain. The obturation of both maxillary and mandibular central incisors was done by using lateral condensation and epoxy resin-based sealer, followed by composite resin filling as a permanent restoration. Clinical and radiographic re-evaluations at 4 months and 7 months for maxillary and mandibular teeth respectively revealed progressing bone healing, particularly in a maxillary region. This case report shows that an appropriate diagnosis in combination with RCT as a conservative non-surgical approach can lead to the complete healing of a large lesion without invasive treatments.

Keywords: Non-surgical root canal treatment, anterior teeth, periapical pathosis.

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BACKGROUND

Apical lesions are a collection of inflammatory chronic procedures that are usually caused by microorganisms or their by-products [1]. Apical periodontitis is usually associated with peri-radicular radiolucent changes. These changes range from thickening of the periodontal ligament and resorption of the lamina dura to destruction of apical bone resulting in a well-demarcated radiolucency [2]. Therefore, A three-dimensional obturation of the root canal system after shaping and cleaning is important for successful endodontic therapy [3].

Although failures can appear after basic endodontic treatment, success rates after root canal therapy were reported to be quite high (84%-86%). Furthermore, it was stated that up to 85% of teeth with periapical lesions can be healed after a standard endodontic treatment [4- 6]. The causes of apical periodontitis in RCT teeth include insufficient irrigation, inadequate instrumentation and incomplete obturation of the root canal system [7]. Any other causes such as intra-radicular microorganisms, in the form of biofilms may

still persist in inaccessible ramifications and anastomoses of the main and accessory canals, and within the dentinal tubules [8].

Peters *et al.*, 2001 showed that more than 35% of the root canal walls were left untouched even with contemporary nickel-titanium rotary instrumentation methods. Thus, the reduction or elimination of microbes and biofilms is achieved by mechanical instrumentation, irrigation with tissue-solving and antimicrobial irrigants, and administration of antimicrobial medicaments in the root canal between appointments. So, we preferred to use 2.5% NaOCl and 17% EDTA combinations, which are the most commonly used irrigation solutions in endodontic treatment as irrigants [9]. However, a recent systematic review and meta-analysis showed that the prevalence of apical periodontitis in root-filled teeth is as high as 39% [10].

It is generally accepted that periapical lesions cannot be differentially diagnosed as either radicular cysts or apical granuloma based on radiographic evidence alone [11]. Various studies have shown that with a radiographic lesion size of 20 mm or larger, the

incidence of cysts is equal to or greater than 92%. If the lesion is separate from the apex and with an intact epithelial lining (apical true cyst), it may have developed into a self-perpetuating entity that may not heal when treated non-surgically [12, 13]. In the past, large periapical lesions were generally managed by RCT of the involved tooth or teeth and by surgical excision. This was particularly true if the periapical lesion was suspected to be an apical true cyst. In recent years, a greater awareness of the complexities of root canal systems has led to the development of newer techniques, instruments, and materials [14].

The aim of this case report was to monitor radiographically, a non-surgical root canal treatment for a previously initiated RCT of a single canal for a male patient in the anterior region of both arches with a short follow up-period.

CASE REPORTS

Case #1

A medically fit 53 years old male patient. His main complaint of swelling associated with pus drainage and pain in relation and above to the maxillary anterior teeth. 1 year ago, swelling with drainage and bad taste observed in the upper front side of the mouth. The past dental history was started 4-years ago, because of a trauma to the mid face then 1-year later, an intraoral swelling observed in maxillary frontal front of the mouth. After 2-years root canal treatment was started by pulp extirpating in private clinic.

The intra oral examination showed multiple teeth missing and swelling in maxillary arch in relation to incisors teeth. The preapical radiographic x-ray was taken and shows periapical pathosis in relation to tooth # 11 with winding of periodontal ligaments (Figure 1A). A group of endodontic tests were carried out, started by electrical pulp tester (EPT) and cold tested ETHYL CHLORIDE a-50C COLD SPRAY 200ML (terraDENT Sp. z o.o.ul. Mickiewicza 17, 43-430 Skoczów, Poland) which both shows negative (-ve) response, while the percussion test indicated +ve pain to both lateral and perpendicular percussion with slight vertical compression associated with grade II mobility of tooth #11.

The data were collected and as RCT was started earlier, the tooth was diagnosed as a previously initiated RCT with chronic abscess and grade II mobility with slight vertical compression with apical root resorption. To confirm the diagnosis and to tract the sinus origin a fistula tract test was carried out with gutta perch size 25, Meta Biomed Gutta Percha Point 0.02 Taper GP (META, BIOMED, Korea) as shown in Figure 1B.

Next visit, the treatment was started by isolation of the infected teeth with rubber dam. After that cleaning and shaping was done manually with EDTA 17%, Meta Md Chelcream (META, BIOMED, Korea) and irrigation

by using saline and sodium hypochlorite 5% (Septodont Parcan, France). The initial working length was measured with file 35# and length of 20mm (Figure 1C), after that a master file with size 50# and length was reached and checked with master cone size 60# and length (20mm) as obvious in figure 1D. Later, obturation was done by using lateral condensation and epoxy resin-based sealer, Meta Biomed ADSEAL (META, BIOMED, Korea) and GIC liner, Meta Biomed Biner light cure (META, BIOMED, Korea), and composite resin filling 3M™ Espe Filtek™ Z250 (3M, USA) as permanent restoration. Finally, a stainless-steel wire size 0.7mm was cemented to the palatal side of tooth # 11 and adjacent teeth (Figure 1E). The occlusion was adjusted to be slightly out of occlusion during both centric and eccentric occlusion and during protrusive movements. Patient was instructed to be follow up after 3-months. During follow-up visit the healing of the periapical pathosis was obvious and ongoing healing was observed at postoperative per-apical x-ray (Figure 1F), after that RCT teeth # 11 was checked for mobility which was absent, and the splinting wire was removed. Programs of periodical follow up was scheduled.

Case #2

A young male patient with 34-years attended to dental interns' clinics. The patient was with no medical problems, and he is a heavy smoker. His came with history of previous swelling in the lower anterior teeth and he complained of pain during night at mandibular anterior teeth. A year ago, the patient started RCT for teeth # 14 in a private clinic and pulp extirpating was done. After that a swelling history in relation to lower incisors teeth was recorded.

An intra-oral examination showed good oral hygiene condition with discoloured tooth # 41. The preapical radiographic x-ray was taken and shows periapical pathosis in relation to tooth # 41 (Figure 2A). Endodontic tests were carried out, started by the EPT and cold tested ETHYL CHLORIDE a-50C COLD SPRAY 200ML (terraDENT Sp. z o.o.ul. Mickiewicza 17, 43-430 Skoczów, Poland) which both shows negative (-ve) response, while the percussion test indicated +ve pain to both lateral and perpendicular percussion with no mobility of the infected tooth. The data were interoperated as an open tooth with previously RCT established earlier, the tooth was diagnosed as a previously opened RCT with symptomatic apical periodontitis and apical root resorption.

The treatment was started at the next appointment. It started with isolation of the infected teeth with rubber dam after local anaesthesia injection. Next that cleaning and shaping was done using rotary TFine IPro Endomotor with EDTA 17% Meta Md Chelcream (META, BIOMED, Korea) and irrigation by using saline and sodium hypochlorite 5% (Septodont Parcan, France). The initial working length was measured with file #20 taper 2 % and length of #21 (Figure 2B), after that a

master file with size and length was reached and checked with master cone size 25# Constant taper 4% Meta Biomed Gutta Percha Point 0.02 Taper GP (META, BIOMED, Korea) and length (21mm) as obvious in figure 2C. Subsequent, obturation was done by using single cone and epoxy resin-based sealer Meta Biomed ADSEAL (Meta Biomed Gutta Percha Point 0.02 Taper GP (META, BIOMED, Korea) as shown in Figure 2D, then a GIC liner Meta Biomed Biner light cure, and composite resin filling 3M™ Espe Filtek™ Z250 (3M, USA) as permanent restoration was placed in the access opening. Finally, the occlusion was adjusted to be slightly out of occlusion during both centric and

eccentric occlusion and different mandibular movements. Patient was examined after 3-months, and the postoperative preapical x-ray shows that there as an improvement of the periapical condition of the RCT tooth (Figure 2E). Another follow-up appointment was carried out after 7 months of obturation. This time much more reduction in the size of preapical infection was obvious (Figure 2F). Both cases were scheduled for further monitoring of RCTs and final restoration treatments.

LIST OF FIGURES



Figure 1: Pretreatment operative view (A), Sinus tract (B), Working length measurement (C), Mater cone (D), Post treatment after obturation (E), 3-months follow-up (F)

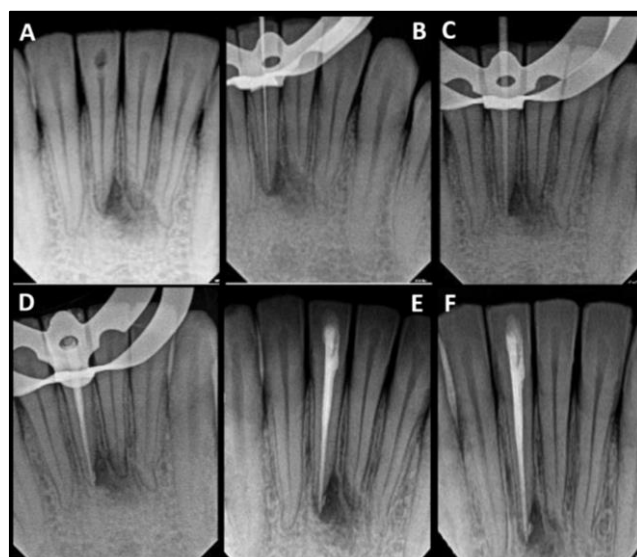


Figure 2: Preoperative view (A), Isolation and working length measurement (B), Mater cone (C), At the time of obturation (D), 3-months follow-up (E), Postoperative view at 7-months follow-up.

DISCUSSION

The life of an RCT tooth depends on the accuracy of the diagnosis and planning, excellence of

sanitization, RC preparation and filling, and final rehabilitation procedures [15]. Once the pulp becomes necrotic, its environment becomes suitable to allow microorganisms to multiply and release various toxins

into the periapical tissues, initiating an inflammatory reaction and leading to the formation of a periapical lesion [16]. This case reports showed a radiographically healing of apical periodontitis associated with swelling of maxillary and mandibular central incisor teeth. A non-surgical treatment of previous initiated RCT of single canal root for a male patient in the anterior region with a short period follow-up.

The periapical tissues have a rich blood supply, lymphatic drainage, and abundant undifferentiated cells. All these structures are involved in the process of inflammation and repair. Therefore, because the periapical tissues have the potential to heal, the first treatment of periapical lesions should be directed only towards the removal of the causative factors [17]. A nonsurgical RCT should be considered as the first choice in cases of nonvital teeth with infected root canals. Elimination of bacteria from the root canal is the most important factor for the successful treatment of periapical lesions [18].

In the past, it was considered that large periapical lesions would not respond to RCT alone and that surgery was always required. However, in current years, there is greater awareness of the EC morphology, and the development of newer instruments, techniques, and materials has greatly enhanced the clinician's abilities [19]. Recently, a clinical and radiographical examination of case series treated in the maxillary anterior teeth with non-surgical RCTs revealed no signs and symptoms following treatment while relative improvement of the lesion and apical closure was apparent after 7 and 9 months, 4 years subsequently. A complete healing occurred in 35.5% after 12-17 months [20]. Also, a longitudinal study was carried out to evaluate a nonsurgical RCT after 2-3 years to identify the possible prognostic factors. They concluded that a highly successful procedure after this observation period is primarily affected by the presence of large periapical lesions [21]. Similar findings were documented in our cases during follow-up appointments which showed complete absence of swelling and other symptoms, no loss of function, absence of sinus tract and radiological evidence of a normal periodontal ligament space around the tooth.

A study by Sjögren *et al.*, to monitor and re-examined 356 endodontic patients after 8-10 years. They reported a 96% success rate if the teeth had vital pulps prior to treatment. The success rate dropped to 86% if the pulps were necrotic and the teeth had peri-radicular lesions and dropped still lower to 62% if the teeth had been re-treated. They concluded that “teeth with pulp necrosis and peri-radicular lesions and those with peri-radicular lesions undergoing re-treatment constitute major therapeutic problems”. They surmised that bacteria in “sites inaccessible” might be the cause of increased failure [22]. This agrees with these cases, because a single canal results in more accessibility and

the presence of complete debridement of the RC system by chemo-mechanical cleaning and an appropriate microbial removal are the most essential factors for achieving good outcomes.

Irrigating solutions help to reduce the microbial flora of the infected canals, and the use of ultrasonically activated warm 3% sodium hypochlorite can dissolve and help eliminate the necrotic tissue [23]. Baumgartner and Cuenin stated that “The effectiveness of low concentrations of NaO Cl may be improved by using larger volumes of irrigant or by the presence of replenished irrigants in the canals for longer periods of time [24]. The same protocol was strictly followed during the treatment of the current cases to increase the effectiveness against microbial flora in the infected canals.

One of the reasons we tried non-surgical treatment was to minimize the possibility of damaging the adjacent teeth during teeth preparation for a bridge construction. Also, save periapical tissue during apicoectomy. Since the adjacent teeth were vital, so we tried our best option to maintain the vitality of the teeth. Furthermore, non-surgical treatment resulted in the reduction of the total cost and minimizing the complication that usually associated with surgery.

CONCLUSION

The clinical cases reported in this article showed excellent radiographic healing of periapical lesions achieved through a non-surgical RCT approach for anterior teeth in both arches after a short period of follow-up. Throughout irrigation and complete debridement of the canal system with EDTA 17% and irrigation and by using saline and sodium hypochlorite 5.25% followed by obturation with using lateral condensation and epoxy resin-based sealer. The favorable healing of the lesions confirms that even large periapical lesions can respond favorably to non-surgical RCT. Therefore, such techniques can be considered as the first treatment of choice.

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