

One Visit Endodontic Retreatment with the Aid of Photodynamic Therapy: A Case Report

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Abstract:

Persistent microorganisms, which are not decontaminated from root canals easily, might bring about endodontic failure. A 51-year-old man with endo-perio lesion was considered for endodontic retreatment. The existing root filling was removed with a solvent, hand, and rotary files. The working length was determined, and the canals were cleaned and shaped with ProTaper files. During each instrumentation, root canals were subjected to photodynamic therapy with attached Endo tip. Finally, the dried canals were filled with AH Plus sealer and gutta-percha cones. 9 months follow-ups were taken to order.

Key Words: Endodontic retreatment, endo-perio lesion, photodynamic therapy

Introduction

Existence of persistent microorganisms, which are not decontaminated from the root canals during the chemomechanical procedure, might cause endodontic failure.¹ It has been stated that 30-50% of endodontic treatments fail from remnant infections,² which apparently suggests that requirement of improved or supplemental endodontic disinfection strategies.³ Gram-positive bacteria species might in the root-filled teeth with the periradicular lesion by using polymerase chain reaction-based analysis. Higher prevalence of Gram-positive bacteria species in the root canals of teeth with failed root canal treatment is explained by higher resistance of Gram-positive bacteria to mechanical and physical treatment due to the stiff and stable structure of the peptidoglycan layer (15-80 nm) in the cell membrane.⁴

Some recent investigations have been dedicated to new disinfectant materials and techniques specially by using technology and new devices.^{5,6} The use of photodynamic therapy (PDT) for final decontamination of root canals has demonstrated hopeful results and no adverse effect has been established until now.⁷

The purpose of this clinical report is to describe an endodontic retreatment of a complicated case with an endo-perio lesion by relying on a new approach of disinfection technique.

Case Report

A healthy 51-year-old man referred to the Department of Endodontic, Faculty of Dentistry, Shahid Sadoughi University of Medical Sciences. His chief complaint was about pain during chewing on the right side of lower jaw. During intraoral examination, mild to moderate chronic periodontitis was detected. Furthermore, slight amalgam fracture was observed on the occlusal and distal site of the tooth number #32. Moreover, 3 mm vertical bone defect was observed while periodontal probing on the furcal site. Furthermore, objective tests showed mild sensitivity to percussion. Periapical radiograph (Figure 1) of suspected tooth revealed previous endodontic treatment, which was somehow with convincing quality, with a periapical lesion on the apical site of mesial root. Moreover, the vertical bone defect was noticed at the furcal site. Hence, one-visit endodontic treatment was scheduled for the tooth to eliminate the endo-perio lesion. Inferior alveolar nerve block was administered with 1.8 ml Lidocain (Daroopaksh, Tehran, Iran). The tooth was isolated with a rubber dam, all of the previous amalgam fillings was removed by using high-speed fissure burs (Teeskavan, Tehran, Iran)



Figure 1: The suspected tooth with the endo-perio lesion.

and handpiece (NSK, Tokyo, Japan). The crown-down technique with sizes 3-1 of Gates Glidden drills (Dentsply, Maillefer, Ballaigues, USA) was used to enlarge the orifices with a brushing motion. The existing root filling was removed with a solvent, hand, and rotary files. A pilot hole was created by using the D1 instrument, and then the D2 instrument was used in the middle third of the root canal and the D3 in the apical part of it. The working length was determined by using an apex locator device (Root ZX II, J. Morita Corp., Tokyo, Japan) and radiographic confirmation. Normal saline was used to evacuate any remained debris or gutta-percha fillings. The canals were cleaned and shaped with ProTaper files (Dentsply, Maillefer, Ballaigues, USA). During each instrumentation, root canals were subjected to PDT (FotoSan 360, CMS Dental, Copenhagen, Denmark) with attached Endo tip (Figure 2a).

The high viscosity of toluidine blue O solution at 0.1 mg/mL concentration was applied inside of each the root canal, by the help of an endodontic needle, apico-coronal and remained for 1 minute. The activation procedure was accomplished by using a light emitting diode device (FotoSan 360, CMS Dental, Copenhagen, Denmark) in the red spectrum at wavelength of 625-635 nm and 2 W/cm² output for 1 min (Figure 2b). During irradiation, the Endo tip navigated the total length of the root canal. After each activation, canals were irrigated with normal saline. Finally, the canals were dried with sterile absorbent paper points and AH Plus sealer (Dentsply Maillefer, Ballaigues, Switzerland) and gutta-percha cones (Diadent Group International Inc., Vancouver, Canada). After completion of root canal therapy, the crown of tooth was restored with Amalgam filling Material (Sina, Tehran, Iran). After nine months the patient were recalled for follow up procedure.

Discussion

Endodontic treatment sole reduces the number of multi-drug resistant microbiotas in root canals and might diminish the bacterial species in 10 of 30 teeth. Interestingly, application of PDT with conventional endodontic treatments reduces the bacterial species ultimately in all of the teeth.⁷ Recently, the use of PDT as the final irrigation has gain acceptance among clinicians because of its high degree of selectivity for killing microorganisms.⁸ Maisch *et al.* claimed identical killing of methicillin-resistant *Staphylococcus aureus* and negative strains.⁹

In the present case, the use of PDT seemed to be non-invasive and effective after 9 months follow-up (Figure 3). Interestingly, no antimicrobial intracanal medicaments were used, and treatment was completed at one session. The periapical radiograph revealed remarkable bone healing of endo-perio lesion in which both periapical lesion and vertical bone defect at furcation site was healed after 9 months.

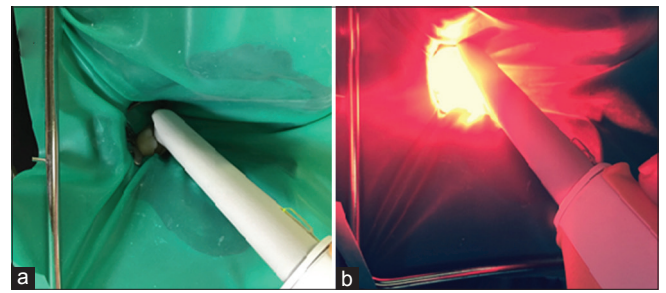


Figure 2: Adjusting of FotoSan 360 for photodynamic therapy (a), activation of the device for disinfecting the canals (b).



Figure 3: After 9 months follow-up the healing was noticed.

The fiber design of endodontic tip of the photodynamic device permits a three-dimensional exposure of the emitting light at the tip and lateral sides.¹⁰ The efficacy of photodynamic treatment was tracked by Garcia *et al.* who stated that neoangiogenesis was observed in the most of the treated animals.¹¹ Furthermore, the results of *in vitro* studies on the effects of PDT human fibroblast cells indicated no significant deleterious impacts.¹² That might an expression of the antiseptic efficacy of PDT especially against *Enterococcus faecalis*, one the most resistant bacteria.¹³

An important aspect that needs to be indicated is importance of quality of restoration that directly affect prognosis of endodontically treated teeth.¹⁴⁻¹⁵ It is strongly recommended these teeth restore immediately.¹⁶ In this case amalgam filling materials was selected that can provide perfect coronally sealing, also because of tooth condition such as fractured walls and lack of enamel support.

Conclusion

The use of PDT might increase the success rate of one visit endodontic retreatment remarkably, and there is hope for PDT to become a routine disinfectant in dental procedures and reduce the treatment sessions.

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