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FAST HEALING OF A NEGLECTED PERIAPICAL LESION: A CASE REPORT



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ABSTRACT

Complete elimination of microorganisms from the root canal system is crucial for the healing process of an endodontic lesion. Nevertheless, some species of bacteria can cope with root canal irrigants, survive in the dentinal tubules for years and cause persistent periradicular lesions. In the last decade, diode lasers received wide acceptance in laser-supported endodontics because of their impactful and deep-reaching disinfection ability. This case report presents the fast healing of a periapical lesion as a result of performing intra-canal laser disinfection in conjunction with conventional root canal treatment procedures.

Keywords: *Periapical periodontitis, Diode lasers, Root Canal Therapy, Disinfection, Treatment outcome*

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İHMAL EDİLMİŞ PERİAPİKAL LEZYONU HIZLI İYİLEŞMESİ: BİR VAKA RAPORU

ÖZET

Endodontik lezyonun iyileşme süreci için mikroorganizmaların kök kanal sisteminden tamamen elimine edilmiş olması hayati önem taşımaktadır. Bununla birlikte, bazı bakteri türleri kök kanal yıkama solusyonlarına direnç gösterebilmekte ve dentin tübüllerinde yıllarca yaşayarak kalıcı periradiküler lezyonlara neden olabilmektedir. Derinlere inebilen ve çok etkin dezenfeksiyon yeteneğine sahip olmaları nedeniyle son on yılda diyet lazerler, lazer destekli endodonti işlemlerinde yaygın olarak kabul görmüştür. Bu vaka raporu, geleneksel kök kanal tedavi prosedürleri ile birlikte kanal içi lazer dezenfeksiyonu yapılması sonucunda periapikal bir lezyonun hızlı iyileşmesini sunmaktadır.

Anahtar Kelimeler: *Periapikal periodontitis, Diyet lazerler, Kök Kanal Tedavisi, Dezenfeksiyon, Tedavi sonucu*

INTRODUCTION

The outcome of the root canal treatment substantially depends on efficient disinfection of the root canal system. Unfortunately, the root

canal system's irregularities, isthuses, and canal ramifications can serve as a settlement that shields microorganisms against conventional cleaning techniques and can hinder the efficacy of disinfection carried out using irrigants and medicaments.¹ The root canal dentin contains tiny ductules (the dentinal tubules) inside that may raise the disinfection challenge because of their narrow and deep structures. Also, the irrigants' high surface tension makes penetration to those hard-to-reach areas difficult.² In some instances, such as necrosis, the irrigants must reach the farthest point to eliminate all bacterial colonization in the deeper layers of the dentin tubules. One of the bacterial species mostly found in the failed root canal treatment is *Enterococcus faecalis* (*E. faecalis*), with an incidence of 22-77% of failed cases. This type of bacteria has a resistant mechanism that can stand off against calcium hydroxide medication and can survive in the dentinal tubules for a long time.²⁻⁵ Berutti reported that conventional irrigation can reach $\approx 130 \mu\text{m}$ in the dentinal tubules, on the other side *E. faecalis* can penetrate the dentinal tubules to

a depth of $>1000 \mu\text{m}$.^{2,6} From this point, the need for a new strategy to eliminate the bacteria in the deep layers has arisen. In the last decade, Diode and Nd: YAG lasers have been used for root canal disinfection, and successful results were reported in bacteria elimination deep into the dentin tubules.⁷

This case report presents the benefit of the diode laser in endodontic treatment outcome and the fast healing of a periapical lesion.

CASE REPORT

A 20-year-old male patient in good general health sought treatment at the department of endodontics in the University of Van Yüzüncü Yıl University with esthetic complaints associated with a fractured maxillary central incisor. The patient reported a history of trauma, which resulted in a coronary fracture five years earlier.

On clinical examination, pain on percussion was reported, and the radiographic examination revealed an apparent periradicular lesion (Figure 1).

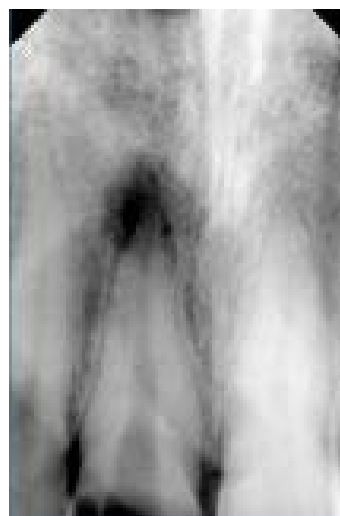


Figure 1: Before treatment

The patient was anesthetized with an Articaine-based agent (Ultracain DS Forte; Aventis, Istanbul, Turkey). The tooth was isolated with a rubber dam, caries was removed, and the endodontic access cavity was prepared using a diamond bur.

After the determination of working length, conventional chemomechanical procedures were performed. Protaper Next (PTN) files were used in the sequence PTN X1, PTN X2, PTN X3, and PTN X4 at 300 rpm speed and 2 Ncm torque via an endodontic motor (X-Smart, Dentsply, Maillefer). The root canal was irrigated using 2 mL of 2 % NaOCl after each instrument change. Following the completion of prepa-

ration, the smear layer was removed with the consequent use of 17 % EDTA (3 mL), and 2.5 % NaOCl (3 mL). The irrigation procedure was completed with 5 mL physiological saline and the root canal was dried. Finally, the canal was disinfected using a 940-nm diode laser (Ezlase, Biolase, San Clemente, California, USA). Laser energy was delivered via a 200- μ m fiber tip (E2 Endo Tip, Biolase, San Clemente, California, USA) at 1 W power in the continuous mode. The laser tip was placed at the working length, and canal was irradiated at a speed of 2 mm/s, with circling movements from the apical to the most coronal part of the root canal (Figure 2).

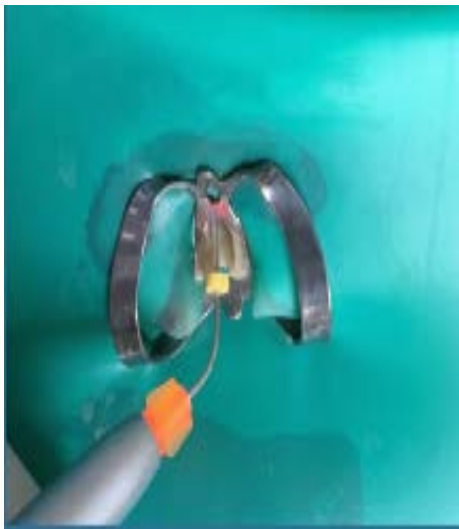


Figure 2: Intra-canal laser application

This procedure was repeated four times, with a 20-s interval between applications. After that, the root canal was filled using gutta-percha and epoxy-resin sealer (ADSEAL, Meta Biomed CO., Chungcheongbuk-do, Korea) using lateral compaction technique (Figure 3).



Figure 3: Root canal filling.

Following obturation, a fiber post was cemented in the canal, and the core restoration was performed using a hybrid composite material (Filtek Z250, 3M ESPE, St Paul, MN, US). The follow-up radiographs were taken 2, 4, and 5 months post-op. (Figure 4, 5).



Figure 4: 2 months follow-up



Figure 6: 5 months follow-up



Figure 5: 4 months follow-up

The radiograph showed the complete healing of the periapical lesion in the 5th month (Figure 6). The tooth was asymptomatic and functional.

DISCUSSION

The healing process of periapical periodontitis depends on effective disinfection of the root canal system and the prevention of reinfection.⁸ It is known that some species of bacteria (e.g: streptococci, enterococci, and lactobacilli) can survive after chemo-mechanical disinfection of the root canals, have the ability to sustain periapical inflammation, and obviate periapical healing.^{9,10} According to Lars Fabricius et al., in 97% of the cases with bacteria inside the canal, the healing would not occur.⁹ They emphasized the importance of achieving a bacteria-free root canal system before the obturation of root canals. Therefore, in the case presented, intracanal diode

laser disinfection was performed in conjunction with conventional chemo-mechanical procedures.

Masoud Parirokh stated that after removing the smear layer using EDTA, laser radiation would be absorbed by the canals' wall, ruin the microorganisms in the main canal and dentine tubules, block dentinal tubules and prevent the canals' reinfection. The water inside the dentinal tubules absorbs the laser beam, increasing the temperature and causing vaporization and fusion through the tissue, which may cause the closing of the dentinal tubules.¹¹ In this case, before diode laser irradiation, the smear layer was removed using EDTA to have the laser beam disinfect deep inside to the dentinal tubules and prevent reinfection of them as well.

During the irradiation with diode lasers, there is a temperature increase between 1°C–7°C, which is safe for the ambient periodontal tissues.^{12,13} Providing a 20-second passive cooling period between the 940 nm diode laser irradiation cycles allows temperature decrease on the exterior root surface.¹⁴ Thus, in this case, we provided a 20-second resting time between irradiation cycles. Besides, we performed laser irradiation with circling movements to scan whole

root canal walls and prevent extra temperature increments on the surface.¹⁵

The elimination of microorganisms in root canal system is essential for preventing postoperative complications.¹⁶ In endodontics, laser application is considered one of the most effective antimicrobial treatments because of its elimination ability on microorganisms settled both in the root canal system and periapical lesion.¹⁷ Genc Sen and Kaya,¹⁸ reported that 940 nm diode laser disinfection in the root canal reduces postoperative pain and provides comfort after endodontic retreatment. In line with these researchers' results, in this case, the patient stated no discomfort after treatment.

In the case presented, root canal disinfection with a 940-nm diode laser subsequent to conventional chemomechanical procedures provided fast and comfortable healing. Therefore, the aforementioned treatment procedure can be recommended to clinicians as an alternative approach with quick response and ease to perform.

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