UDK: 616.314.18:616.314.17-008.1

NON-SURGICAL ENDODONTIC TREATMENT OF PERIAPICAL LESION- A CASE REPORT

НЕХИРУШКИ ЕНДОДОНТСКИ ТРЕТМАН КАЈ ПЕРИАПИКАЛНА ЛЕЗИЈА – ПРИКАЗ НА СЛУЧАЈ

Grbovic E.[1], Eftimoska M.[2], Nedelkovska I.[3], Bonevska A.[4], Matlioska Kocevska T.[5], Bogoevska T.[6]

[1] Faculty of Dentistry - University "Ss. Cyril and Methodius" Skopje, Department of Endodontics USKC "Sv.Pantelejmon" Skopje, North Macedonia, [2]Faculty of Dentistry - University "Ss. Cyril and Methodius " Skopje, Department of Endodontics USKC "Sv.Pantelejmon" Skopje, North Macedonia, [3]Faculty of Medical Sciences, Goce Delchev University, Shtip,North Macedonia,Department of Periodontology and Oral Pathology USKC "Sv.Pantelejmon" Skopje, North Macedonia, [4]Faculty of Dentistry - University "Ss.Cyril and Methodius" Skopje, Private dental clinic, [5]Faculty of Dentistry - University "Ss.Cyril and Methodius" Skopje, Private dental clinic, [6]Faculty of Dentistry - University "Ss.Cyril and Methodius" Skopje, Private dental clinic

Abstract

The dental pulp reacts unfavorably to traumatic dental injuries. Common adverse outcomes are pulp necrosis and infection of the root canal system which are most often accompanied by the development of periapical lesion. These lesions arise due to microbial invasion from the necrotic pulp tissue, leading to acute or chronic inflammation. **Aim:** To evaluate the effectiveness of non-surgical endodontic treatment in managing inflammatory periapical lesions. **Material and method:** A 23-year-old patient came to the Clinic of Dental Diseases and Endodontics with continuous pain in the upper left quadrant persisting for 2-3 days. Clinical examination revealed an old composite restoration on tooth 24 and acute pain upon vertical percussion. Radiographic imaging Showed the presence of a periapical lesion associated with the affected tooth. We performed conservative non-surgical treatment of tooth 24. **Result:** In this case, we encountered a periapical lesion, which was most likely caused by occlusal trauma. The non-surgical endodontic treatment, which included multiple visits for intracanal medications, gave us the success of the therapy, which we confirmed with retroalveolar radiographs taken over a period of 3 and 6 months. **Conclusion:** Proper instrumentation is one of the key factors for the success of endodontic therapy and at the same time the apical part of the canal is difficult to prepare. It is also necessary to thoroughly examine the pulp chamber, canals and associated pathology to ensure complete debridement of the entire root canal system. This increases the chance of long-term successful endodontic therapy. **Keywords:** Apical periodontitis, nonsurgical root canal treatment, necrosis, lesion.

Апстракт

Забната пулпа реагира неповолно на трауматски забни повреди. Неповолни реакции се некроза на пулпата односно инфекција на коренскиот канал и најчесто пратена со периапикална лезија која се развива како резултат на микроорганизми од некротичното ткиво на пулпата, што доведува до акутно или хронично воспаление.**Цел:**Нехируршки ендодонтски третман како ефективна терапија за воспалителни периапикални лезии. **Материјал и метод:** Пациентка 23 годишна дојде на Клиниката за Болести на заби и ендодонт со симптоми на континуирана болка во горен лев квадрант 2-3 дена. При клиничкиот преглед можеше да се забележи стара композитна реставрација на заб 24. Субјективен анамнестички податок беше и акутна болка на вертикална перкусија. По направена радиографија на коренскиот канален систем се гледаше периапикална промена. Спроведовме конзервативен нехирушки третман на заб 24. **Резултат:** Во овој случај се соочивме со периапикална лезија, која најверојатно била предизвикана од оклузалната траума. Спроведовме нехирушкиот ендодонтски третман кој вклучи повеќектартни посети, а во интерсеансниот период аплицираме интраканална медикација. Успешниот исход од терапијата го потврдивме со ретроалвеоларни снимки направени во период од 3 и 6 месеци. **Заклучок:** Инструментацијата е еден од клучните фактори за успехот на ендодонтската терапија. Апикалниот дел од каналот е тешко да се подготви, но исто така мора темелно да се испита комората на пулпата и коренските канали за да се обезбеди комплетен дебридман на целиот систем на коренскиот канал. На тој начин се зголемува шансата за долгорочна успешна ендодонтска терапија. **Клучни зборови:** Апикален периодонтитис, нехируршки третман на коренскиот канал, некроза, лезија.

Introduction

Periapical lesions arising from infections originating from necrotic pulp tissue, which can be caused by deep caries or trauma, are referred to as Lesions of Endodontic Origin (LEO). In the presence of bacteria and their byproducts, the periapical tissues initiate an immune response, leading to the development of various types of periapical

lesions, including granulomas, periapical cysts, or abscesses[1, 2]. The prevalence of these lesions varies among studies, with clinical evidence suggesting a higher prevalence of cystic lesions in cases with larger lesion sizes. However, large granulomas can also be observed. The final diagnosis of periapical lesions requires histopathological examination[3].

Treatment options for managing periapical lesions encompass a spectrum ranging from nonsurgical endodontic treatment to surgical interventions, such as apicoectomy or tooth extraction. However, in alignment with minimally invasive endodontics, nonsurgical endodontic treatment is favoured. The objective of this approach is to eliminate or reduce the bacterial load within the root canal system, thereby creating a conducive biological environment for the healing of periapical lesions[4]. The success of the healing process depends on the treatment protocol, including the selection of irrigation solutions and intracanal medicaments[5, 6]. These factors play a crucial role in modulating the host's immune response, ultimately aiming to achieve the primary goals of endodontic treatment: eradication of periapical infection and prevention of periapical reinfection. The success rate of initial nonsurgical endodontic treatment has been reported to be as high as 97%[7]. However, treatment failures may occur, often attributed to the presence of residual bacteria or retained foreign bodies that trigger inflammatory and immune responses, leading to bone destruction in the periapical region[8]. Therefore, root-end resection and retrograde under the microscope have emerged as an alternative approach for managing periapical lesions, offering more predictable treatment outcomes[9, 10]. The selection between surgical and nonsurgical endodontic treatment for managing periapical lesions remains a controversial issue despite numerous studies demonstrating no significant difference in success rates[11,12]. Nonetheless, the inclination towards conservative treatment is still favoured by many clinicians when considering nonsurgical endodontic management[13].

This article presents successful nonsurgical endodontic treatment of periapical lesions in clinical case with a follow-up period ranging from 3 to 6 months.

CASE 1

A 23-year-old patient came to the Clinic of Dental Diseases and Endodontics with symptoms of continuous pain localized in the upper left quadrant persisting for the pas 2-3 days. Clinical examination revealed an old composite restoration on tooth 24. The patient also reported acute pain on vertical percussion during subjective anamnesis. A periapical radiograph on the affected tooth revealed changes consistent with periapical pathology and suggested a root canal system resembling a a Vertucci type

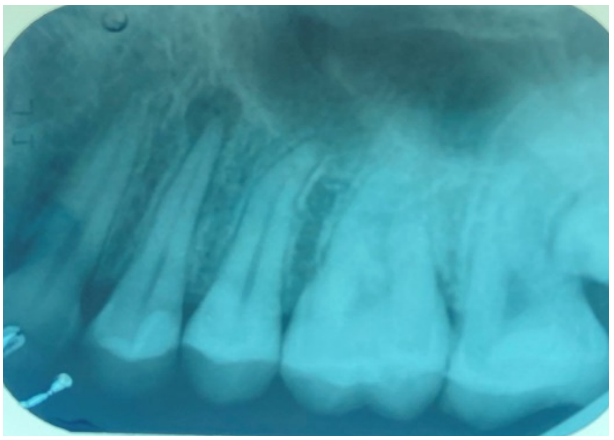

Figure 1. *Periapical lesion on tooth 24*

IV configuration)(Figure 1). We performed conservative non-surgical treatment of tooth 24.

After isolation with a rubber dam, the old composite restoration was removed, and an access cavity was expose

Figure 2. *Determinatin of working lenght with apex locator*

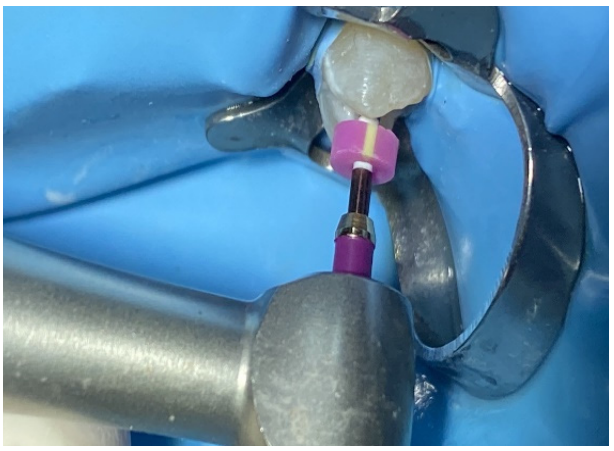

Figure 3. *.Machinig the canals with Nickel titanium rotary files*

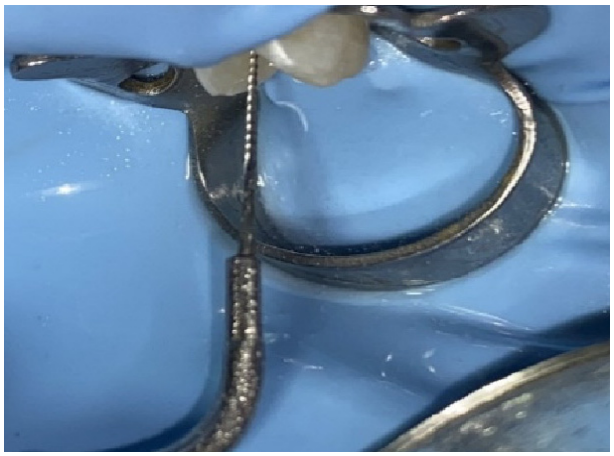

Figure 4. *Ultrasonic irrigation*

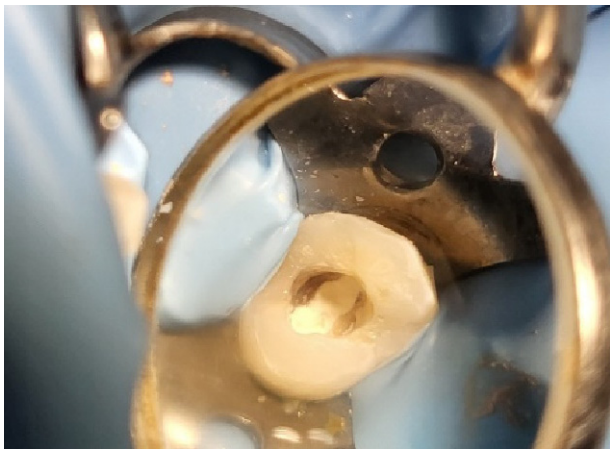

Figure 5. *Filling of calcium hydroxid paste*

in the pulp chamber. Canal patency was initially established using a Kerr expander (0.8, 10) and with the help of an apex locator, the exact working length of the root canals was determined (Figure 2). The next phase was mechanical cleaning of the canals with nickel titanium rotary reamers with a taper of 0.4 to 0.15 0.25 size (Figure 3). Between each phase of changing the rotary instrument, ultrasonic irrigation was performed for 3x20 seconds in each canal with 5.25% sodium hypochlorite (NaOCL), abundant irrigation with saline and 17% EDTA liquid with repeated irrigation with saline (Figure 4). The canals were dried with sterilized paper points and then the canals were filled with calcium hydroxide paste (CaOH) for 1 week (Figure 5). The cavity was obturated with Glass-ionomer cement.

In the second phase of treatment, the patient was recalled for a final obturation. The temporary filling was removed and the same irrigation protocol was repeated, including ultrasonic activation. The chosen technique for definitive obturation was Single Cone in which was used two-component epoxy resin AH 26 plus that positively

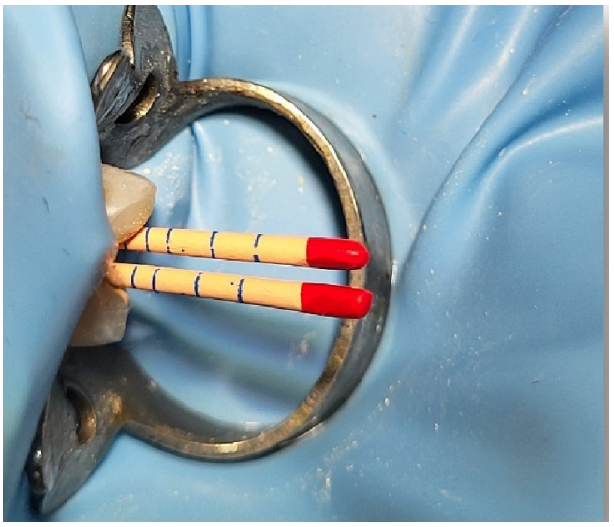

Figure 6a. *Final obturation with guta percha points*

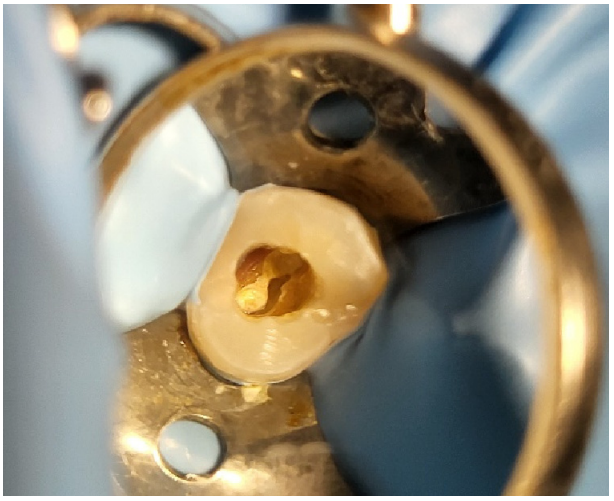

Figure 6b. *Final obturation*

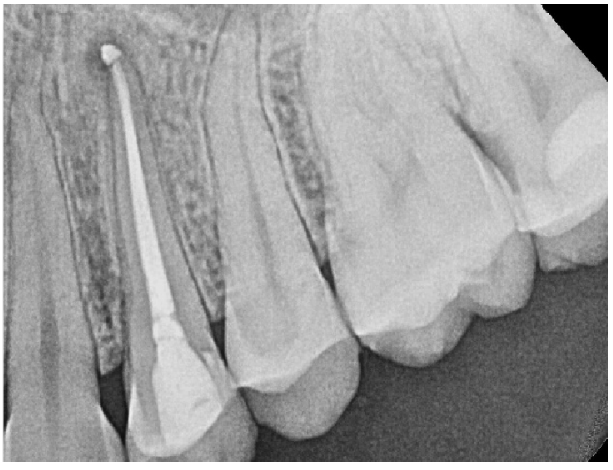

Figure 7. *Intraoral radiographic*

Figure 8. *Composite Restoration*

adheres to the canal walls and gutta-percha points with a 0.4 taper and a size of 0.25 are inserted (Figure 6 a,b). After obturation digital intraoral radiographic was taken. (Figure 7). Finally, a new composite restoration is applied. (Figure 8).

Discussion

Recent studies found a high prevalence of bacterial biofilms in the root canals, even in treated teeth with apical periodontitis, especially in cases involving large lesions and cysts[14]. Marina Fernandes et al. (2010) stated that a nonsurgical approach should always be adopted before considering surgery, with the success rate reaching up to 97%[7,15]. The primary objectives of endodontic treatment, as reported by Shilder H., are to thoroughly clean, shape, and seal the root canal system in three dimensions. This approach aims to effectively treat or prevent apical periodontitis and preserve natural teeth[16,17]. The presented case in this article exhibited periapical lesions caused by various factors, including occlusal trauma, dental injury, and failed endodontic treatment. This case involved microorganisms from necrotic pulp as a result of trauma, leading to periapical infections and subsequent bone destruction.

In this case, the irrigation protocol featured the use of abundant 3% sodium hypochlorite activated by ultrasonic agitation, followed by 17% EDTA to eliminate the smear layer. A systematic review and meta-analysis of randomized controlled trials conducted by Kasidid Ruksakiet et al. (2020) found that sodium hypochlorite significantly, but not completely, mechanically and chemically eliminated endodontic infections during root canal therapy[18]. Many studies have revealed that the efficacy of sodium hypochlorite on endodontic biofilm is accelerated with ultrasonic agitation, and other researchers have reported that ultrasonic activation of irrigants improves debridement, disinfection, and smear layer removal, resulting in better cohesion between the sealers and the dentin tubules, preventing apical leakage and tooth fracture[19,20]. Calcium hydroxide was used as an interappointment intracanal medication to enhance root canal disinfection by targeting the remaining bacteria that cannot be eliminated by chemomechanical irrigation[21]. Based on its broad bactericidal effects and high pH, calcium hydroxide creates a consistently favorable condition for periapical healing when placed intracanal for less than 28 days[22,23].

Periodic clinical examination and radiographic testing were conducted at a 6-months intervals.The healing process of the periradicular tissue after endodontic infection is completely controlled by nonsurgical root canal treatment.

Conclusion

Instrumentation and irrigation are critical factors for the success of endodontic therapy, although preparing the apical part of the canal remains challenging. The dentist must also thoroughly examine the pulp chamber, root canals and associated pathology to ensure complete debridement of the entire root canal system. This increasing approach significantly increases the chance of long-term successful endodontic therapy.

Reference

1. 1.Ramachandran Nair PN, Pajarola G, Schroeder HE. Types and incidence of human periapical lesions obtained with extracted teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1996; 81(1): 93-102.
2. Nair PNR. On the causes of persistent apical periodontitis: A review. Int Endod J 2006; 39(4): 249-81.
3. Schulz M, von Arx T, Altermatt HJ, Bosshardt D. Histology of periapical lesions obtained during apical surgery. J Endod 2009; 35(5): 634-42.
4. Ng YL, Mann V, Gulabivala K. A prospective study of the factors affecting outcomes of nonsurgical root canal treatment: Part 1: Periapical health. Int Endod J 2011; 44(7): 583-609.
5. Gulabivala K, Ng YL. Factors that affect the outcomes of root canal treatment and retreatment : A reframing of the principles. Int Endod J 2023; 56(S2)(Suppl. 2): 82-115.
6. Holland R, Gomes Filho JE, Cintra LTA, Queiroz ÍOA, Estrela C. Factors affecting the periapical healing process of endodontically treated teeth. J Appl Oral Sci 2017; 25(5): 465-76.
7. Friedman S, Mor C. The success of endodontic therapy healing and functionality. J Calif Dent Assoc 2004; 32(6): 493-503
8. Ramachandran Nair PN. Non-microbial etiology: foreign body reaction maintaining post-treatment apical periodontitis. Endod Topics 2003; 6(1): 114-34
9. Song M, Kim HC, Lee W, Kim E. Analysis of the cause of failure in nonsurgical endodontic treatment by microscopic inspection during endodontic microsurgery. J Endod 2011; 37(11): 1516-9.
10. Kang M, In Jung H, Song M, Kim SY, Kim HC, Kim E. Outcome of nonsurgical retreatment and endodontic microsurgery: A meta-analysis. Clin Oral Investig 2015; 19(3): 569-82.
11. Del Fabbro M, Taschieri S, Testori T, Francetti L, Weinstein RL. Surgical versus non-surgical endodontic re-treatment for

periradicular lesions. Cochrane Database Syst Rev 2007; 18(3): CD005511.
12. Bucchi C, Rosen E, Taschieri S. Non-surgical root canal treatment and retreatment versus apical surgery in treating apical periodontitis: A systematic review. Int Endod J 2023; 56(S3)(Suppl. 3): 475-86.
13. Georgelin-Gurgel M, Diemer F, Nicolas E, Hennequin M. Surgical and nonsurgical endodontic treatment-induced stress. J Endod 2009; 35(1): 19-22.
14. Ricucci D, Siqueira JF Jr. Biofilms and apical periodontitis: Study of prevalence and association with clinical and histopathologic findings. J Endod 2010; 36(8): 1277-88.
15. Fernandes M, de Ataide I. Nonsurgical management of periapical lesions. JCD 2010; 13(4): 240-5.
16. Siqueira JF Jr, Rôças IN, Ricucci D, Hülsmann M. Causes and management of post-treatment apical periodontitis. Br Dent J 2014; 216(6): 305-12.
17. Schilder H. Canal debridement and disinfection. Pathways of the pulp 11th. 1984; 1-120.
18. Ruksakiet K, Hanák L, Farkas N, et al. Antimicrobial efficacy of chlorhexidine and sodium hypochlorite in root canal disinfection: A systematic review and meta-analysis of randomized controlled trials. J Endod 2020; 46(8): 1032-41.
19. Mohammadi Z, Shalavi S, Giardino L, Palazzi F, Asgary S. Impact of ultrasonic activation on the effectiveness of sodium hypochlorite: A review. Iran Endod J 2015; 10(4): 216-20.
20. Lin LMRD, Kahler B. Radicular Cysts Review. JSM Dent Surg 2017; 2(2): 1017.
21. Siqueira JF Jr. Strategies to treat infected root canals. J Calif Dent Assoc 2001; 29(12): 825-35.
22. Weiger R, Rosendahl R, Löst C. Influence of calcium hydroxide intracanal dressings on the prognosis of teeth with endodontically induced periapical lesions. Int Endod J 2000; 33(3): 219-26.
23. Vianna ME, Zilio DM, Ferraz CCR, Zaia AA, Souza-Filho FJ, Gomes BPFA. Concentration of hydrogen ions in several calcium hydroxide pastes over different periods of time. Braz Dent J 2009; 20(5): 382-8.