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Non-Surgical Healing of Large Endodontic Lesions Using a Novel Combination of Triple Antibiotics: A Report of 2 Cases

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ABSTRACT

Background: Infections of the root canal system are typically polymicrobial. Due to their complexity, no single antibiotic can effectively sterilize the canal. Microorganisms re-accessing the pulp chamber or radicular space can cause primary or secondary infections, leading to endodontic pathosis. To avoid complications associated with surgical treatment of large endodontic lesions, conservative non-surgical approaches are recommended.
Aim: This report aims to describe the healing of symptomatic large endodontic lesions through non-surgical management using a novel combination of triple antibiotics
Methods and Material: Two cases of symptomatic large endodontic lesions were treated non-surgically with a novel combination of triple antibiotics. The approach focused on the disinfection of the root canal system to eliminate active intracanal microorganisms.
Statistical Analysis: Follow-up radiographs were utilized to qualitatively assess the progressive healing of the endodontic lesions.
Results: Follow-up radiographs of both cases showed progressive healing of the endodontic lesions. These findings suggest that surgical treatment is not always necessary for managing symptomatic large endodontic lesions.
Conclusions: Even cyst-like periapical lesions can heal following conservative endodontic therapy with a novel combination of triple antibiotics, effectively eliminating active intracanal microorganisms through root canal system disinfection.

Keywords: Polymicrobial infection, Triple antibiotics, Non-surgical management, Endodontic lesions, Disinfection

INTRODUCTION

Endodontic treatment aims to eliminate as many microorganisms as possible from the root canal system (RCS), create an inhospitable environment for any remaining bacteria, promote tissue healing, and prepare a matrix for future ministrations. In fact, if microorganisms manage to regain their access to the pulp chamber or radicular space, they are able to cause primary/secondary infections resulting in endodontic pathosis.(1)

Non-surgical management of periapical lesions often involves mechanical root canal instrumentation and intracanal medicaments. Using intracanal medication to eliminate microorganisms and create a

suitable environment for further treatment is a key aspect of this approach.(2)

Calcium hydroxide and various antibiotic pastes are used alongside mechanical root canal preparation. However, recent studies suggest that calcium hydroxide (CH), despite its alkaline pH, is not as effective against intracanal microorganisms as previously thought and lacks strong antibacterial properties.(3)

Due to the complexity of root canal infections and recent studies indicating calcium hydroxide's limited antibacterial efficacy, a combination of antibiotics could potentially achieve effective sterilization of the canal.(4)

Triple antibiotic paste (TAP), comprising ciprofloxacin, metronidazole, and minocycline, is used in regenerative endodontics and root canal disinfection. While it has shown success, TAP has drawbacks, including tooth discoloration and changes in radicular dentine properties, likely due to minocycline.(5)

Some studies have removed minocycline from the combination without any replacements for the drug; however, the double antibiotic paste comprising ciprofloxacin and metronidazole lack the antibacterial activity related to minocycline.(6)

A recent study introduced a novel triple antibiotic combination (Penicillin G, Metronidazole, and Ciprofloxacin; PMC). This combination demonstrated broad antibacterial activity, with Penicillin G effectively targeting Enterococcus faecalis, a key microorganism in endodontic failure, and showing acceptable efficacy against other intracanal microbiota.(7)

The aim of the current case study is to report the non surgical healing of large endodontic lesions using a novel combination of triple antibiotics, Penicillin G (PG), Metronidazole, and Ciprofloxacin (PMC), for the disinfection of the root canal system.

MATERIALS AND METHODS

CASE REPORT 1

A 26-year-old female patient came to the department of conservative dentistry and endodontics with a chief complaint of pain in the left lower back tooth region. Her medical history was non-contributory.

The patient had a previous root canal treatment about 2 years ago.

Extraoral examination revealed diffuse swelling in the lower left posterior tooth region, extending from the base to the angle of the mandible, and tender on palpation. The patient also reported night pain and difficulty chewing. (Fig.1a)

Fig 1a - Extra Oral Examination

Intraoral examination of tooth #36 showed a dislodged permanent access restoration, with gutta-percha visible in the canal orifices. The tooth was tender on percussion, but no pathological mobility, periodontal pockets, or active pus drainage were noted. (Fig.1b)

Fig.1b - Intra Oral Examination Of Tooth #36

Radiographic evaluation revealed a large periradicular radiolucency and severe bone destruction. Closer examination of the

previous endodontic treatment showed underfilling in all three canals. (Fig.1c)

Fig.1c - Diagnostic Radiograph Of Tooth #36

A diagnosis of previously endodontic treated tooth with symptomatic periapical abscess was given, therefore, the proposed treatment options were thoroughly explained to the patient, comprising:

(i) simple extraction of tooth #36 with/without replacement using dental implants or fixed/removable dental prosthesis,
(ii) nonsurgical endodontic retreatment (NSER) of tooth #36, and
(iii)surgical interventions, that is, apicoectomy or intentional replantation

The patient preferred a conservative approach to retain the tooth, so NSER of tooth #36 was chosen. Informed consent was then obtained.

An emergency removal of gutta-percha was performed with xylene, and the distal canal was over-instrumented with a #25 K-file for patency. The mesiobuccal and mesiolingual canals could not be fully negotiated to working length. The patient received an open dressing and was recalled the next day.

At the next appointment, the patient reported reduced swelling. Upon re-accessing the canals, resistance was felt in the mesiolingual canal, leading to a referral for CBCT imaging.

CBCT revealed two well-defined radiolucencies in the mesial and distal roots of #36: 6.2 x 5.6 mm mesially and 2.8 x 2.0 mm distally, with buccal cortical bone loss. Radioopaque material in the mesiolingual canal indicated file breakage. (Fig.1d)

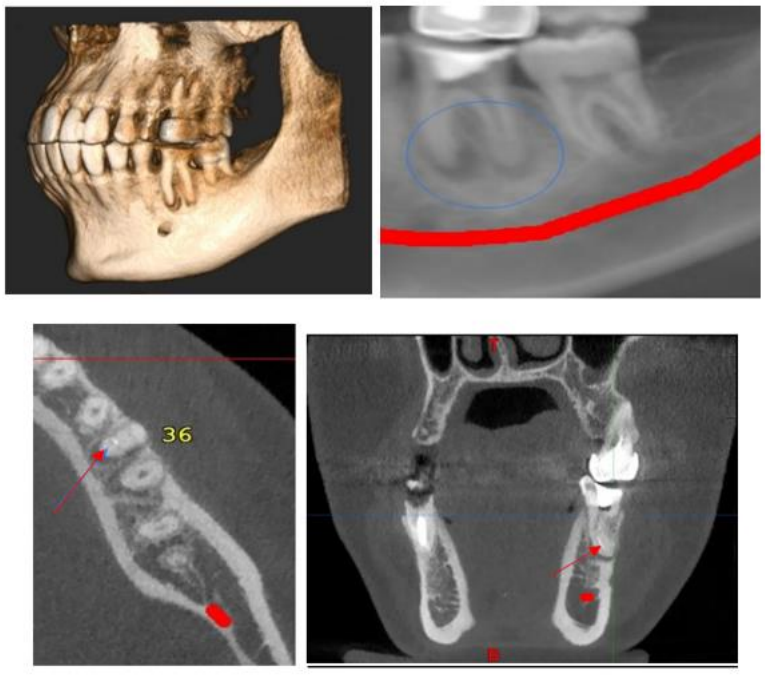

Fig.1d - CBCT Of Tooth #36

The broken instrument was bypassed with a #8 K-file, and the working lengths were estimated as: MESIOBUCCAL – 17.5 mm, MESIOLINGUAL – 17.5 mm, DISTAL – 16 mm. The canals were then prepared with 2% chlorhexidine (CHX). (Fig.1e (a & b) and 1f)

a b

Fig 1e - Bypassing of the Broken Instrument

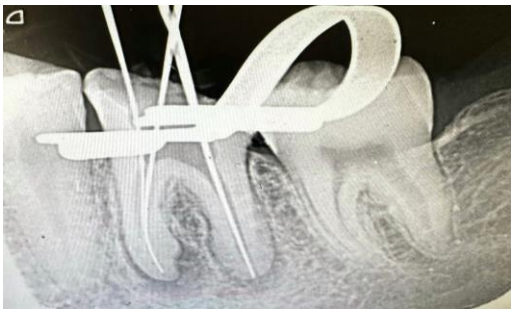

Fig 1f - Working Length Estimation Of Tooth #36

After irrigation with normal saline, a mixture of penicillin G, metronidazole, and ciprofloxacin (1:1:1 in propylene glycol) was placed into the root canal system, and the coronal cavity was temporarily sealed At the 2-week follow-up, the patient reported no pain, and radiographs showed partial resolution of the large periradicular radiolucency. The root canal system was cleaned with saline, and PMC paste was replenished every 2 weeks, showing progressive healing of the lesion. (Fig 1g)

2 weeks **4 weeks** **6 weeks**

Fig 1g - Follow up radiograph 2 weeks apart of tooth #36

The RCS was cleaned with saline, obturated with gutta-percha and sealer using a single cone technique, and the coronal cavity was temporized. The patient was then scheduled for regular follow-ups (Fig 1h)

Fig 1h - Obturation of tooth #36

Tooth #36 was subsequently restored with a glass fiber post followed by an all-ceramic crown.

At the 6-month recall, the patient reported no discomfort, and the tooth was fully functional and symptom-free. Radiographs showed complete healing of the endodontic lesion, normal bone architecture, and re-establishment of the periodontal ligament. (Fig 1i)

Fig 1i - Post Cementaion Of Tooth #36

CASE REPORT 2

A 30-year-old male patient presented to the department of conservative dentistry and endodontics with a chief complaint of discoloration in the lower front tooth region accompanied by pus discharge from the tooth.

Patients past medical and dental history were non-contributory. The patient reported a fall one year ago and complained of broken lower front teeth

On clinical examination, tooth #41 revealed Ellis class 3 fracture with pus drainage from the canal and painful response to the percussion test. (Fig 2a)

Fig 2a - Intaroral Examination Of Tooth #41

In the diagnostic radiographic evaluation, a large periapical radiolucency was observed. (Fig 2b)

Fig 2b - Radiographic examination of tooth #41,

The tooth was diagnosed with symptomatic periapical abscess with pulpal necrosis**.** and thus, possible treatment options were methodically explained to the patient, consisting of

(i) simple extraction of tooth #41 with/without replacement using dental implants or fixed/removable dental prosthesis,

(ii) NSER of tooth #41.

The patient chose the most conservative approach to preserve dental structure and agreed to NSER of tooth #41. Informed consent was then obtained.

The root canal of tooth #41 was accessed and the patency was obtained with a #20 k file beyond apex to allow the drainage of the pus through the canal and an open dressing was given.

The patient was recalled the following day, and rubber dam isolation was performed, followed by working length estimation. (Fig 2c)

Fig 2c) Diagnostic radiograph of tooth #36

The same protocols were followed as in the previous case, including thorough biomechanical preparation with 2% chlorhexidine. After the patient tested negative for penicillin allergy, PMC paste was applied to the canals, and the cavity was temporized.

The two-week follow-up radiograph showed resolution of the periapical lesion. The canals were irrigated and filled with PMC paste, and the patient was scheduled for another follow-up in two weeks. (Fig 2d)

Fig 2d - 2 Weeks Follow Up Radiograph Of Tooth #41

At the 4-week follow-up visit, the patient remained asymptomatic, allowing for obturation of the root canals with gutta-percha and sealer using a lateral condensation technique. (Fig 2e)

Fig 2e - 4 week follow up radiograph of tooth #41

The coronal cavity was restored with a resin-based composite, and the patient was scheduled for regular follow-ups (Fig 2f). Tooth #41 was later restored with an all-ceramic crown (Fig 2g).

Fig 2f **Fig 2g**

Fig 2f - Obturation of tooth #41 followed by coronal seal,
Fig 2g – All Ceramic Crown ert tooth #41

DISCUSSION

In the presented case reports, a newer combination of triple antibiotics, that is, Penicillin G, Metronidazole & Ciprofloxacin (PMC), was employed as an intracanal medicament to combat root canal microbiota, encourage bone healing, re-establish the Periodontal Ligament, and help arrest External Inflammatory Root Resorption.

The novel PMC replaces Minocycline with Penicillin G in Triple Antibiotic Paste containing Minocycline(1,2), due to drawbacks like tooth discoloration, bacterial resistance, dentine changes, and its inefficacy against Enterococcus faecalis, a

cause of endodontic failure.(4,5) TAP also doesn't combat Candida albicans biofilm and may harm stem cells.(8)

Penicillin G is effective against *E. faecalis* and other gram-positive intracanal microorganisms, acting as a bactericidal agent. Its white appearance suggests that combining it with other white medications like ciprofloxacin and metronidazole might prevent tooth discoloration. However, thorough in vitro and in vivo studies are necessary to confirm this. Additionally, the absence of minocycline in newly formulated triple antibiotics may not alter dentin mechanical properties as traditional antibiotic paste (TAP) does. Therefore, any claimed superiority of the new formulation should be rigorously tested.(1)

Endodontic lesions such as symptomatic apical periodontitis, apical abscess, or cysts result from microorganisms like *E. faecalis*, *Porphyromonas endodontalis*, and *Streptococcus* species, along with their by-products, infiltrating periapical or radicular tissues after exiting the root canal system (RCS).(9)

Enterococcus faecalis, an anaerobic gram-positive coccus, typically originates in the human oral cavity due to its adeptness in environments with abundant nutrients and low oxygen levels. Studies consistently show its prevalence in cases of failed endodontic treatment, often exceeding 90% in instances of post-endodontic therapy pain and infection. Interestingly, E. faecalis is more commonly associated with asymptomatic cases in primary endodontic infections compared to symptomatic ones.(10)

Enterococcus faecalis and Candida albicans are often found in root canals needing retreatment, especially in cases of failed endodontic therapy and persistent infections. E. faecalis, a gram-positive coccus and facultative anaerobe, typically inhabits the intestines but can also be found in the oral cavity. While it is easily eliminated in small numbers, E. faecalis becomes challenging to eradicate in larger quantities due to its unique survival features.(11)

Triple antibiotic paste typically resolves lesions within 1–2 years, with a 3-month treatment duration and dressing changes every 3 weeks. It is more effective than calcium hydroxide for treating polymicrobial infections and is a viable alternative when calcium hydroxide therapy fails.

A study by Kumar et al. observed periapical lesion healing using intracanal medication over a minimum of 12 months, with complete healing occurring within 1–2 years and the increase in bone density within 18 months of treatment with triple antibiotic paste.(12) In another study, Brogni et al. conducted a 15–24 month follow-up to assess periradicular pathosis healing using TAP, calcium hydroxide, and chlorhexidine as intracanal medications.(13) Asgary et al. studied non-obturated root canals and PDL re-establishment over 12 months, while Shah et al. reported on delayed root canal obturation over a 6-year period.(14) Longer follow-up periods tend to yield more reliable results.

In this case report, post-operative radiographs in follow-up sessions revealed complete resolution of large endodontic lesions in teeth treated with PMC with 1.5 month and 1 month treatment duration in the 1st case and 2nd case respectively with dressing changed every 2 weeks.

The observed healing in the surrounding bone suggests that PMC effectively eliminated a wide range of microorganisms from the root canal system (RCS) and satisfactorily countered harmful microbiota by-products/toxins.

Thereby proving that the PMC antibiotic paste is effective in treating large endodontic lesions in a shorter duration of time compared to TAP containing minocycline.

after treatment, the teeth were symptom-free and showed thorough healing of large endodontic lesions on X-rays. Root canal filling was delayed until initial healing and symptom resolution, consistent with Shah et

al.'s findings on healing without immediate obturation.(14)

In the first case, external inflammatory root resorption (EIRR), characterized by the loss of dentin and cementum due to osteoclastic activity, was identified and managed. EIRR is a troubling complication involving the progressive loss of dental hard tissue.(15)

Various studies claim that bacterial infection, as one of the major predisposing factors, could be the main cause of EIRR and can initiate the undesirable phenomenon. Therefore, if the microbial activity is limited, halted, and managed, EIRR can be arrested, a desirable outcome evident in the first and third cases. It appears that the novel PMC can impact active microorganisms and, by eliminating the involved bacteria, may contribute to the healing and management of External Inflammatory Root Resorption.

CONCLUSION

The case series highlights the effectiveness of the novel triple antibiotic combination (Penicillin G, Metronidazole, and Ciprofloxacin; PMC) in disinfecting the root canal system and complementing canal cleaning and shaping.

PMC effectively manages large periapical lesions and shows promise for treating symptoms like External Inflammatory Root Resorption (EIRR).

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Asgary S, Parhizkar A. Healing of large endodontic lesions using a new combination of triple antibiotics: A case report. Clin Case Rep. 2023 Jan;11(1): e6879.
2. Asgary S, Parhizkar A. Healing of Large Endodontic Lesions Using Long-Term Application of a New Combination of Triple Antibiotics: A Series of Cases. Gavião MBD, editor. Case Rep Dent. 2023 Apr 5; 2023:1–7.
3. Parhizkar A, Asgary S. Local Drug Delivery Systems for Vital Pulp Therapy: A New Hope. Galli C, editor. Int J Biomater. 2021 Sep 15; 2021:1–9.
4. Vijayaraghavan R, Mathian V, Sundaram A, Karunakaran R, Vinodh S. Triple antibiotic paste in root canal therapy. J Pharm Bioallied Sci. 2012;4(6):230.
5. Parhizkar A, Nojehdehian H, Asgary S. Triple antibiotic paste: momentous roles and applications in endodontics: a review. Restor Dent Endod. 2018;43(3): e28.
6. Madhukumar M, Geetha P, Nair KR, Unnikrishnan M. The Effects of Double Antibiotic Paste and Amoxicillin-Clavulanate Paste Used in Endodontic Regeneration on Microhardness of Radicular Dentine: An In vitro Study. J Pharm Bioallied Sci. 2021 Jun;13(Suppl 1): S510–5.
7. Parhizkar A, Nojehdehian H, Tabatabaei F, Asgary S. An Innovative Drug Delivery System Loaded with a Modified Combination of Triple Antibiotics for Use in Endodontic Applications. Int J Dent. 2020 Aug 25; 2020:1–11.
8. Wong J, Manoil D, Näsman P, Belibasakis GN, Neelakantan P. Microbiological Aspects of Root Canal Infections and Disinfection Strategies: An Update Review on the Current Knowledge and Challenges. Front Oral Health. 2021 Jun 25; 2:672887.
9. Rôças IN, Siqueira JF. Frequency and levels of candidate endodontic pathogens in acute apical abscesses as compared to asymptomatic apical periodontitis. Divaris K, editor. PLOS ONE. 2018 Jan 2;13(1): e0190469.
10. Alghamdi F, Shakir M. The influence of Enterococcus faecalis as a dental root canal pathogen on endodontic treatment: A systematic review. Cureus. 2020 Mar 13;12(3).
11. Narayanan LL, Vaishnavi C. Endodontic microbiology. Journal of Conservative Dentistry and Endodontics. 2010 Oct 1;13(4):233-9.
12. Kumar Nk, Brigit B, Annapoorna B, Naik S, Merwade S, Rashmi K. Effect of triple antibiotic paste and calcium hydroxide on the rate of healing of periapical lesions: A systematic review. J Conserv Dent. 2021;24(4):307.
13. Brogni JK, Vitali FC, Cardoso IV, Dos Santos JD, Prado M, Alves AM, Duque TM.

A second attempt at pulp revascularisation on an immature traumatised anterior tooth: a case report with two-year follow-up. Australian Endodontic Journal. 2021 Apr;47(1):90-6.

14. Asgary S, Fazlyab M. A successful endodontic outcome with non-obturated canals. Iranian Endodontic Journal. 2015;10(3):208.
15. Abbott P. Prevention and management of external inflammatory resorption following trauma to teeth. Aust Dent J. 2016 Mar;61(S1):82–94.

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