SEHATRAKYAT (Jurnal Kesehatan Masyarakat)
https://journal.yp3a.org/index.php/sehatrakyat
DOI: 10.54259/sehatrakyat.v5i1.6640
e-ISSN 0852-1239 | p-ISSN 2829-9299
Vol. 5 No. 1 (Februari 2026) 433-442

Diterima Redaksi: 27-12-2025 | Selesai Revisi: 24-01-2026 | Diterbitkan Online: 15-02-2026

Effectiveness of Single-Visit Root Canal Treatment and Adhesive Restoration in Improving Accessibility of Tooth Preservation Services: A Case Report

Teuku Agus Surya[1*], Widi Prasetia[2]
[1]Resident of Department of Conservative Dentistry, Faculty of Dentistry, Universitas Sumatera Utara, 20155, Medan, Indonesia
[2] Lecture of Department of Conservative Dentistry, Faculty of Dentistry, Universitas Sumatera Utara, 20155, Medan, Indonesia
Email: [1*]agsur137@gmail.com, [2]widi.prasetya@usu.ac.id

Abstract

Background: The management of teeth with pulp necrosis and symptomatic apical periodontitis requires effective root canal disinfection and durable restoration. Single-visit root canal therapy with bioceramic sealers and adhesive restorative techniques provides a comprehensive approach to promote periapical healing and tooth preservation. Aim: This case report describes the endodontic treatment and restorative management of a maxillary second premolar with a periapical lesion using single-visit endodontic and DME technique for direct composite restoration. Case Report: A patient presented with pain during chewing on the maxillary left second premolar, previously restored one year earlier. The tooth was initially sensitive but developed pain on mastication after six months. Clinical findings included negative thermal response, positive percussion, negative palpation, and no mobility. Radiographs showed a periapical lesion. The diagnosis was pulp necrosis with symptomatic apical periodontitis. Case Management: Endodontic treatment was performed in a single visit. Root canal preparation was followed by obturation using a single-cone technique with bioceramic sealer. Restorative management involved the DME technique to elevate the cervical margin, followed by direct composite for functional restoration. Discussion: Single-visit root canal therapy provides outcomes comparable to multi-visit protocols. Bioceramic sealer enhances periapical healing due to its bioactivity and sealing properties. The DME technique facilitates restorative access and margin control in deep areas, while direct composite ensures conservative reinforcement and esthetics. Conclusion: This integrated single-visit approach combining bioceramic obturation, DME, and direct composite restoration achieved successful management of a maxillary second premolar with pulp necrosis and.

Keyword: *Endodontic Treatment, Maxillary Second Premolar, Single-Visit.*

INTRODUCTION

Various studies indicate that pulp necrosis and periapical lesions constitute a significant endodontic disease burden. Globally, radiographic meta-analyses show that about 52% of adults have at least one tooth with a periapical lesion, while

Penulis Korespondensi:
Teuku Agus Surya | agsur137@gmail.com

approximately 5% of all teeth exhibit apical periodontitis related to untreated pulpal infection. Clinically, pulp necrosis accounts for nearly one-third of endodontic diagnoses and is commonly associated with chronic periapical lesions (Naved, Umer, & Khowaja, 2024). In Indonesia, although national epidemiological data remain limited, radiographic studies in dental teaching hospitals reveal that most teeth with pulp necrosis are accompanied by periapical lesions, underscoring the substantial impact of these conditions on oral health and dental care needs . Tooth loss due to extraction carries greater economic costs because it often requires further treatment such as dentures, bridges, or implants. Conversely, tooth preservation through endodontic treatment is more cost-effective because it preserves natural teeth, prevents the need for complex rehabilitation, and preserves the patient's function and quality of life (Zang, Zhang, Hao, Yang, & Liang, 2023).

The successful management of teeth diagnosed with pulp necrosis and symptomatic apical periodontitis relies on the complete disinfection of the root canal system and the establishment of a durable coronal seal to prevent reinfection and promote periapical tissue repair (Anjali Sharma, Sharma, Sharma, & Jain, 2023). Conventionally, endodontic treatment for necrotic teeth with periapical pathology was performed over multiple visits with the use of intracanal medicaments such as calcium hydroxide to enhance microbial control. However, recent studies and systematic reviews have shown that single-visit endodontic therapy can achieve comparable outcomes in terms of periapical healing and clinical success (Jesslyn, Iskandar, & Suwartini, 2024).

Single-visit endodontics is defined as the conservative, non-surgical root canal therapy involving complete chemomechanical preparation, disinfection, and obturation of the root canal system in one appointment (Jesslyn et al., 2024). The evolution of nickel–titanium rotary instrumentation, bioceramic sealers, electronic apex locators, and enhanced magnification systems has significantly improved the efficiency, precision, and predictability of this approach (AbdurRahman, Aziz, Gawdat, & AbdalSamad, 2019). The use of bioceramic sealers offers additional biological advantages, including excellent sealing ability, biocompatibility, and bioactivity that stimulates periapical healing through the formation of hydroxyapatite at the material–tissue interface (AbdurRahman et al., 2019; Arvind Sharma, 2024).

Several clinical studies have demonstrated that single-visit endodontic therapy provides similar postoperative pain levels, flare-up incidence, and healing rates compared with multi-visit protocols, while offering greater patient comfort and reduced treatment time (Rumate, Wicaksono, & Yuliana, 2023). Additionally, immediate definitive restoration in a single visit can minimize coronal leakage and improve long-term prognosis (Theodoridis & Economides, 2023).

In restorative management, the deep margin elevation (DME) technique has emerged as an effective method for elevating subgingival margins to a supragingival position, facilitating better access, isolation, and bonding of direct composite restorations. The integration of DME with adhesive restorative materials enables both functional and esthetic rehabilitation following endodontic therapy (El-Ma’aita, Radwan, & Al-Rabab’ah, 2024; Sadowsky, 2020).

Therefore, this case report presents the endodontic and restorative management of a maxillary left second premolar with pulp necrosis and periapical lesion, treated using single-visit endodontic therapy combined with DME and direct composite restoration, demonstrating a comprehensive and conservative approach that supports both periapical healing and tooth preservation (Abdelmawgoud, Fawzy, Elhousiny, & Abdel-Aziz, 2022; Bhalla, Chockattu, Srivastava, & Prasad, 2020; Yildiz et al., 2024).

The single-visit endodontic method represents a strategic solution for public health care systems because it is more efficient, cost-effective, and access-oriented. Providing treatment in a single appointment reduces both direct and indirect costs for health facilities and patients, including operational expenses, transportation costs, and loss of working time. In addition, single-visit treatment improves patient compliance and reduces treatment dropout rates commonly associated with multi-visit protocols, particularly in primary care settings and populations with limited access to dental services. From a system perspective, this approach enables greater service coverage and more optimal use of dental health resources without compromising clinical outcomes, thereby supporting tooth preservation and reducing the need for extractions and more costly rehabilitative treatments.

CASE REPORT

The choice of single-visit endodontic treatment is also influenced by patient convenience and time constraints, such as work commitments, distance to healthcare facilities, and limited frequency of visits. These conditions reflect the still-common barriers to accessibility of dental healthcare services, making the single-visit approach a more practical option and can improve patient acceptance and compliance with treatment.

A 34-year-old male patient presented to the USU Dental and Oral Hospital (RSGM USU) complaining of pain in his upper left premolar when chewing. The tooth had been filled approximately one year ago. Initially, the tooth felt sensitive for several days six months after the filling, then became painful when eating or pressing. The patient had no history of systemic diseases or allergies. An intraoral examination revealed a composite resin filling in tooth 25. EPT was negative; percussion was positive and palpation was negative; there was no tooth mobility, and the surrounding tissue was within normal limits. Radiological examination revealed a radiolucency extending from beneath the filling into the pulp, no widening of the periodontal membrane, a normal lamina dura, and the presence of a periapical lesion (figure1).

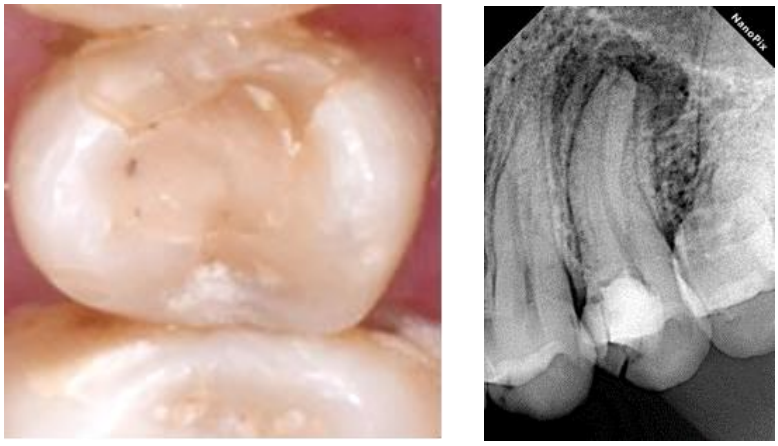

Figure 1. Initial clinical assessment

The diagnosis for tooth 25 was pulp necrosis with symptomatic apical periodontitis (AAE, 2013). The treatment plan was a single-visit root canal treatment followed by a direct composite resin restoration. The prognosis for this case is good, considering the patient's young age and willingness to care for her teeth, her cooperative nature, the absence of systemic disorders, and the adequate and intact remaining tooth structure.

The patient received a comprehensive explanation regarding the treatment procedures and the purpose of publication and provided written informed consent for the use of medical data and clinical documentation for scientific and publication purposes, with the patient's identity kept confidential.

CASE MANAGEMENT

After obtaining informed consent, the endodontic procedure was performed under local anesthesia using 2% lidocaine with 1:100,000 epinephrine to ensure profound anesthesia and patient comfort throughout the procedure. The tooth was isolated using a rubber dam to prevent salivary contamination during instrumentation and restoration.

Endodontic access was established using an endo-access bur to achieve straight-line access to the canal orifices. The coronal and middle third of the canal were explored with a #10 K-file to establish patency. The working length was determined using an electronic apex locator and confirmed radiographically (figure 2).

Figure 2. working length was determined using an electronic apex locator and confirmed radiographically

Before cleaning and shaping canals, deep margin elevation (DME) was performed on the mesial aspect using flowable resin composite to elevate the cervical margin to a supragingival position (figure 3). This step improved isolation, enhanced accessibility, and provided an adequate bonding substrate for the subsequent definitive restoration.

Figure 3. Deep Marginal Elevation

Root canal instrumentation was performed using E-Flex Blue rotary files in a crown-down motion to achieve optimal cleaning and shaping. During instrumentation, 5% sodium hypochlorite (NaOCl) was used as the primary irritant due to its potent antimicrobial and organic tissue dissolution properties, followed by normal saline for neutralization and 17% ethylenediaminetetraacetic acid (EDTA) to remove the smear layer and open dentinal tubules.

To enhance the penetration and effectiveness of irrigants, the Ultra X sonic endoactivator was used for activation, producing cavitation that facilitate debris removal and deep disinfection of the root canal system. After complete debridement, a MAC trial cone was fitted and confirmed radiographically to ensure an accurate apical seal (figure 4).

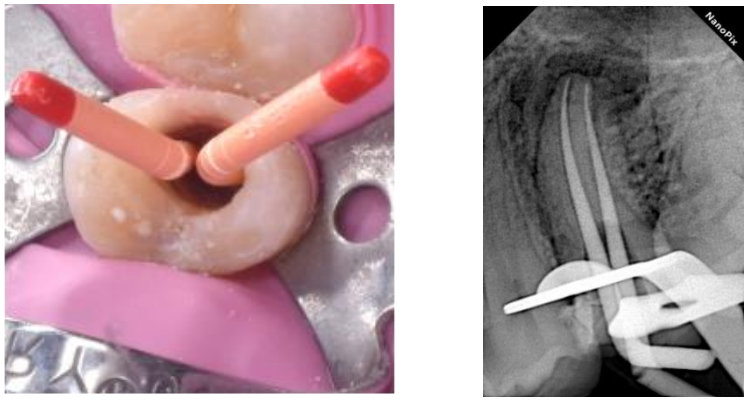

Figure 4. Master Apical Cone

Following canal drying with sterile paper points, the root canal was obturated using the single-cone technique with a bioceramic sealer, which provides superior sealing ability, dimensional stability, and bioactivity to stimulate periapical healing. Post-obturation radiography confirmed the quality and homogeneity of the filling. The gutta-percha was sectioned 2 mm below the canal orifice, and an orifice barrier of flowable resin was placed to reinforce the coronal seal and prevent microleakage prior to the final restoration.

The access cavity was immediately restored with a direct resin composite restoration following an etch-and-rinse adhesive protocol. Incremental layering and light-curing were performed to minimize polymerization shrinkage stress and ensure optimal marginal integrity (figure 5). Finishing and polishing were completed to achieve proper contour, occlusal function, and esthetics.

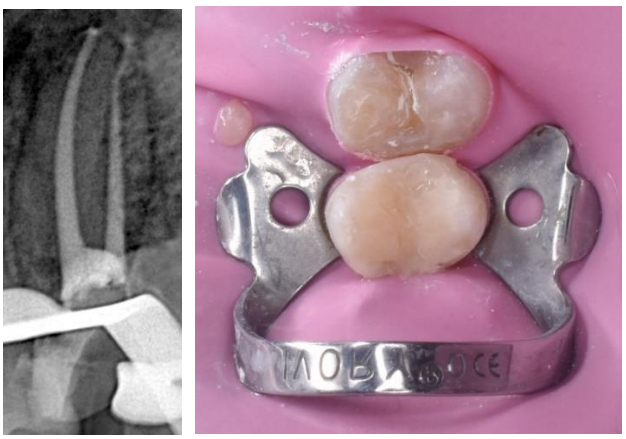

Figure 5. Obturation and final restoration

A postoperative radiograph showed dense obturation with a well-adapted apical seal and no evidence of voids. The patient reported no discomfort during follow-up, indicating a successful single-visit endodontic treatment combined with deep margin elevation (DME) and direct composite restoration — an approach that promotes efficient workflow, coronal integrity, and favorable periapical healing outcomes.

At the one-month follow-up, the patient reported no postoperative pain or discomfort. Clinical examination revealed normal soft tissue without swelling, sinus tract, or tenderness on percussion and palpation. The periapical radiograph demonstrated a reduction in the size of the periapical radiolucency, suggesting ongoing bone regeneration and periapical tissue repair (Figure 6). The restoration maintained marginal integrity, and there were no signs of marginal leakage or restoration failure. The overall outcome was considered clinically and radiographically successful. The patient was advised to maintain oral hygiene and avoid excessive occlusal loading on the restored tooth.

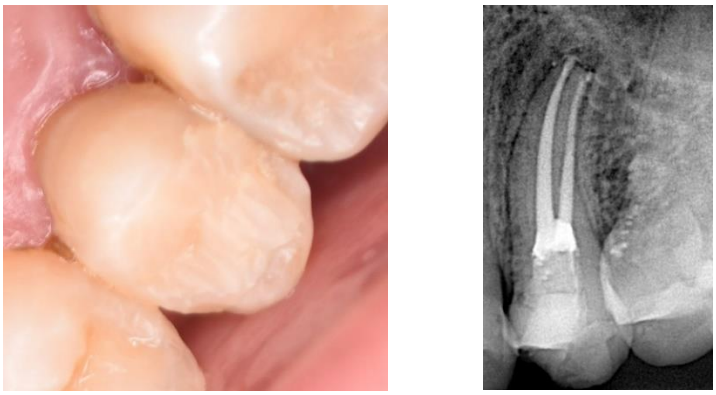

Figure 6. One-month follow-up radiograph and clinical

DISCUSSION

The management of pulp necrosis with symptomatic apical periodontitis aims to eliminate intraradicular infection, prevent reinfection, and facilitate periapical tissue healing (Stefani, 2023). In the present case, these goals were achieved through a single-visit endodontic therapy combined with bioceramic sealer obturation and a direct adhesive restoration using the deep margin elevation (DME) technique. This integrated approach allows for effective infection control, an immediate coronal seal, and functional rehabilitation in one appointment (Etman, 2023; Mergoni et al., 2022).

Recent evidence supports that single visit endodontic provides healing outcomes comparable to multi-visit treatment, with no significant differences in postoperative pain, flare-ups, or radiographic healing rate (Chaudhari, Chandak, Jaiswal, & Mishra, 2023). Sharma et al. reported successful periapical healing in cases of necrotic pulp with periapical lesions treated in a single sitting using bioceramic sealers, emphasizing the importance of aseptic technique and thorough chemomechanical preparation (Moreta Criollo, 2024).

The use of E-Flex Blue rotary nickel–titanium instruments enabled efficient canal shaping with reduced risk of file separation and canal transportation, supporting effective irrigation dynamics (Hussein & Kadhum, 2025). The irrigation protocol—using 2.5–5sodium hypochlorite, saline, and 17% EDTA—is consistent with contemporary endodontic practice, ensuring optimal disinfection and smear layer removal. The activation of irrigants using the Ultra X sonic endoactivator enhances their penetration and bactericidal effect within the canal system through cavitation (Garcia & Sohn, 2012; Sholekhah, 2025).

Obturation was performed with a bioceramic sealer and single-cone technique, providing an effective three-dimensional seal (Drouri, Laslami, Dhaim, & Jabri, 2024). Bioceramic sealers such as calcium silicate–based materials are bioactive, dimensionally stable, and biocompatible, capable of inducing hydroxyapatite formation and promoting periapical healing. The bioceramic sealer's alkaline pH also contributes to its antimicrobial action, creating an environment unfavorable for bacterial survival (Malik et al., 2024; Mergoni et al., 2022).

The deep margin elevation (DME) technique was performed prior to canal instrumentation to elevate the cervical margin to a supragingival level, improving isolation and facilitating the final adhesive restoration (Atlas, Grandini, & Martignoni, 2019). This method has been widely supported for its ability to preserve sound tooth structure and optimize adhesive bonding in posterior teeth with deep subgingival margins. Immediate coronal sealing after obturation is essential to prevent reinfection and microleakage, which are major causes of endodontic failure (Alhamdan et al., 2024; Reis et al., 2024).

From a clinical standpoint, this case highlights the advantages of a single-visit, minimally invasive, and adhesive-centered workflow (Anjali Sharma et al., 2023). The use of rotary instrumentation, bioceramic sealers, and DME allowed for a predictable outcome with minimal postoperative discomfort (Zamparini et al., 2024). Follow-up revealed a satisfactory functional and esthetic result, consistent with published reports showing high success rates for single-visit endodontic therapy when strict aseptic protocols and immediate restoration are employed (El-Ma'aita et al., 2024; Rao et al., 2025).

The Deep Margin Elevation (DME) technique is a conservative restorative approach that enables the elevation of subgingival restoration margins to a supragingival position using adhesive materials, thereby improving access, isolation, and bonding quality without the need for additional periodontal surgical procedures, such as crown lengthening. Compared with surgical interventions, DME is minimally invasive, reduces soft tissue morbidity, treatment time, and patient discomfort. From an economic perspective, DME is more cost-effective, as it eliminates surgical costs, postoperative care, and potential periodontal complications, while preserving tooth structure and periodontal tissue stability. Consequently, DME represents an effective and economically favorable alternative for post-endodontic rehabilitation, offering comparable functional and esthetic outcomes (Aldakheel et al., 2022)

The single-visit endodontic treatment technique can be implemented in community health centers and general hospitals to shorten patient queues without compromising treatment success through proper case selection, standardized clinical protocols, and the use of supporting technologies such as rotary instruments and apex locators, which increase efficiency and predictability of results. This approach reduces the number of visits, improves patient compliance, and optimizes the use of dental healthcare resources. Studies have shown that clinical success rates and periapical healing remain comparable to multi-visit treatments (AbdurRahman et al., 2019; Jesslyn et al., 2024).

CONCLUSION AND RECOMMENDATION

This case indicates that single-visit endodontic therapy using rotary instrumentation and a bioceramic sealer, combined with deep margin elevation and direct composite restoration, is an effective and conservative approach for treating teeth with pulp necrosis and symptomatic apical periodontitis. This technique provides adequate canal disinfection, promotes periapical healing, and ensures immediate coronal

sealing in a single visit, improving clinical efficiency and patient comfort. It is recommended that this approach be applied with careful case selection, strict aseptic procedures, and precise restorative planning to achieve predictable outcomes and long-term tooth preservation.

REFERENCES

Abdelmawgoud, A., Fawzy, M. I., Elhousiny, M. A., & Abdel-Aziz, M. M. (2022). Evaluation of Single Visit Endodontic Treatment Outcome in Teeth with Asymptomatic Necrotic Pulp and Apical Periodontitis Using EndoVac Irrigation Device: Randomized Controlled Clinical Trial. *Al-Azhar Dental Journal for Girls*, *9*(3), 431-439.

AbdurRahman, S., Aziz, S. M. A., Gawdat, S. I., & AbdalSamad, A. M. (2019). Postoperative pain of patients with necrotic teeth with apical periodontitis following single visit endodontic treatment versus multiple visit endodontic treatment using triple antibiotic paste: a randomized clinical trial. *F1000Research*, *8*, 1203.

Aldakheel, M., Aldosary, K., Alnafissah, S., Alaamer, R., Alqahtani, A., & Almuhtab, N. (2022). Deep Margin Elevation: Current Concepts and Clinical Considerations: A Review. *Medicina (Kaunas), 58*(10). doi:10.3390/medicina58101482

Alhamdan, M. M., Aljamaan, R. F., Abuthnain, M. M., Alsumikhi, S. A., Alqahtani, G. S., Alkhraiyef, R. A., . . . Alqahtani Jr, G. S. (2024). Direct versus indirect treatment options of endodontically treated posterior teeth: a narrative review. *Cureus, 16*(8).

Atlas, A., Grandini, S., & Martignoni, M. (2019). Evidence-based treatment planning for the restoration of endodontically treated single teeth: importance of coronal seal, post vs no post, and indirect vs direct restoration. *Quintessence Int, 50*(10), 772-781.

Bhalla, V. K., Chockattu, S. J., Srivastava, S., & Prasad, S. (2020). Decision making and restorative planning for adhesively restoring endodontically treated teeth: an update. *Saudi Endodontic Journal, 10*(3), 181-186.

Chaudhari, P. S., Chandak, M. G., Jaiswal, A. A., & Mishra, A. D. (2023). Revelation of outcome of single visit V/s multiple visit endodontic therapy. *Journal of Datta Meghe Institute of Medical Sciences University, 18*(4), 915-925.

Drouri, S., Laslami, K., Dhaim, S., & Jabri, M. (2024). Influence of number of visits on the outcome of endodontic treatment. *Journal of Conservative Dentistry and Endodontics, 27*(12), 1211-1220.

El-Ma'aita, A. M., Radwan, H., & Al-Rabab'ah, M. A. (2024). Deep Margin Elevation–A Retrospective Clinical Study. *The Journal of Adhesive Dentistry, 26*, b5199089.

Etman, A. (2023). Success of pulpectomy in primary molars using a modified obturating materials (a comparative study between Metapex and Endoflas). *Egyptian Dental Journal, 69*(4), 2599-2607.

Garcia, R. I., & Sohn, W. (2012). The paradigm shift to prevention and its relationship to dental education. *Journal of dental education, 76*(1), 36-45.

Hussein, I. M., & Kadhum, O. M. A. (2025). The Impact of Autoclave Sterilization on Cyclic Fatigue of Nickel-Titanium Rotary Endodontic Instruments. *Dentistry 3000, 13*(1).

Jesslyn, G., Iskandar, B. O., & Suwartini, T. (2024). Perawatan endodontik sekali kunjungan molar pertama kiri mandibula dengan nekrosis pulpa disertai periodontitis apikalis asimptomatik: laporan kasus. *Jurnal Kedokteran Gigi Universitas Padjadjaran, 36*(4), 196-201.

Malik, S., Shah, S. A., Fatima, F., Alim, S., Ameer, S., & Ahmed, I. (2024). Postoperative Pain in Single-Visit Versus Multiple-Visit Endodontic Treatment of Permanent Teeth. *Journal of Health and Rehabilitation Research, 4*(1), 1-5.

Mergoni, G., Ganim, M., Lodi, G., Figini, L., Gagliani, M., & Manfredi, M. (2022). Single versus multiple visits for endodontic treatment of permanent teeth. *Cochrane Database of Systematic Reviews*(12).

Moreta Criollo, J. E. (2024). *Materiales para obturación en pulpectomías en dentición primaria. revisión sistemática.*

Naved, N., Umer, F., & Khowaja, A. R. (2024). Irreversible pulpitis in mature permanent teeth: a cost-effectiveness analysis of pulpotomy versus root canal treatment. *BMC Oral Health, 24*(1), 285.

Rao, V., Shah, A. G., Desai, E. C., Agrawal, H., Patel, K., Patel, P., . . . Bharti, R. (2025). Outcomes of Single-Visit Versus Multi-Visit Root Canal Therapy: A Meta-Analysis of Success Rates. *European Journal of Cardiovascular Medicine, 15*, 62-67.

Reis, A., Feitosa, V. P., Chibinski, A. C., Favoreto, M. W., Gutierrez, M. F., & Loguercio, A. D. (2024). Biomimetic Restorative Dentistry: an evidence-based discussion of common myths. *Journal of Applied Oral Science, 32*, e20240271.

Rumate, D. E., Wicaksono, D. A., & Yuliana, Y. (2023). Kepatuhan Pasien Menjalani Perawatan Saluran Akar Multi Kunjungan di Rumah Sakit Gigi dan Mulut Universitas Sam Ratulangi. *e-GiGi, 11*(2), 176-182.

Sadowsky, S. (2020). Evidence-Based Treatment Planning for the Restoration of Endodontically Treated Single Teeth: Importance of Coronal Seal, Post vs No Post, and Indirect vs Direct Restorations. *International Journal of Prosthodontics, 33*(1).

Sharma, A. (2024). Bioactive Root Canal Sealers: A Review of Material Science and Clinical Outcomes. *International Journal of Cell Science and Biotechnology, 13*(01), 10-14.

Sharma, A., Sharma, R., Sharma, M., & Jain, A. (2023). Periapical lesion: A single-sitting root canal treatment. *Cureus, 15*(4).

Sholekhah, N. K. (2025). Penatalaksanaan Kontrol Infeksi Pada Perawatan Saluran Akar Gigi Di Praktik Dokter Gigi (Systematic Review). *Jurnal Kesehatan Gigi dan Mulut (JKGM), 7*(1), 29-40.

Stefani, R. (2023). Perawatan saluran akar periodontitis apikalis kronis pada gigi insisivus lateral maksilaris kiri. *Jurnal Kedokteran Gigi Terpadu, 5*(2).

Theodoridis, A., & Economides, N. (2023). Single versus multiple visits endodontic therapy on healing rate of periapical lesions: A systematic review and meta-analysis. *Balkan Journal of Dental Medicine, 27*(3), 140-147.

Yildiz, B., Dumani, A., Isci, A. S., Sisli, S. N., Tumani Ustdal, B., & Yoldas, O. (2024). Outcome of single-visit root canal treatment with or without MTAD: a randomized controlled clinical trial. *International Endodontic Journal, 57*(1), 2-11.

Zamparini, F., Lenzi, J., Duncan, H. F., Spinelli, A., Gandolfi, M. G., & Prati, C. (2024). The efficacy of premixed bioceramic sealers versus standard sealers on root canal treatment outcome, extrusion rate and post-obturation pain: A systematic review and meta-analysis. *International Endodontic Journal, 57*(8), 1021-1042.

Zang, H.-L., Zhang, Y., Hao, X.-W., Yang, L., & Liang, Y.-H. (2023). Cost-effectiveness analysis: nonsurgical root canal treatment versus single-tooth implant. *BMC Oral Health, 23*(1), 489.