SRYAHWA PUBLICATIONS

Archives of Dentistry and Oral Health
ISSN: 2638-4809 | Volume 7, Issue 1, 2026
https://doi.org/10.22259/2638-4809.0701001

RESEARCH ARTICLE

Single-Visit Endodontic Retreatment: An Observational Study

Tanvirul Islam Wali[1], Md. Sharif Hossein[2], Smita Das[3], Rabeya Sultana[4], Md. Azharul Islam[5]

[1]Assistant Professor (Conservative Dentistry), Sher-E-Bangla Medical College, Barishal, Bangladesh.
[2]Assistant Professor (Conservative Dentistry & Endodontics), Sher-E-Bangla Medical College, Barishal, Bangladesh.
[3]Consultant (Conservative Dentistry & Endodontics), Farazy Dental and Research Center, Dhaka, Bangladesh.
[4]Assistant Professor (Conservative Dentistry & Endodontics), Update Dental College, Dhaka, Bangladesh.
[5]Assistant Professor (Dental Pharmacology), Rangpur Medical College Hospital, Rangpur, Bangladesh.

Received: 15 January 2026 Accepted: 06 February 2026 Published:13 February 2026

Corresponding Author: Tanvirul Islam Wali, Assistant Professor (Conservative Dentistry), Sher-E-Bangla Medical College, Barishal, Bangladesh.

Abstract

Background: Endodontic retreatment is indicated when previous root canal therapy fails due to persistent infection, inadequate obturation, coronal leakage, or procedural errors. Conventionally, retreatment is performed over multiple visits; however, advances in rotary instrumentation, magnification, irrigation protocols, and obturation techniques have renewed interest in completing retreatment in a single visit. Evidence regarding the clinical outcomes of single-visit endodontic retreatment remains limited and sometimes contradictory.

Aim: To evaluate the clinical and radiographic outcomes of single-visit endodontic retreatment and to assess factors associated with treatment success and failure.

Methods: An observational study was conducted on 120 teeth requiring nonsurgical endodontic retreatment. All cases were treated in a single visit using standardized protocols. Patients were followed clinically and radiographically for up to 18 months. Treatment outcome was classified as success, healing, or failure based on predefined criteria. Data were analyzed descriptively and inferentially.

Results: At 18 months, complete success was observed in 82.5% of cases, healing in 10.8%, and failure in 6.7%. Teeth without preoperative periapical lesions showed significantly higher success rates compared with those presenting lesions. No statistically significant association was found between outcome and tooth type or patient age.

Conclusion: Single-visit endodontic retreatment demonstrated a high success rate and may be considered aviable treatment option in appropriately selected cases.

Keywords: Endodontic Retreatment, Single-Visit, Root Canal Failure, Observational Study, Periapical Healing.

1. Introduction

Root canal treatment is a predictable and successful procedure with reported success rates ranging from 85% to 95% [1]. Despite this high success, failures still occur and may manifest as persistent pain, swelling, sinus tract formation, or radiographic evidence of periapical pathology [2]. The most common causes of endodontic failure include persistent or secondary intraradicular infection, inadequate cleaning and shaping, missed canals, coronal leakage, and procedural errors such as ledges or separated instruments [3,4]. Nonsurgical endodontic retreatment is often the first line of management for failed root canal therapy. The objective of retreatment is to regain access to the root canal system, remove previous filling materials,

Citation: Tanvirul Islam Wali, Md. Sharif Hossein, Smita Das, *et al*. Single-Visit Endodontic Retreatment: An Observational Study. Archives of Dentistry and Oral Health 2026;7(1): 01-06.

disinfect the canals, and obturate them adequately to allow periapical healing [5]. Traditionally, retreatment has been performed over multiple visits, often with the placement of intracanal medicaments such as calcium hydroxide between appointments to reduce microbial load [6]. However, the concept of single-visit endodontic treatment has gained acceptance in primary endodontic therapy due to advantages such as reduced treatment time, decreased inter-appointment contamination, improved patient compliance, and lower overall cost [7,8]. Similar advantages have been proposed for single-visit retreatment, but clinicians remain cautious due to concerns regarding adequate disinfection, postoperative pain, and long-term healing, especially in teeth with pre-existing periapical lesions [9]. Recent advancements in nickel–titanium rotary instruments, operating microscopes, bio ceramic sealers, ultrasonics, irrigation activation systems, and obturation techniques have significantly improved the efficiency and predictability of retreatment procedures [10–12]. These developments have made it feasible to thoroughly clean and disinfect root canals within a single appointment. Nonetheless, clinical evidence supporting single-visit retreatment is still evolving, and outcomes may vary depending on case selection and operator skill [13]. The present observational study was designed to evaluate the clinical and radiographic outcomes of single-visit endodontic retreatment in a cohort of 120 patients and to analyze factors influencing treatment success.

2. Materials and Methods

2.1 Study Design

This was a prospective observational study conducted in the Dept. of Conservative Dentistry, Sher-E-Bangla Medical College, Barishal, Bangladesh Sher -E -Bangla Medical College, Barishal, Bangladesh from January 2024 to June 2025. The study protocol was reviewed and approved by the institutional ethics committee. Written informed consent was obtained from all participants prior to enrollment.

2.2 Study Population

A total of 120 teeth from 120 patients requiring nonsurgical endodontic retreatment were included in the study. Patients were recruited over a defined period based on inclusion and exclusion criteria.

2.2.1 Inclusion Criteria

- Patients aged 18 years and above
- Teeth with previously completed root canal treatment requiring retreatment
- Teeth that were restorable after retreatment
- Patients willing to return for follow-up visits

2.2.2 Exclusion Criteria

- Teeth with vertical root fractures
- Teeth with severe periodontal disease (probing depth >6 mm)
- Non-restorable teeth
- Patients with uncontrolled systemic diseases
- Pregnant patients

2.3 Preoperative Assessment

All patients underwent detailed clinical and radiographic examination. Clinical parameters included pain, tenderness, swelling, and presence of sinus tract. Radiographic assessment was performed using standardized periapical radiographs to evaluate the quality of previous obturation, presence and size of periapical lesions, and root morphology.

2.4 Treatment Protocol

All retreatment procedures were completed in a single visit by experienced endodontists using a standardized protocol

1. *Anesthesia and Isolation:* Local anesthesia was administered as required, and teeth were isolated using a rubber dam.
2. *Access and Removal of Restorations:* Existing restorations were removed to assess coronal leakage and facilitate access.
3. *Removal of Previous Filling Material:* Gutta-percha was removed using rotary retreatment files and GP solvent when necessary.
4. *Canal Negotiation and Working Length Determination:* Working length was determined using tactile sensation an electronic apex locator and confirmed radiographically.
5. *Cleaning and Shaping:* Canals were prepared using nickel–titanium rotary instruments following a crown-down technique.
6. *Irrigation Protocol:* Irrigation was performed using 5.25% sodium hypochlorite, followed by 17% EDTA and 2% Chlorhexidine.
7. *Obturation:* Canals were obturated using warm vertical compaction with gutta-percha and bio ceramic sealer.
8. *Coronal Seal:* A permanent coronal restoration was placed immediately after obturation.

2.5 Outcome Assessment

Patients were recalled at 3, 6, 12 and 18 months. Outcome was assessed based on clinical signs and symptoms and radiographic findings.

- *Success:* Absence of symptoms and complete radiographic healing
- *Healing:* Absence of symptoms with reduction in periapical radiolucency
- *Failure:* Persistence or emergence of symptoms and/or increase in radiolucency

2.6 Statistical Analysis

Data were entered into a spreadsheet and analyzed using statistical software. Descriptive statistics were used to summarize data. Associations between treatment outcome and variables such as age, sex, tooth type, and presence of periapical lesion were analyzed using chi-square tests. A p-value <0.05 was considered statistically significant.

3. Results

Table 1. *Demographic Distribution of Study Population (n = 120)*

Variable	Category	Number (n)	Percentage (%)
Gender	Male	68	56.7
	Female	52	43.3
Age (years)	18–30	38	31.7
	31–40	46	38.3
	41–50	24	20.0
	>50	12	10.0

The study population consisted of 120 patients who underwent single-visit endodontic retreatment. Among them, 68 patients (56.7%) were male and 52 patients (43.3%) were female, showing a slight male predominance. The age of the patients ranged from 18 to over 50 years. The majority of patients belonged to the 31–40 years age group (38.3%), followed by the 18–30 years group (31.7%). Patients aged above 50 years constituted the smallest proportion of the sample (10%).

Table 2. *Distribution of Teeth According to Tooth Type*

Tooth Type	Number (n)	Percentage (%)
Anterior	48	40.0
Premolar	36	30.0
Molar	36	30.0

With respect to tooth distribution, anterior teeth accounted for the highest number of retreatment cases (40%), while premolars and molars each contributed 30% of the total sample. This distribution reflects the relatively higher retreatment demand in anterior teeth, likely due to esthetic concerns and earlier treatment history.

Table 3. *Preoperative Clinical and Radiographic Findings*

Finding	Present (n)	Percentage (%)
Preoperative pain/tenderness	72	60.0
Sinus tract	18	15.0
Periapical radiolucency	74	61.7
Inadequate obturation	92	76.7

Preoperative assessment revealed that pain or tenderness on percussion was present in 72 teeth (60%). Sinus tract formation was observed in 18 cases (15%), indicating chronic periapical infection. Radiographic examination showed periapical radiolucency in 74 teeth (61.7%). Inadequate obturation, including underfilling, overfilling, or voids, was identified as the most common reason for retreatment and was present in 92 teeth (76.7%).

Table 4. *Treatment Outcome at 18-Month Follow-up*

Outcome	Number (n)	Percentage (%)
Success	99	82.5

Healing	13	10.8
Failure	8	6.7

At the 18-month follow-up evaluation, complete clinical and radiographic success was achieved in 99 cases (82.5%). Thirteen teeth (10.8%) were classified under the healing category, as they showed reduction in periapical radiolucency without clinical symptoms. Failure was observed in 8 cases (6.7%), which presented with persistent symptoms and/or progression of periapical pathology.

Table 5. *Association Between Preoperative Periapical Status and Treatment Outcome*

Preoperative Periapical Status	Success n (%)	Healing n (%)	Failure n (%)	Total
Lesion present (n=74)	57 (77.0)	11 (14.9)	6 (8.1)	74
No lesion (n=46)	42 (91.3)	2 (4.3)	2 (4.3)	46

A statistically higher success rate was observed in teeth without preoperative periapical lesions (91.3%) compared to teeth presenting with periapical radiolucency (77.0%). Failure was more frequent in teeth with pre-existing lesions. The association between preoperative periapical status and treatment outcome was found to be statistically significant ($p < 0.05$), indicating that the presence of a lesion negatively influenced retreatment prognosis.

Table 6. *Association Between Tooth Type and Treatment Outcome*

Tooth Type	Success n (%)	Healing n (%)	Failure n (%)	Total
Anterior	40 (83.3)	5 (10.4)	3 (6.3)	48
Premolar	30 (83.3)	4 (11.1)	2 (5.6)	36
Molar	29 (80.6)	4 (11.1)	3 (8.3)	36

When treatment outcome was analyzed according to tooth type, anterior teeth showed a success rate of 83.3%, followed by premolars (83.3%) and molars (80.6%). Although molars demonstrated a slightly higher failure rate, the difference among tooth groups was not statistically significant ($p > 0.05$), suggesting that tooth type did not substantially influence the outcome of single-visit retreatment.

4. Discussion

The present observational study evaluated the outcomes of single-visit endodontic retreatment in 120 teeth and demonstrated a high overall success rate of 82.5% at 18 months. When cases classified as healing were included, the favorable outcome rate exceeded 93%, which is consistent with previously reported success rates for nonsurgical retreatment [14,15]. The primary objective of endodontic retreatment is the elimination of persistent intraradicular infection, which has been identified as the most critical factor associated with endodontic failure [16]. Traditionally, multiple-visit retreatment protocols incorporating intracanal medicaments have been recommended to enhance microbial reduction [6,17]. However, several studies have shown no significant difference in healing outcomes between single-visit and multiple-visit endodontic procedures when effective chemomechanical preparation is achieved [18,19]. In the present study, teeth without preoperative periapical lesions demonstrated a significantly higher success rate compared to teeth with existing lesions. This finding is in agreement with earlier investigations reporting that the presence of a periapical lesion is a negative prognostic indicator for retreatment outcome [20,21]. Nevertheless, the majority of teeth with lesions in this study showed either complete healing or radiographic reduction, indicating that single-visit retreatment can still yield favorable outcomes in such cases [22]. Postoperative pain and flare-ups are frequently cited concerns associated with single-visit retreatment [23]. In the current study, postoperative symptoms were minimal and self-limiting, with no cases requiring unscheduled emergency visits. Adequate canal debridement, copious irrigation, and immediate coronal sealing may have contributed to this favorable response, as suggested by previous authors [24,25]. Analysis of treatment outcome according to tooth type revealed no statistically significant difference among anterior teeth, premolars, and molars. This observation is consistent with prior studies indicating that anatomical complexity alone does not adversely affect retreatment prognosis when modern instrumentation and magnification are used [26, 27]. The limitations of the present study include its observational design and the absence of a comparison group treated using a multiple-visit protocol. Additionally, a longer follow-up period would be desirable to assess long-term periapical

healing. Despite these limitations, the standardized treatment protocol and relatively large sample size strengthen the validity of the findings and support the clinical feasibility of single-visit endodontic retreatment.

5. Conclusion

Within the limitations inherent to this observational study, single-visit endodontic retreatment demonstrated a high level of clinical success with favorable short- to medium-term outcomes. The findings suggest that, when appropriately indicated, single-visit retreatment can effectively eliminate infection, relieve symptoms, and promote periapical healing in previously failed root canal cases. Careful case selection, including assessment of canal anatomy, periapical status, and patient-related factors, plays a pivotal role in treatment success. Additionally, the use of modern endodontic instruments, advanced irrigation protocols, magnification, and biocompatible obturation materials, combined with strict adherence to aseptic principles, significantly contributes to predictable results. Performing retreatment in a single visit also offers advantages such as reduced treatment time, improved patient compliance, and decreased risk of inter-appointment contamination. Although long-term randomized controlled trials are warranted to further validate these outcomes, the present study supports single-visit endodontic retreatment as a reliable, efficient, and clinically acceptable treatment modality for managing failed root canal therapies.

5.1 Clinical Significance

Single-visit endodontic retreatment offers advantages in terms of patient convenience, reduced treatment time, and cost-effectiveness without compromising treatment outcomes when performed under appropriate conditions.

5.2 Limitations and Recommendations

- Lack of a control group for comparison
- Limited follow-up duration

Future randomized controlled trials with longer follow-up periods are recommended to further validate these findings.

6. References

1. Sjögren U, Hägglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. J Endod. 1990;16(10):498–504.
2. Friedman S. Prognosis of initial endodontic therapy. Endod Topics. 2002;2(1):59–88.
3. Siqueira JF Jr. Aetiology of root canal treatment failure: why well-treated teeth can fail. Int Endod J. 2001;34(1):1–10.
4. Ng YL, Mann V, Gulabivala K. A prospective study of the factors affecting outcomes of nonsurgical root canal treatment. Int Endod J. 2011;44(7):583–609.
5. Bergenholtz G, Lekholm U, Milthon R, Heden G, Ödesjö B, Engström B. Retreatment of endodontic fillings. Scand J Dent Res. 1979;87(3):217–224.
6. Sjögren U, Figdor D, Spångberg L, Sundqvist G. The antimicrobial effect of calcium hydroxide as a short-term intracanal dressing. Int Endod J. 1991;24(3):119–125.
7. Trope M, Delano EO, Ørstavik D. Endodontic treatment of teeth with apical periodontitis: single vs multivisit treatment. J Endod. 1999;25(5):345–350.
8. Sathorn C, Parashos P, Messer H. Effectiveness of single- versus multiple-visit endodontic treatment of teeth with apical periodontitis: a systematic review. Int Endod J. 2005;38(6):347–355.
9. Peters LB, Wesselink PR. Periapical healing of endodontically treated teeth in one and two visits obturated in the presence or absence of detectable microorganisms. Int Endod J. 2002;35(8):660–667.
10. Hülsmann M, Bluhm V. Efficacy, cleaning ability and safety of different rotary NiTi instruments in root canal retreatment. Int Endod J. 2004;37(7):468–476.
11. Ruddle CJ. Nonsurgical retreatment. J Endod. 2004;30(12):827–845.
12. Plotino G, Pameijer CH, Grande NM, Somma F. Ultrasonics in endodontics: a review of the literature. J Endod. 2007;33(2):81–95.
13. Ricucci D, Siqueira JF Jr. Biofilms and apical periodontitis: study of prevalence and association with clinical and histopathologic findings. J Endod. 2010;36(8):1277–1288.
14. Ng YL, Mann V, Gulabivala K. Outcome of secondary root canal treatment: a systematic review of the literature. Int Endod J. 2008;41(12):1026–1046.
15. Gorni FGM, Gagliani MM. The outcome of endodontic retreatment: a 2-yr follow-up. J Endod. 2004;30(1):1–4.
16. Sundqvist G. Associations between microbial species in dental root canal infections. Oral Microbiol Immunol. 1992;7(5):257–262.
17. Ørstavik D, Kerekes K, Molven O. Effects of extensive apical reaming and calcium hydroxide dressing on bacterial infection during treatment of apical periodontitis. Int Endod J. 1991;24(1):1–7.
18. Penesis VA, Fitzgerald PI, Fayad MI, Wenckus CS, BeGole EA, Johnson BR. Outcome of single- vs

multiple-visit endodontic treatment on postoperative pain. J Endod. 2008;34(7):785–793.

19. Figini L, Lodi G, Gorni F, Gagliani M. Single versus multiple visits for endodontic treatment of permanent teeth. Cochrane Database Syst Rev. 2007;(4):CD005296.
20. Strindberg LZ. The dependence of the results of pulp therapy on certain factors: an analytic study based on radiographic and clinical follow-up examinations. Acta Odontol Scand. 1956;14(Suppl 21):1–175.
21. Kvist T, Reit C. Results of endodontic retreatment: a randomized clinical study comparing surgical and nonsurgical procedures. J Endod. 1999;25(12):814–817.
22. Sjögren U, Persson G, Sundqvist G. Influence of infection at the time of root filling on the outcome of endodontic treatment. Int Endod J. 1997;30(5):297–306.
23. Walton R, Fouad A. Endodontic interappointment flare-ups: a prospective study of incidence and related factors. J Endod. 1992;18(4):172–177.
24. Torabinejad M, Walton RE. Endodontics: Principles and Practice. 4th ed. St. Louis: Saunders Elsevier; 2009.
25. Ingle JI, Bakland LK, Baumgartner JC. Ingle's Endodontics. 6th ed. Hamilton: BC Decker; 2008.
26. Ng YL, Mann V, Gulabivala K. Tooth survival following non-surgical root canal treatment: a systematic review of the literature. Int Endod J. 2010;43(3):171–189.
27. European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report. Int Endod J. 2006;39(12):921–930.