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Non-Surgical Endodontic Retreatment- A Case Series

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Abstract

Background: Non-surgical endodontic retreatment is the preferred first-line approach for managing failed root canal therapy, aiming to eradicate persistent infection, restore periapical health, and preserve natural dentition. Success rates approach those of primary treatment when modern techniques and strict protocols are followed.

Methods: Three previously root canal–treated teeth presenting with post-treatment disease were managed non-surgically.

Results: All cases were asymptomatic at follow-up, with intact coronal restorations and radiographic signs of periapical healing. The retreatment protocols effectively eliminated residual infection and re-established canal obturation without surgical intervention.

Conclusion: Non-surgical retreatment remains a predictable and minimally invasive option for managing persistent apical pathology in endodontically treated teeth. Careful case selection, adherence to disinfection protocols, and utilisation of contemporary instrumentation and materials are key to achieving long-term success.

Keywords: Non-Surgical Retreatment, Post-Treatment Disease, Gutta-Percha Removal, Chronic Apical Periodontitis, Calcium Hydroxide, Hybrid Technique.

Introduction

A Successful endodontic triad consists of three-dimensional cleaning and shaping, effective disinfection, and complete obturation. Literature indicates that success rates can approach 98% when these protocols are meticulously applied[1]. Nevertheless, some cases fail to heal or are reinfected—termed post-treatment disease—requiring retreatment[2].

Retreatment objectives are three-fold: remove the existing filling material, disinfect the canal thoroughly, and reseal it to halt reinfection and preserve the tooth—

maintenance that supports both periodontal health and masticatory function. Especially in younger patients, non-surgical retreatment is a conservative and cost-effective alternative to extraction and implant placement.

This case series report details the non-surgical management of three previously treated root canal failures. In all cases, written informed consent was obtained after a detailed discussion of risks, benefits, and alternatives.

Case 1

A 32-year-old male patient, medically healthy, reported with pain, swelling, and pus discharge in the lower left posterior jaw region. He had received root canal therapy on the mandibular first molar four years earlier, and a new restoration was placed six months ago after loss of the previous filling. On clinical examination, a well-adapted composite restoration was present and evidence of tooth discolouration and a draining sinus on the buccal aspect adjacent to the mandibular second molar (Fig. 1a). The tooth was tender to percussion, non-responsive to cold stimulus, and exhibited neither mobility nor periodontal pocketing.

Radiographic assessment revealed periapical radiolucencies associated with the mesial and distal root apices and inadequately radiopaque fillings within two mesial and two distal canals. A sinus tract tracing with gutta-percha confirmed involvement of the mandibular first molar (Fig.1b). Based on clinical and radiographic findings, the tooth was diagnosed as previously treated with chronic apical periodontitis. Given the prognosis, non-surgical retreatment was preferred to surgical management.

After rubber dam isolation, endodontic access was gained through the existing restoration and refined with ultrasonic tips. Four canal orifices were located. The previous filling material was removed using a combination of thermal softening (obturating pen), rotary retreatment files, and H-files. Residual gutta-percha was eliminated with Endosolv-soaked paper points. Working lengths for all four canals were established with an electronic apex locator (Woodpex III) and confirmed radiographically (Fig. 1c).

Canal patency and glide path were achieved with hand instruments, and the initial apical size was determined. Shaping was performed using a hybrid approach with stainless steel K-files and Protaper Gold rotary files, preparing to size F3 in the disto-buccal and disto-lingual canals, and F2 in the mesio-buccal and mesio-lingual canals. Irrigation was carried out with 3% sodium hypochlorite and 17% EDTA, interspersed with saline flushes, and completed with a final rinse of 2% chlorhexidine. Calcium hydroxide was placed as an intracanal medicament, and the access cavity was sealed temporarily.

At the two-week follow-up, the patient was asymptomatic and the temporary restoration intact. Calcium hydroxide was removed with 3% NaOCl using ultrasonic agitation and negative pressure irrigation. After master cone selection (Fig. 1d), a final root canal rinse with 17% EDTA for 5 minutes to remove the smear layer was performed. The canals were paper points dried and obturated using gutta-percha master cones with bioceramic sealer by lateral compaction. The prepared access cavity was cleaned and restored using a sandwich technique with resin-modified glass ionomer cement and composite resin, and a postoperative IOPA radiograph was taken (Fig. 1e). Final prosthetic rehabilitation was done with a full coverage metal crown (Fig. 1f). A 2-month follow-up shows complete asymptomatic clinical and radiographic signs of healing (Fig. 1g).

Case 2

A 31-year-old male serving soldier reported with the chief complaint of pain and swelling in the upper front tooth region for the last 1 week. The patient reported a history of root canal treatment of the same tooth 6 months prior. Earlier, it was asymptomatic, but the patient had been having pain and swelling for the last 1 week. Pain was continuous and throbbing in nature, and relieved only with medication. There was no relevant medical history.

On intraoral examination, a swelling measuring 2x2 cm in the maxillary left lateral incisor buccal region extending from attached gingiva to the periapical region and soft in consistency, and 22 was with Grade-2 mobility, had pain on palpation and was tender on percussion. There was no response to the cold and hot tests for both 21 and 22. On radiographic examination in IOPA radiograph, there was a separated instrument extending beyond the apex, and there was a sign of apical root resorption with periapical radiolucency in 22 (Fig. 2a), also periapical radiolucency in 21. Diagnoses of previously treated patients with acute apical abscess (n = 22) and necrotic acute apical periodontitis (n = 21) were made, and management plans included non-surgical retreatment for 22 and endodontic treatment for 21.

After rubber dam isolation, the access opening was done through previously restored access opened the palatal region and the old coronal restoration was removed. On coronal enlargement of 22 and irrigation with 3% sodium hypochlorite solution, there was oozing of pus from the canal. By-pass of the separated instrument was done with a 10 K file (Fig. 2b), and a glide path was prepared. Enlargement of the bypass with 2% tapered 40 K file. Copious irrigation was done with 3% sodium hypochlorite and EDTA solution. With the help of bypassing the separated instrument with a 20 H file on one side and a bypass with a 20 K file on the other side, after crossing both 20 H and K and starting to twist against each other to properly engage the separated instrument. When the separated instrument was properly engaged between the 20 No H and K file, canal was filled with 3% sodium hypochlorite solution to lubricate the canals and with the pulling motion, the separated instrument was removed from the canal (Fig. 2c). After removing the separated instrument, biomechanical preparation was done as in case 1.

Access opening and the same biomechanical preparation protocol were followed for the left central incisor also. Calcium hydroxide closed dressing for 1 month was given in both 21 & 22. As there was an open apex at 22 hence apical closure was done with the help of Biodentine, and obturation of both 21 & 22 was done with the lateral compaction techniques (Fig. 2d). Coronal restoration was done with light-cure glass ionomer cement. 6 months follow-up shows complete resolution of radiolucency in radiograph (Fig. 2e), and the patient was asymptomatic clinically.

Case-3

A 19-year-old male patient reported with a chief complaint of pain, swelling and mobility in the lower anterior teeth region with a history of trauma one year before and endodontic treatment was done during that period. On clinical examination, there was a Crown fractured 41, Intraoral swelling in between 31 & 41 apical region at the labial vestibule (Fig. 3a). Both 31 & 41 were Grade-1 mobile and had a Tender on percussion and palpation. On IOPA examination, there was periapical radiolucency in 31 and apical widening in 41, previously obturated 31,41 (Fig. 3b).

Considering the patient's age and prognosis, non-surgical retreatment was selected in preference to surgical management.

After isolation with a rubber dam, the old coronal restoration was removed, and the access opening was refined and extended lingually to negotiate suspected missed canals in both 31 and 41. There were lingual untreated canals in lingual direction in both previously obturated 31 & 41 (Fig. 3c). Old obturation material was removed from 31 & 41, and biomechanical preparation was done for both canals buccally and lingually in both the teeth by following the same procedure as in case 1. Calcium hydroxide close dressing was given for 3 weeks, and obturation was done with the lateral compaction technique in both 31 & 41 (Fig. 3d). Coronal restoration was done with modified glass ionomer cement. Post space preparation and fibre post adaptation were done in 41 after 1 one month of follow-up. Complete resolution of periapical radiolucency was observed at 4-month follow-up (Fig. 3e).

Discussion

Non-surgical endodontic retreatment involves the removal of existing root canal fillings, reshaping of the canal system, and re-obturation. It is indicated when previous therapy is inadequate, has failed, or when canals are decontaminated through prolonged oral exposure. The primary cause of failure is incomplete three-dimensional cleaning, shaping, and obturation, resulting in persistent microbial infection.

Retreatment challenges may be morphological or iatrogenic, including insufficient access, retained materials, or foreign objects[2]. A comprehensive evaluation using multi-angled radiographs, magnification, fibre optic illumination, sodium hypochlorite bubble tests, endodontic explorers (e.g., DG-16), ultrasonic tips, and dyes (e.g., methylene blue) aids in detecting untreated canals.

Periapical radiolucencies in retreated teeth can develop due to apical or coronal leakage, inadequate obturation, incomplete canal preparation, persistent or extraradicular infections, foreign body reactions, contaminated filling materials, or the presence of cysts or scar tissue.

Kvist and Reit (1999) found comparable long-term outcomes between surgical and non-surgical approaches, but recommended a non-surgical option first owing to reduced postoperative complications and discomfort[3]. In a systematic review, Torabinejad et al. (2009) observed that surgical retreatment achieved higher short-term healing rates (77.8%) than non-surgical retreatment (71.9%) at 2–4 years; however, after 4–6 years, the outcomes were more favourable for non-surgical treatment (83% vs. 71.8%)[4]

Gutta-percha can be removed using hand or rotary instruments, sometimes combined with heat, solvents, or ultrasonic techniques. The method chosen depends on the quality and condensation of the filling, the obturation technique (e.g., cold lateral, warm vertical, or single-cone), the sealer type, and operator preference. Solvents may be used to soften gutta-percha or sealer materials and facilitate removal, but since all available solvents (such as chloroform, eucalyptol, turpentine, or orange oil) exhibit some degree of toxicity, their use should be conservative and carefully controlled[5-11].

Non-setting pastes or cements can generally be removed with a combination of solvents, hand files, rotary instruments, and ultrasonics. In contrast, hard-setting cements are more safely managed with ultrasonics rather than aggressive bur removal, which increases the risk of perforation. The disinfection and chemo mechanical protocols used in primary root canal therapy are also applicable in retreatment cases. However, retreatment is often time-consuming due to the need to dismantle existing restorations and negotiate canals to full working length. As a result, multi-visit treatment with interappointment medicaments is frequently necessary,

since complete disinfection in a single session is often not achievable[12].

Effective irrigation is critical for successful retreatment. Standard protocols employ sodium hypochlorite (NaOCl) and EDTA, sometimes followed by a final rinse with chlorhexidine (CHX). CHX is particularly effective against *Enterococcus faecalis*, a frequent pathogen in persistent infections, due to its ability to disrupt bacterial membranes. Moreover, CHX exhibits substantivity, binding to dentin and maintaining antimicrobial activity over time. While CHX has strong antimicrobial properties, it does not dissolve organic tissue, a limitation compared to NaOCl[13,14].

Given that persistent intraradicular infection is the principal cause of failure, non-surgical retreatment is generally considered the first treatment option. When retreatment is not feasible due to altered apical anatomy (such as canal transportation or blockage), surgical intervention may be indicated. Patient-specific factors—including anatomy, restorative considerations, prognosis, cost, and risk of complications—should be assessed carefully before deciding on retreatment, surgery, or extraction with replacement. For example, an anterior tooth with a well-adapted cast post and core may pose a high risk of fracture upon dismantling, making surgical retreatment a more suitable alternative.

Conclusion

With advanced training, refined techniques, and modern technology, clinicians can enhance the predictability of non-surgical retreatment. Prospective, well-structured studies are essential to refine case selection and treatment protocols, thereby minimising failures due to inappropriate clinical decisions.

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Legend Figures

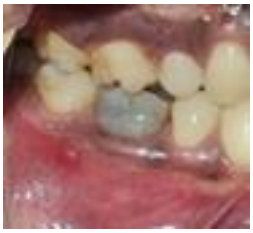

Figure 1a: Preoperative 36 with sinus in the buccal mucosa

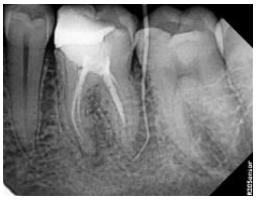

Figure 1b: Tracing of sinus tract shows involvement of the distal root of 36

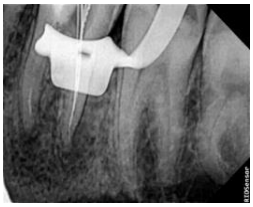

Figure 1c: Old obturating material removed, Working length determination with EAL & confirmation with the radiographic method in 36

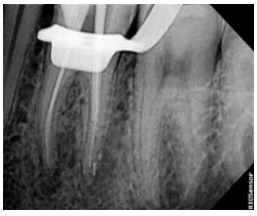

Figure 1d: Master Cone selection

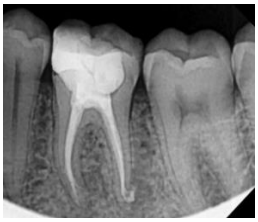

Figure 1e: Post Operative

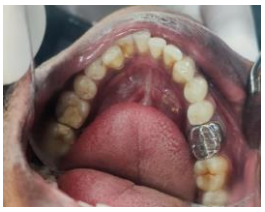

Figure 1f: Full Metal crown in 36

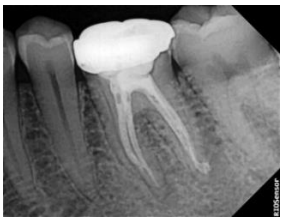

Figure 1g a 2: month follow-up shows signs of healing

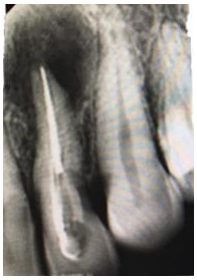

Figure 2a: Pre-operative -previously treated 22 with separated instrument and periapical radiolucency

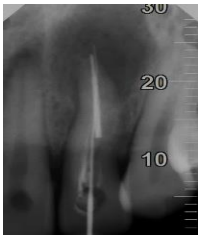

Figure 2b: Instrument By-pass with K file and confirmed with radiograph

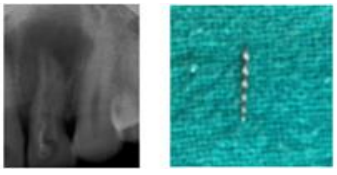

Figure 2c: Retrieval of the separated instrument in 22

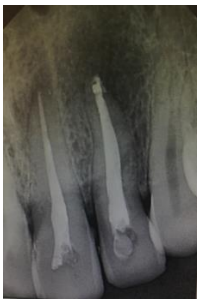

Figure 2d: Apical closure with Biodentine-22 & obturation-21,22

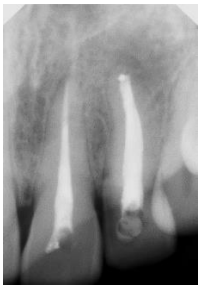

Figure 2e: 6 Months follow-up of 21,22 shows complete resolution in radiolucency

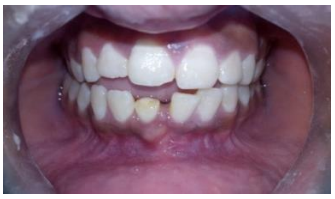

Figure 3a: Pre-operative Fractured 41 with swelling between 31,41

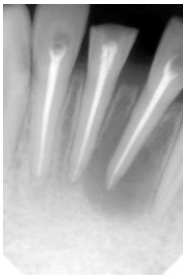

Figure 3b: Pre-operative IOPA radiograph reveals periapical radiolucency in 31 and apical widening in previously obturated 41

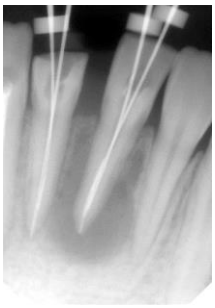

Figure 3c: Two canals in both 41 & 31

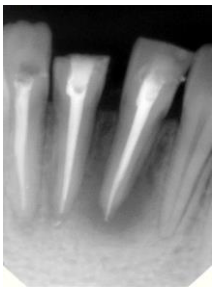

Figure 3d: Post-obturation 31 & 41

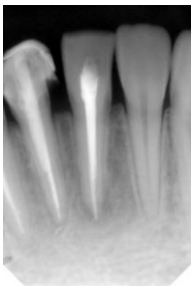

Figure 3e: A 4-month follow-up with fibre post adaptation in 41 with a crown and resolution in periapical radiolucency