



# Management of a Late Complication of Strip Perforation with Overextended Gutta-percha Using Intentional Replantation: A 10-Year Follow-up Case Report

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Strip perforation is a severe procedural complication during root canal therapy, often associated with poor prognosis, especially when combined with overextended gutta-percha. While surgical or nonsurgical retreatment is commonly indicated, patient-centered decision-making and long-term follow-up may influence the management strategy. This case report describes the conservative follow-up and eventual successful treatment of a mandibular second molar with an extensive midroot strip perforation and extruded gutta-percha, ultimately managed with intentional replantation and root-end filling using calcium-enriched mixture (CEM) cement. In 2015, a 40-year-old female patient presented for routine examination. A previously treated mandibular second molar (#37), which had a severe strip perforation in the mesial root and overextended gutta-percha one year prior, remained asymptomatic and functional. The patient declined retreatment and opted for annual monitoring. Over five years, the tooth remained functional and symptom-free, and the extruded gutta-percha showed gradual radiographic resorption. In 2023, the patient returned with a symptomatic apical periodontitis and a large periapical lesion associated with the same tooth. Intentional replantation was performed with midroot resection of the mesial root, root-end filling using CEM cement, and immediate replantation. At the 1-year follow-up, the tooth remained functional, asymptomatic, and radiographically healed. The case highlights the long-term clinical risks of untreated strip perforations, the unpredictable resorption of overextended materials, and the efficacy of minimally invasive surgical interventions in preserving tooth function.

**Keywords:** Calcium Derivative; CEM Cement; Intentional Replantation; Mineral Trioxide Aggregates; Periapical Periodontitis; Root Canal Filling Material; Strip Perforation; Surgical Endodontics

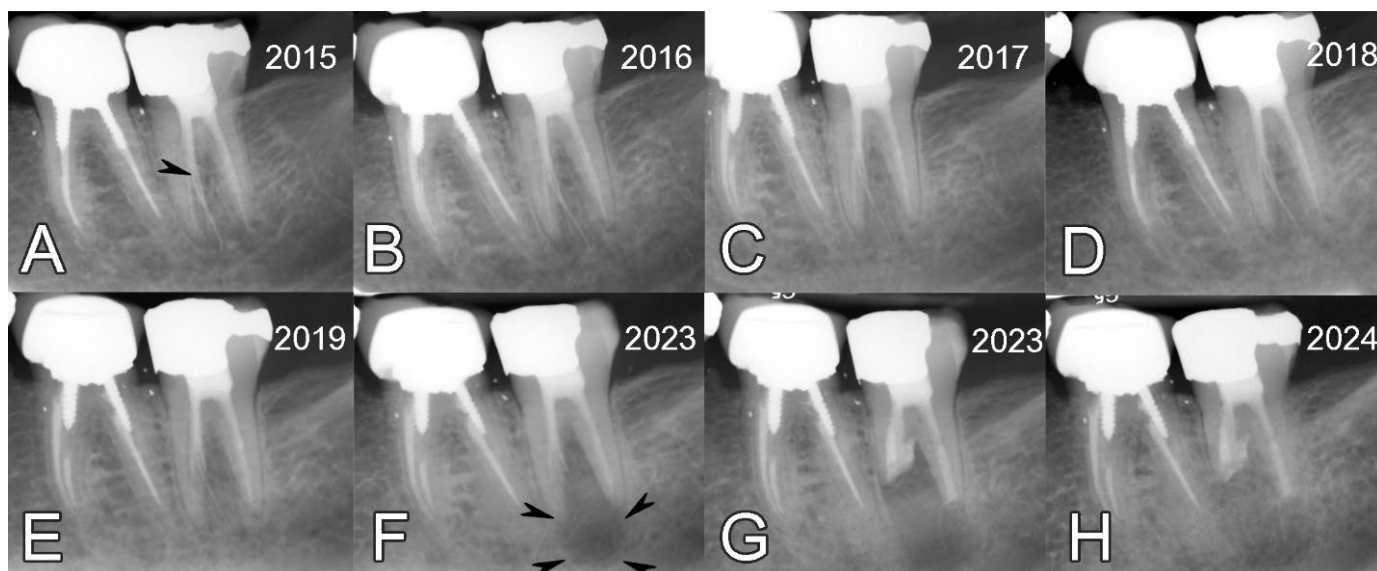
## Introduction

Strip perforations are severe iatrogenic complications commonly occurring during root canal instrumentation, particularly in curved or narrow roots with thin dentinal walls [1]. These longitudinal defects, often located in the mesial roots of mandibular molars, are created by over-instrumentation or inappropriate shaping techniques and pose a significant threat to tooth survival. The main concern with strip perforations is that they connect the root canal system and the periodontal ligament space, allowing for bacterial leakage and inflammation around the root [2].

In addition to perforation, overextension of obturation materials, such as gutta-percha or sealer, beyond the apical or perforation site can further aggravate the inflammatory response.

However, in some cases, extruded materials may undergo gradual resorption, and symptoms may remain absent for extended periods, leading both patients and clinicians to defer intervention [3].

When conventional nonsurgical endodontic retreatment or periradicular surgery is unfeasible due to case complexity, anatomical limitations or patient preferences, intentional replantation (IR) serves as a viable last-resort strategy [4-8]. This technique involves atraumatic extraction, extraoral repair of the defect, and reinsertion of the tooth into its socket. Advances in biomaterials have expanded the indications for this procedure, particularly with the use of bioactive cements such as calcium-enriched mixture (CEM) cement, which offers excellent sealing ability, biocompatibility, and potential for promoting osteogenesis and cementogenesis [9].



**Figure 1.** Serial periapical radiographs documenting the clinical course and management of tooth #37; A) Initial radiograph showing a midroot strip perforation (black arrow) in the distal aspect of the mesial root with overextended gutta-percha cones extruding into the periradicular tissues; B–E) Annual follow-up radiographs demonstrating progressive resorption of the extruded gutta-percha and stable periradicular tissue/bone; F) Development of a large periradicular radiolucency (black arrow heads) indicative of symptomatic apical periodontitis; G) Immediate post-replantation periapical radiograph showing midroot resection of the mesial root and extensive root-end filling with calcium-enriched mixture cement (white filling); H) Complete resolution of the periapical lesion, with evidence of bony regeneration and stable replantation, one year later

This report presents a rare case of a mandibular second molar with a midroot strip perforation and overextended gutta-percha that was asymptomatic and functional for five years under regular follow-up. After a delayed presentation with an acute abscess and periapical lesion, the tooth was successfully treated *via* IR using CEM cement. The one-year follow-up confirmed clinical and radiographic success, highlighting the long-term potential of conservative monitoring and advanced surgical salvage in endodontic failures.

### Case Presentation

In 2015, a 40-year-old female patient presented for routine dental evaluation. Her dental history revealed a root canal treatment (RCT) performed one year earlier (2014) on the mandibular left second molar (tooth #37). She reported no symptoms at the time of presentation.

Radiographic examination revealed a significant procedural complication in the mesial root; a midroot strip perforation accompanied by overextended gutta-percha extruded into the periradicular tissues (Figure 1A). Despite these findings, the tooth was functional, with no signs of swelling, tenderness to percussion or palpation, mobility, or periodontal compromise.

The condition was diagnosed as an asymptomatic tooth with a strip perforation and extruded obturation material, but without radiographic signs of active periapical pathology/infection. The

prognosis was considered guarded to poor, and nonsurgical retreatment of the mesial root was recommended.

The patient declined the proposed retreatment, expressing a preference for conservative monitoring unless symptoms developed. Annual follow-up visits were scheduled accordingly.

Over five years (2015–2019), the patient remained asymptomatic. Clinical examinations confirmed the absence of tenderness, mobility, or gingival pathology. Serial annual periapical radiographs demonstrated a progressive and smooth resorption of the overextended gutta-percha material (Figures 1A–1E). There was no evidence of new periapical pathology or progression at the perforation site.

After a four-year hiatus from dental care, the patient returned with acute pain, localized tenderness, and redness of the soft tissues adjacent to tooth #37. Radiographic examination revealed a large apical lesion at the apices of the involved tooth, consistent with an acute periapical periodontitis associated with chronic inflammatory progression of the previously diagnosed strip perforation (Figure 1F).

Given the extent of the periapical lesion and the structural compromise of the mesial root due to the midroot strip perforation, IR was selected as a last-resort salvage procedure. After written informed consent, under local anesthesia, tooth #37 was extracted atraumatically, with careful handling to minimize damage to the periodontal ligament. The extraoral time was strictly maintained under 10 min. Once extracted, the

mesial root was resected at the midroot level to eliminate the perforation and the structurally compromised segment. A root-end cavity was prepared ultrasonically, irrigated with sterile saline, and thoroughly dried. The cavity was then filled with CEM cement, a bioceramic material known for its superior sealing properties and its ability to induce osteogenesis. The tooth was immediately replanted into its original socket with proper orientation and passive fit (Figure 1G).

Postoperative care was focused on infection control, pain management, and promoting soft tissue healing. No systemic antibiotics were prescribed, as the infection had been locally managed. The patient was given 400 mg of ibuprofen before the procedure and instructed to take it as needed for pain in the following days. For oral hygiene, a 0.12% chlorhexidine mouthwash was recommended twice daily for one week to reduce microbial load in the area. Additionally, the patient was instructed to follow a soft diet and avoid excessive loading of the treated tooth to facilitate periodontal healing and reattachment.

At the one-week follow-up, the patient reported gradual resolution of pain and swelling. Clinical examination revealed normal tooth mobility, healthy gingival tissues, and absence of tenderness. At the one-year follow-up, radiographic evaluation showed complete resolution of the periapical radiolucency (Figure 1H), indicating successful healing. The tooth remained fully functional and asymptomatic, with normal probing depth, with no signs of inflammation or pathology or mobility, demonstrating the long-term success of IR and the biocompatibility of the CEM cement.

## Discussion

This case highlights a rare clinical scenario in which a midroot strip perforation associated with overextended gutta-percha remained asymptomatic for an extended period, definitely 5 years and probably 8 years, before manifesting as an acute apical periodontitis. The gradual resorption of gutta-percha, though biologically inert, likely resulted from a foreign body response in the absence of active infection.

Nonetheless, subclinical inflammation likely persisted during this time, ultimately leading to periapical breakdown and symptomatic presentation in 2023.

The conservative approach of annual monitoring, although initially successful, may have contributed to delayed intervention. This case underscores the limitations of deferring retreatment in asymptomatic cases with known procedural complications such as strip perforation. Radiographic findings, including extruded material and subtle bone changes, should prompt earlier consideration of

corrective intervention even in the absence of clinical symptoms. Patient education is essential to ensure understanding of the potential risks of delayed treatment in such cases [10].

Retreatment of strip perforations poses considerable challenges due to their irregular location, thin root dentin walls, and limited accessibility, particularly in curved mesial roots of mandibular molars [11]. Traditional orthograde retreatment may risk further structural compromise, while surgical access can be anatomically restricted. In this case, IR was selected as a viable salvage technique. This approach allowed for extraoral inspection, resection of the defective root portion, and precise retrograde filling. Studies have supported its utility in managing complex endodontic failures where conventional retreatment is contraindicated or carries a poor prognosis [12].

CEM cement was selected as the root-end filling biomaterial owing to its bioactive properties, including excellent sealing ability, biocompatibility, and ability to promote osteogenesis, dentinogenesis, and cementogenesis [9, 13-15]. Recent research has demonstrated the favorable outcomes of CEM cement in root-end surgeries, perforation repair, and various endodontic applications, often comparable to those of MTA [9, 16, 17]. In this case, its application contributed to the successful healing of the periapical lesion and long-term retention of the natural tooth.

Only a limited number of case reports have documented IR for strip perforation repair in mandibular molars [18]. Similar successful outcomes using bioceramic materials have been reported in these cases where conservative management was impossible, but tooth preservation remained a priority [19]. These cases, like the present report, emphasize the importance of individualized treatment planning and the strategic use of advanced materials and techniques.

Key clinical insights from this case include: *i*) Asymptomatic presentation should not be interpreted as successful resolution following procedural complications, underscoring the need for clinician awareness even in the absence of overt symptoms; *ii*) Patient adherence may diminish when symptoms are absent, highlighting the critical role of enhanced patient education regarding long-term risks to ensure informed decision-making; *iii*) IR demonstrates viability as a salvage technique for structurally compromised teeth when conventional retreatment is impractical; and *iv*) The selection of root-end filling material significantly influences periradicular tissue healing and long-term treatment success.

This case underscores the efficacy of biologically oriented strategies in complex endodontic retreatments, emphasizing the importance of meticulous technique and evidence-based material selection to optimize outcomes.

## Conclusions

This report illustrates a rare case in which long-term conservative monitoring of a strip perforation with overextended gutta-percha was initially successful in an asymptomatic patient. However, the eventual development of an endodontic lesion underscores the importance of vigilance and regular follow-up, even when clinical symptoms are absent. When pathology does arise, especially in structurally compromised teeth, intentional replantation combined with biocompatible root-end filling presents a predictable and biologically sound treatment option. The favorable outcome in this case demonstrates that this technique can effectively manage complex endodontic complications.

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### Conflict of interest

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### Authors' contributions

SA is the sole author and is solely responsible for all aspects of the study, including conception, data collection, analysis, and manuscript preparation.

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