Treatment of a Mandibular Premolar with Uncommon Mesial and Distal Canal Configuration with Triple Antibiotic PasteÂ”

Abstract

Endodontic failure often results from persistent microorganisms , debris in untreated or inadequately prepared canals. Mandibular first premolars commonly present anatomical variations, increasing the risk of missed canals and complicating treatment.
This case describes the retreatment of a mandibular first premolar in which a previously undetected canal and an associated periapical lesion were identified. After thorough chemo mechanical preparation, as a intracanal medicament Triple antibiotic paste was placed . The medicament effectively reduced microbial load and promoted progressive healing. The canal system was then obturated and restored, with follow-up radiographs confirming favorable periapical repair. This report highlights the need for careful assessment of anatomical variations in mandibular premolars and demonstrates that triple antibiotic paste can serve as a valuable adjunct in retreatment cases with persistent periapical infection.

Key words : Anatomical variation, Missed canal ,Periapical lesion, Triple antibiotic paste,

Key Message : Identification of anatomical variations in mandibular premolars is essential to prevent missed canals and endodontic failure. The triple antibiotic paste can significantly enhance disinfection and support predictable healing during retreatment of persistent periapical infections.

Introduction :

Failure to disinfect and obturate all anatomical spaces, particularly in teeth with complex canal morphology, can result in persistent intraradicular infection and subsequent post-treatment disease.[1] Mandibular first premolars are widely recognized for their anatomical variability, which often complicates treatment procedures. Although a single canal configuration

is most frequently observed, several studies have reported a considerable incidence of additional canals and atypical configurations, making these teeth among the most challenging to manage.[2]

Slowey described mandibular premolars as some of the most difficult teeth to treat due to their unpredictable internal anatomy.[3] Missed anatomy remains a significant etiologic factor in endodontic failure, and retreatment cases often exhibit untreated or partially treated canals.[4] In such situations, persistent microbial contamination within anatomical irregularities or inaccessible areas is a major concern.

Intracanal medicaments serve as an essential adjunct in achieving deeper disinfection when instrumentation and irrigation alone are insufficient. Triple antibiotic paste (TAP), a combination of metronidazole, ciprofloxacin, and minocycline, has demonstrated broad antimicrobial action against polymicrobial endodontic infections due to the complementary mechanisms of its components.[5] Its effectiveness in managing large periapical lesions and in cases requiring enhanced disinfection has been well documented.[6] However, reports describing the nonsurgical retreatment of mandibular premolars with previously missed canals using TAP remain limited in the literature.

The present case is distinctive as it documents the successful nonsurgical retreatment of a mandibular first premolar with a previously undetected canal and an associated periapical lesion, managed effectively with triple antibiotic paste. The combination of rare canal morphology, missed anatomy, and the incorporation of TAP as an intracanal medicament underscores the clinical relevance and uniqueness of this case.

Case Report

A 32-year-old male patient came to the Department with a complaint of severe pain in the lower left posterior region for the past three days. The pain was persistent and showed no

association with diurnal or postural variations. Dental history revealed that the patient had undergone root canal treatment on the mandibular left first premolar approximately four months earlier. There was no medical history.

Clinical examination showed that the mandibular left first premolar was tender on percussion, with no evidence of swelling, sinus tract, or periodontal pocketing. An intraoral periapical radiograph revealed inadequately obturated canals, a widened periodontal ligament space, and a periapical radiolucency. Based on the clinical and radiographic findings, a diagnosis of **symptomatic apical periodontitis associated with a previously treated tooth** was established, and nonsurgical endodontic retreatment was planned.

Endodontic Procedure

Local anaesthesia was administered using 2% lidocaine containing 1:80,000 adrenaline, Isolation through rubber dam and access was re-established with an EndoAccess bur (Size 2; Mani Inc., Japan). The previously placed composite restoration was removed, following which the gutta-percha in the obturated canal was softened with gutta-percha solvent (RC Solve®, Prime Dental Products, India) and mechanically retrieved using a No. 25 H-file. The chamber was flushed with sterile saline to remove remnants of filling material.

Working length was determined using an apex locator (Root ZX®, J. Morita) and confirmed radiographically, measuring 16 mm for the buccal canal and 17 mm for the lingual canal.

Cleaning and shaping were initiated with #10 and #25 K-files, followed by enlargement with ProTaper hand files up to size F1 . Irrigation was carried out using 5.25% sodium hypochlorite and 17% EDTA (SmearClear™, SybronEndo, USA), followed by a final saline rinse.

A triple antibiotic paste (TAP) was placed as an intracanal medicament. At the third appointment, the patient was asymptomatic. The TAP dressing was removed using copious saline irrigation.

Master cone selection was performed, and obturation was completed using F1 gutta-percha cones and AH Plus sealer by the single-cone technique. The access cavity was restored subsequently.

Discussion :

Mandibular premolars often exhibit considerable anatomical variability, making their endodontic management challenging. Variations such as additional canals can complicate debridement and obturation, leading to persistent infection if not identified. Missed anatomy is a well-recognized cause of endodontic failure, with Hoen and Pink reporting that 42% of

retreatment cases were attributed to undetected canals (7). Moreover, Al-Attas and Al-Nazhan described a mandibular second premolar with three canals in which failure occurred due to a missed third canal, identified only after modifying the access cavity during retreatment (8). Such cases reinforce the importance of careful exploration and the use of advanced diagnostic aids when treating teeth with suspected anatomical complexities.

Epidemiological data from the University of Washington showed failure rates of 11.45% in mandibular first premolars and 4.54% in mandibular second premolars, highlighting the influence of complex anatomy on treatment outcomes (9). When patients continue to report postoperative pain or sensitivity after root canal therapy, clinicians should strongly suspect untreated or missed canals, particularly in premolar teeth.

Odontogenic infections are typically polymicrobial, involving aerobes and anaerobes. In chronic infections, the intricate canal anatomy protects microbial biofilms from mechanical preparation and irrigation, making eradication difficult. Because single-agent intracanal medicaments may be insufficient, combinations such as triple antibiotic paste (TAP) have gained prominence. TAP, composed of ciprofloxacin, metronidazole and minocycline, provides broad antimicrobial activity against gram-positive, gram-negative, facultative and obligate bacteria, enhancing disinfection and promoting periapical healing (10-12).

In the present case, endodontic failure resulted from a missed canal that harboured persistent infection and caused a periapical lesion. During retreatment, the use of TAP as an intracanal medicament facilitated disinfection of the complex canal system. The clinical resolution achieved emphasizes the importance of thorough anatomical assessment, adequate access refinement, and evidence-based use of intracanal medicaments in managing retreatment cases with previously undetected canals.

Conclusion

Missed canals remain a significant contributor to endodontic failure, especially in teeth with anatomical variations such as mandibular premolars. This case demonstrates the necessity of careful radiographic interpretation, proper access cavity design and the use of enhanced diagnostic techniques to locate additional canals. The application of triple antibiotic paste proved valuable in eliminating persistent infection, supporting periapical healing and improving the retreatment outcome. Comprehensive knowledge of anatomical variations and meticulous clinical execution are essential for successful management.

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FIGURES

Figure 1: Pre-op wrt 34

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Figure 2: Guttapercha removed wrt 34

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Figure 3 : Working length taking wrt 34

Figure 4 : Working length xray wrt 34

Figure 5 : Manipulation of Triple antibiotic paste for the placement inside the canal as Intracanal medicament wrt 34.

Figure 6 : Master cone x ray wrt 34

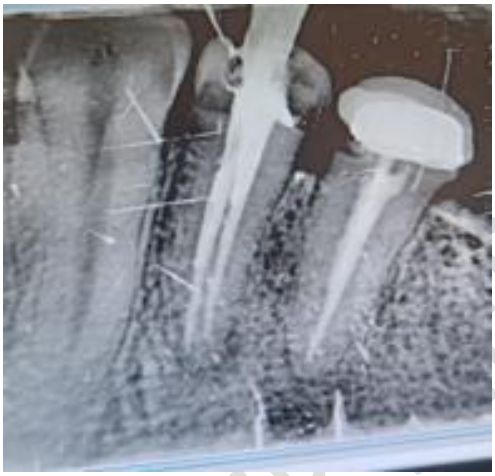

Figure 7 : Obturation xray wrt 34

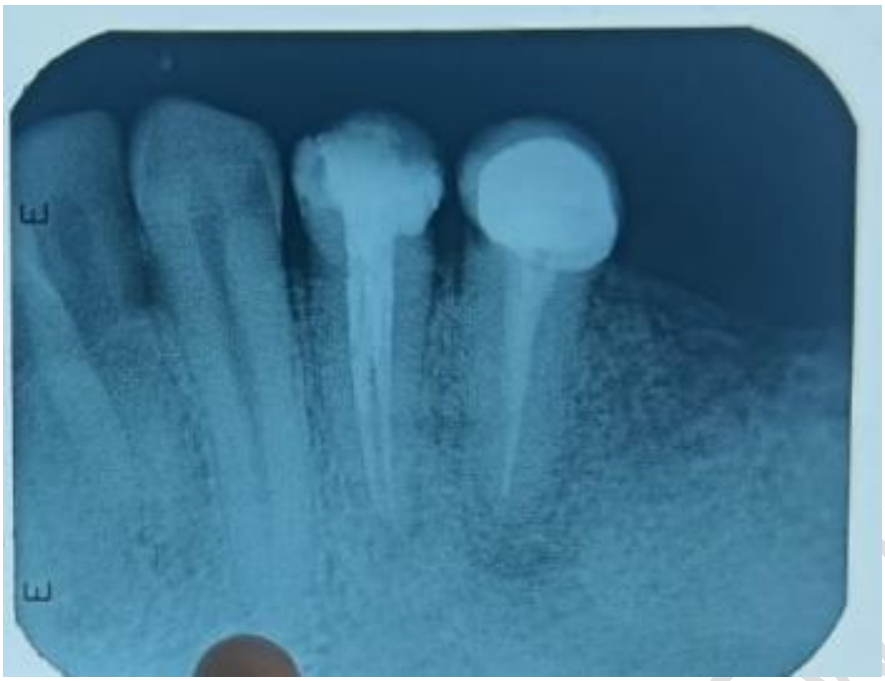

Figure7 : **POST-OP(after 1 month) wrt 34**