



Endodontic management of a two-rooted mandibular first premolar with buccolingual canal configuration: A case report

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DOI: <https://doi.org/10.66856/ijds.2026.8.2.8051>

Abstract

Background: Mandibular first premolars exhibit significant anatomical variability, often leading to missed canals and endodontic failure. Although typically single-rooted, the presence of two roots is rare and poses a clinical challenge.

Case Presentation: A 63-year-old female patient presented with a decayed tooth in the lower right posterior region. Clinical and radiographic examination of tooth #44 revealed distal caries with periapical pathology. A diagnosis of irreversible pulpitis with chronic apical periodontitis was made.

Management: Root canal treatment was performed under rubber dam isolation. Two distinct canals were identified in buccal and lingual positions, confirming a two-rooted morphology. Cleaning, shaping, and obturation were completed successfully.

Conclusion: Careful clinical and radiographic evaluation is essential to detect anatomical variations and ensure successful endodontic outcomes.

Keywords: Mandibular first premolar, two roots, root canal variation, endodontics

Introduction

Successful endodontic treatment depends on thorough debridement, disinfection, and obturation of the entire root canal system. A comprehensive understanding of root canal anatomy and its variations is therefore essential for achieving favorable treatment outcomes. Among all teeth, mandibular first premolars are considered one of the most challenging for endodontic management because of their highly variable root and canal morphology. Although they commonly present with a single root and a single canal, numerous anatomical variations such as bifurcated canals, multiple canals, and multiple roots have been documented in the literature.

Vertucci reported considerable variations in the canal configuration of mandibular premolars, emphasizing the need for clinicians to anticipate atypical anatomy during treatment. The incidence of two-rooted mandibular first premolars is relatively low, making their diagnosis and management particularly challenging. Failure to identify additional roots or canals may result in incomplete cleaning and shaping, persistent microbial contamination, postoperative symptoms, and eventual treatment failure.

Conventional intraoral periapical radiographs remain the primary diagnostic aid for detecting root canal morphology; however, their two-dimensional nature may limit the identification of complex canal systems. Advanced imaging techniques such as cone-beam computed tomography (CBCT), along with the use of magnification and enhanced illumination, have significantly improved the clinician's ability to detect anatomical variations. Awareness of these variations is therefore critical for successful endodontic treatment.

The present case report describes the diagnosis and successful endodontic management of a rare two-rooted mandibular first premolar exhibiting a buccolingual canal configuration and highlights the importance of careful clinical and radiographic evaluation in identifying unusual root canal anatomy.

Case Report

A 63-year-old female patient reported with the chief complaint of a decayed tooth in the lower right posterior region. Medical history was non-contributory.

Clinical examination revealed distal caries with tenderness on percussion in relation to tooth #44. Radiographic examination showed coronal radiolucency involving the pulp and periapical radiolucency.

Diagnosis

- **Pulpal:** Irreversible pulpitis
- **Periapical:** Chronic apical periodontitis

Treatment Procedure

Local anesthesia was administered using 2% lidocaine with 1:200,000 adrenaline. The tooth was isolated with a rubber dam.

Caries removal was completed, followed by access cavity preparation using a round diamond bur. On exploration, two canal orifices (buccal and lingual) were identified.

The canals were enlarged using ProTaper SX files, and working length was determined radiographically. Cleaning and shaping were performed with copious irrigation using sodium hypochlorite and EDTA.

Obturation was completed using gutta-percha and sealer. Postoperative radiograph confirmed adequate obturation.

Figures



Fig 1: Access cavity under rubber dam

Access cavity preparation under rubber dam isolation showing entry into pulp chamber.



Fig 2: Canal orifice identification

Two distinct canal orifices located buccally and lingually.

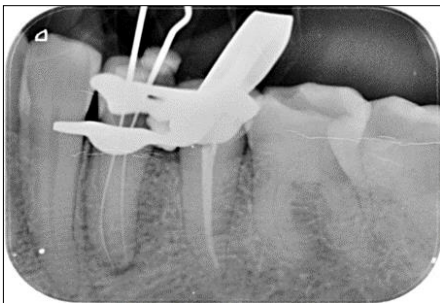


Fig 3: Working Length Determination

Working length radiograph showing two separate canals.

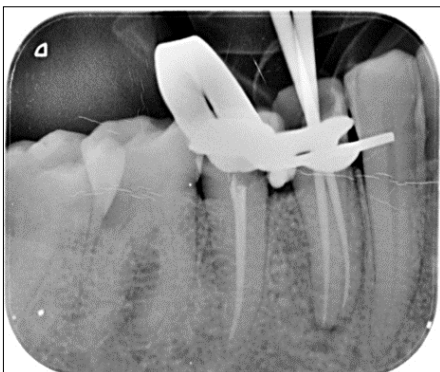


Fig 4: Master cone

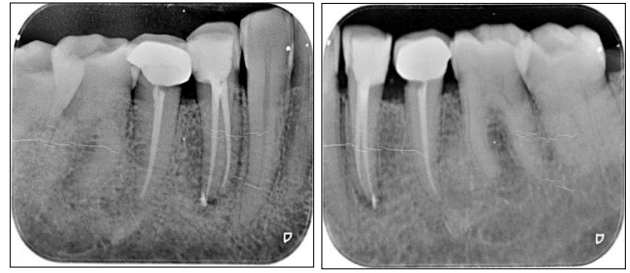


Fig 4: Obturation with post endodontic restoration

Post-obturation radiograph showing well-filled canals.

Conclusion

The present case report highlights the successful endodontic management of a rare two-rooted mandibular first premolar with separate buccal and lingual canals. Anatomical variations in mandibular premolars are not uncommon and may pose significant diagnostic and therapeutic challenges. Failure to recognize these variations can result in missed canals, persistent infection, and treatment failure.

A thorough understanding of root canal anatomy, careful interpretation of radiographs, detailed clinical examination, and the use of modern diagnostic aids are indispensable for identifying unusual canal configurations. Clinicians should always consider the possibility of additional roots or canals when treating mandibular premolars.

Early recognition and appropriate management of anatomical complexities contribute significantly to the success of endodontic therapy and improve long-term prognosis. This case underscores the importance of vigilance, sound clinical judgment, and comprehensive treatment planning in achieving favorable endodontic outcomes.

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