ISSN: 3066-814X
Case Report
Journal of Clinical Dentistry and Oral Care

Endodontic Management of a Maxillary Canine with Two Roots: A Case Report

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Submitted: 03 November 2025 **Accepted:** 10 November 2025 **Published:** 17 November 2025

https://doi.org/10.63620/MKJCDOC.2025.1041

Citation: *Abdel Hamed, K. M. (2025). Endodontic Management of a Maxillary Canine with Two Roots: A Case Report. J of Clin Den & Oral Care, 3(6), 01-04.*

Abstract

This case report describes the diagnosis and successful management of an upper right maxillary canine with two roots, an uncommon anatomical variation. A mid-40s female patient presented in Air Force Specialized Hospital with acute pulpitis with symptomatic apical periodontitis in the upper right canine, which was confirmed through clinical and radiographic examination. The root canal treatment was planned to address the infection and preserve the tooth. Upon access cavity preparation, two distinct canals were identified, a buccal and a palatal canal, CBCT was done to confirm the unusual anatomy. Both of which were thoroughly cleaned, shaped, and obturated using the warm vertical compaction technique. The patient experienced significant symptom relief post-treatment, with follow-up radiographs showing no change in the bone periapically. This case emphasizes the importance of careful clinical exploration and radiographic evaluation in detecting and treating unusual canal anatomy, ultimately ensuring successful endodontic outcomes.

Keywords: Maxillary, Endodontic, Canine, Management.

Abbreviations

CBCT: Cone Beam Computed Tomography
Ca(OH)2: Calcium Hydroxide
NaOCL: Sodium Hypochlorite
CHX: Chlorhexidine
K-files: Kerr Files

Background

Understanding the morphology of root canals is crucial for the success of root canal treatment. Therefore, during both the diagnosis and treatment phases of maxillary canines, clinicians must be mindful of the potential anatomical variations. The incidence of extra canals in the upper (maxillary) canine is relatively low. Studies have reported that approximately 0.5% to 3% of maxillary canines may have one or more additional canals [1]. However, this percentage can vary depending on the population studied and the techniques used for examination. While The occurrence of two roots in the upper (maxillary) canine is quite rare. Studies suggest that only about 0.2% to 2% of maxillary canines have two roots. This anatomical variation is considered uncommon, and most maxillary canines typically have a single root [2].

Patient Information

- Age: 42
- Sex: Female
- Medical History: No significant medical history; non-smoker; no drug allergies.
- Presenting Complaint: Patient presented with severe pain in the upper right canine region. Pain was described as constant, throbbing, and worsening with chewing or touch.

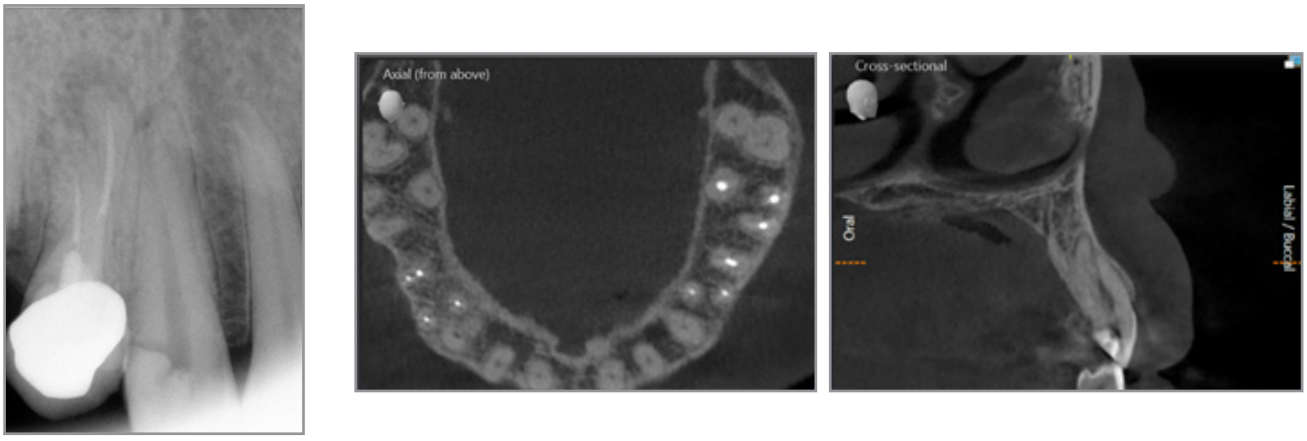
Clinical Examination

On intraoral examination, the upper right canine exhibited moderate-to-severe tenderness to percussion and palpation. There was no visible swelling or sinus tract noted. The surrounding gingiva appeared healthy, with no signs of infection or abscess

formation.

Radiographic Examination

A periapical radiograph was taken, which showed a periapical widening of the periodontal membrane space indicative of an apical periodontitis. The radiograph also revealed an unusual canal anatomy with potential for more than one canal, requiring further investigation (Figure 1). CBCT was taken to ensure the unusual anatomy and confirmation for two roots (Figure 2A, B).



(A) (B)

Figure 1: shows the preoperative radiograph of the two roots of the upper canine
Figure 2: shows the CBCT of the upper canine (A- axial view) (B- sagittal view)

Diagnosis

- Chief Complaint: Acute pulpitis and symptomatic apical periodontitis of the upper right canine (tooth #13).
- Anatomical Finding: The upper right canine was diagnosed with two root canals, a rare but not uncommon anatomical variant. The presence of multiple canals in maxillary canines is unusual, but it is important to explore these possibilities when symptoms suggest pulp involvement.

Treatment Plan

The patient was advised to undergo root canal therapy to resolve the infection and preserve the tooth. The treatment would include the following steps:

1. Access cavity preparation.
2. Canal exploration and cleaning.
3. Shaping and debridement.
4. Intracanal medication.
5. Obturation with gutta-percha.
6. Final restoration with composite resin.

Procedure

1. Anesthesia: Local anesthesia (2% Lidocaine with epinephrine) was administered to ensure patient comfort. The area around the upper right canine was adequately anesthetized.
2. Access Cavity Preparation: An initial access cavity was created using a high-speed round diamond bur under rubber dam isolation. The access was carefully outlined to avoid damage to the pulp chamber floor and to enable optimal visualization of the canal orifices.
3. Canal Exploration: Upon exploration, two distinct canals were identified within the root. The buccal canal was the more traditional, located slightly towards the mesial, while the palatal canal was smaller and more difficult to locate due to its position deep in the palatal aspect of the root. (Figure 3)
4. Using small, tapered endodontic files, both canals were negotiated and confirmed to reach the apical foramen. An initial radiograph was taken to confirm the working length for each canal.
5. Cleaning and Shaping: The canals were meticulously cleaned and shaped using the crown-down technique with ProTaper gold rotary files [3]. The apical one third was enlarged with manual K-files up to file 45 in the buccal canal and 35 in the palatal canal [4].
6. Irrigation was performed between each file using a mixture of 3% sodium hypochlorite and saline. Final flush was done using chlorohexidine 2% [5].
7. Calcium hydroxide intracanal medication was placed for a couple of weeks. (Figure 4)
8. Obturation: After achieving proper working length and adequate cleaning, master cone radiograph was taken to confirm cone fit. (Figure 5)
9. Both canals were obturated with gutta-percha using the warm vertical compaction technique. A resin sealer was applied to ensure a hermetic seal at the apex [6]. (Figure 6&7)
10. Post-Endodontic Restoration: After root canal obturation, the access cavity was sealed with a resin-based restorative material. The patient was then scheduled for a final post-endodontic restoration, which included placing a post and core followed by a crown.
11. Follow-Up: The patient was scheduled for a follow-up visit six months after treatment to monitor any changes in the periapical area. At this visit, a periapical radiograph was taken, showing signs of healing, with normal periodontal membrane space [7] . (Figure 8)

Figure 3: shows the clinical picture of the two orifices
Figure 4: shows the clinical picture of 2 orifices with Ca(OH)2 placed in the palatal canal
Figure 5: shows the master cone fitting

Outcome

The patient reported significant improvement in symptoms following the root canal treatment. Postoperative discomfort was minimal and managed with over-the-counter analgesics. On radiographic follow-up, there was evidence of healing with complete resolution of the apical periodontitis and no signs of infection. The patient remained symptom-free at subsequent follow-up visit

Figure 6: shows postoperative radiograph
Figure 7: shows clinical picture of the obturated canals
Figure 8: shows radiographic picture of the upper canine with the final filling

Discussion

Upper canines typically present with a single root canal, but variations do exist. It is estimated that approximately 0.6-1.4% of maxillary canines have two canals. These variations are often discovered through careful exploration during root canal therapy, and radiographs may provide a clue to the unusual anatomy. In the case presented, both roots were located and treated successfully.

The presence of multiple canals in a single root system can present challenges in treatment, such as difficulty in locating the second canal, increased instrumentation time, and the need for thorough disinfection [8]. However, with careful attention to detail and the use of advanced endodontic techniques, successful outcomes can be achieved.

This case report addresses a rare condition in literature which is an upper canine with two roots [9], the buccal is the main canal while the palatal one is small rudimentary root needs magnification and ultrasonic troughing to locate.

Conclusion

This case highlights the importance of careful examination and exploration in endodontic therapy, especially in teeth with complex canal anatomy like the maxillary canine (rare condition). Root canal treatment can be successfully performed even in cases of unusual anatomy, leading to the preservation of the tooth and resolution of symptoms. Early detection and proper treatment planning are essential for achieving optimal outcomes in such cases.

Acknowledgements

Not applicable

Authors' Contributions

Dr Kareem Mahmoud was the Guarantor of integrity of the entire clinical work, Literature research, Data acquisition, Manuscript preparation, Manuscript editing, Manuscript review and publishing.

Funding

This study was supported by dr Kareem Mahmoud.

Availability of Data and Materials

The datasets used or analyzed during the current study are available from the author upon reasonable request.

Declarations

Ethics of Approval and Consent to Participate

The patient did not have any problem to participate in the research and agreed that all data published in the international journals

Consent for Publication

Written consent was obtained from the participant included in the study. The patient provided written informed consent regarding the personal or clinical details along with any identifying images to be published in this study.

Competing Interests

The authors declare that they have no competing interests.

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