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Atypical Molar- Two Roots and Canals in Upper Molar

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Abstract: A thorough knowledge of root canal anatomy and morphology is essential for ensuring the success of endodontic treatment. The permanent maxillary first molar is recognized for its intricate internal configuration, and although it has been extensively studied, the occurrence of a two-rooted variant with only two canals remains uncommon. This case report describes the management of such a rare anatomical variation in a patient referred to the Department of Conservative Dentistry and Endodontics. Following evaluation with intraoral periapical radiographs (IOPA) and cone-beam computed tomography (CBCT), non-surgical root canal treatment was carried out successfully, and the tooth was subsequently restored with composite resin. The effective utilization of CBCT imaging and a dental operating microscope played a vital role in enhancing diagnostic precision and optimizing treatment outcomes in this unusual presentation of maxillary molar anatomy.

Keywords: *Anatomy, Molar, Roots, Root Canal, Tooth.*

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I. INTRODUCTION

Maxillary first molars are known for their complex anatomical structure, typically presenting with three roots and four canals[1]. However, cases with anatomical variations, such as a maxillary first molar having only two roots and two canals, are exceedingly rare but significant in clinical practice[2]. Such anomalies challenge traditional norms in endodontics, necessitating accurate diagnostic tools like cone-beam computed tomography (CBCT) to ensure proper identification and treatment[3].

In a conventional maxillary first molar, the usual anatomical pattern consists of two buccal roots and a single palatal root, often accompanied by a diverse canal configuration.[4] However, studies have documented that approximately 0.4% of maxillary first molars may exhibit root fusion, resulting in two roots, while the incidence of two canals is similarly rare, occurring in 0.2% to 2.0% of cases[5]. These anomalies are thought to stem from developmental issues, such as fusion of the Hertwig epithelial root sheath, which can affect the number of roots and canals [6].

The detection of such variations is greatly improved with modern imaging techniques like CBCT[7]. These technologies enable clinicians to assess tooth morphology in three dimensions, significantly improving treatment outcomes[8]. Early detection of anatomical variations is crucial, as undiagnosed root or canal anomalies can lead to missed canals and, ultimately, the failure of root canal therapy. The present case reports a maxillary first molar with two roots and two canals.

II. CASE REPORT

A 55-year-old female patient with no significant history of systemic disease presented to the Department of Conservative Dentistry and Endodontics for the management of a broken filling in her left maxillary first molar. The patient's primary complaint was mild discomfort in the damaged filling. Upon examination, pulpal and periapical tests were conducted after obtaining informed consent. The vitality tests revealed no response to cold stimuli, indicating possible pulpal necrosis. The tooth's response to percussion and palpation was normal.

An initial radiographic evaluation showed the presence of a broken occlusal filling on the mesial surface.

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Interestingly, the radiographs revealed an anatomical variation: the molar had two roots, a rare but documented occurrence for maxillary first molars. A CBCT was advised to verify the same.

The pre-treatment diagnosis was asymptomatic pulpal necrosis for the pulpal condition, while the periapical diagnosis was within normal limits. After administering local anesthesia with 2% lidocaine and 1:1:00,000 adrenaline, a rubber dam was placed to isolate the tooth. The old filling was removed, and deroofing of the pulp chamber was completed. Upon examination, only two canal openings were detected—one located buccally and the other on the palatal side. To confirm the canal anatomy, radiographs were taken with #20 K-Files placed in both canals, verifying the two-root, two-canal configuration (Figure 1). The root canals were prepared using a K-File ISO 20 and further shaped with Protaper gold rotary files, using the crown-down technique up to #30 with a 0.06 taper. Irrigation was performed using normal saline, 2.5% sodium hypochlorite, and 17% EDTA to ensure thorough disinfection.

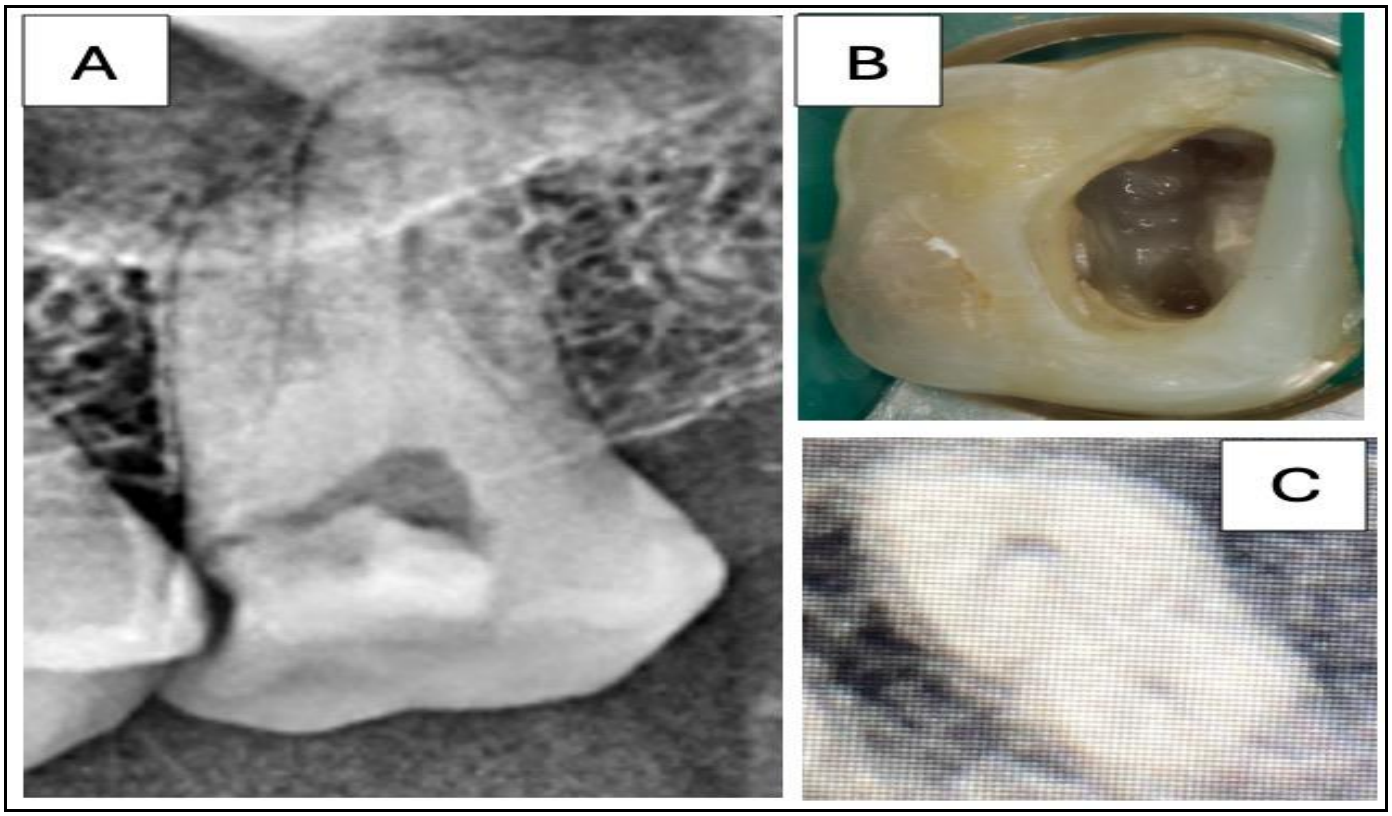

Fig 1 Pre-Operative. A: Intraoral Periapical Radiograph; B: Clinical Photograph of One Buccal and One Palatal Canal; C: CBCT Image

Once the canals were adequately prepared, they were dried with absorbent paper points and obturated using cold lateral compaction of gutta-percha points along with BioActive RCS. Post-treatment radiographs were obtained to assess the adequacy of the obturation (Figure 2). Finally, the access cavity was sealed with composite restoration.

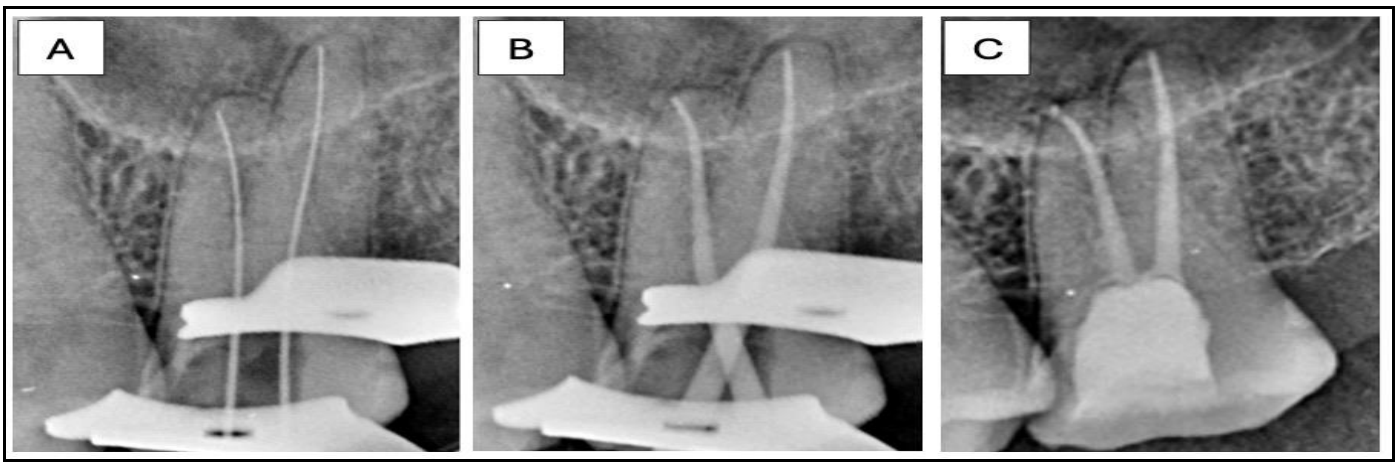

Fig 2 Treatment Process. A: Working Length Radiograph; B: Master Cone Radiograph C: Post-Obturation Periapical Radiograph

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III. DISCUSSION:

This case report describes an uncommon anatomical variation in a maxillary first molar, which presented with only two roots and two canals. This morphology is considered rare, as the typical anatomy of a maxillary first molar consists of three roots (two buccal and one palatal) and four canals[1]. Such variations are clinically significant due to their impact on root canal treatment, requiring careful diagnosis and planning to avoid treatment failure.

As reported in the literature, the prevalence of maxillary first molars with only two roots ranges between 0.2% and 0.4%, depending on the population studied. The incidence of two canals in such teeth is even lower, occurring in less than 2% of cases[5]. Such variations often arise due to developmental anomalies during tooth formation, such as fusion of the Hertwig epithelial root sheath[6].

➢ Classification of Root and Canal Morphology

- Ahmed et al classification: 216B1P1[9]
- Weine's Classification: Type I: Single canal from the orifice to the apex[10]
- Vertucci's Classification: In this case, the morphology likely corresponds to Vertucci Type I in both roots, where each root contains one canal[11]

Identifying these anatomical variations is crucial to avoid missed canals, incomplete debridement, and persistent infection. In this case, thorough examination with modern diagnostic tools such as cone-beam computed tomography (CBCT) were essential in confirming the presence of only two canals. This approach helped prevent any canals from being overlooked, which could otherwise lead to treatment failure[12].

Despite the anatomical variation, the treatment followed conventional protocols for root canal therapy. The canals were successfully located, cleaned, shaped, and obturated using standard techniques with rotary files, sodium hypochlorite irrigation, and gutta-percha.

IV. CONCLUSION

This case underscores the importance of being aware of and prepared for anatomical variations in dental practice. Root and canal morphology can differ significantly from textbook descriptions, and careful radiographic and clinical assessments are essential to avoid missed diagnoses. The use of advanced imaging tools, alongside traditional diagnostic methods, ensures a higher likelihood of successful outcomes in such rare and complex cases.

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