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Case Report
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A Clinical Case Record Concerning an Extraordinary Maxillary Second Molar Having 2 Separate Palatal Roots: Clinical Case Record

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Abstract

Introduction: Variation of pulp aperture, among teeth with multiple roots, constitutes recurring issue during diagnosing and completing efficient endodontic procedures. Understanding normal anatomy features and associated likely modifications is critical in the effective execution of the dental procedure, since inability to effectively treat simply one canal may end up into endodontic unsuccessful therapy.

Methods: The paper covers a procedure whereby the root pattern and canals of maxillary second molar was modified employing operative microscope and verified with Cone-Beam Computed Tomography (CBCT).

Results: CBCT revealed maxillary second molar containing 2 different palatal roots and canals and 2 distinct buccal roots and canals.

Conclusion: Research paper presents and investigates morphological difference observed on maxillary second molar in order to guarantee the effectiveness of root canal treatment examined utilizing imaging techniques like CBCT.

Keywords: 2 separate palatal canals and roots; Cone beam computed tomography; Maxillary second molar

Introduction

Intrinsic architecture within a human teeth is characterized by anatomical complexity. A plethora of studies have proven the fanciful complexities of canal system. Numerous variants are clearly articulated and reported, ranging from countless roots to canals, ramifications, lateral canals, fins, and apical deltas. The introduction of innovative equipment to the dental environment, like operating microscopy and CBCT, has resulted in an unprecedented exploration of the system for root canals.

The internal structure of teeth are an important criterion for determining the efficacy of the root canal procedure [1]. As a result, the outcome of the endodontic procedure is dependent upon the detection and treatment of every single canal [1]. For minimizing endodontic failure, dental professional needs to be well-versed upon tooth and root canal architecture [1]. Because of the uniqueness of every single teeth, there are numerous anatomical nuances imaginable [1]. This feature increases the difficulties of operations especially during chemo-mechanical preparation and sealing canals [1]. Completing this task is essential in the effective conclusion or execution of endodontic therapy [1].

On the contrary, unsatisfactory treatment of root canals because of an incorrect canal sculpting procedure is generally an indication of a lack of understanding of the complicated interior canal architecture [1]. Three roots are the more prevalent and repeated morphological number of roots recorded in the scientific record in maxillary second molars [1]. The aforementioned results, still show that there is inadequate specificity in pinpointing microscopic structures like additional and connecting canals [1]. These investigations are conducted using multifaceted techniques, like radiography, that are unable to recognize tiny differences in morphology [1]. Multiple approaches for examining canal structure are being used, including traditional radiography and, lately, CBCT and micro-CT [2]. CBCT serves as straightforward, safe, and suitable diagnostic approach with a broad spectrum of uses in dentistry, including evaluation of vertical root fractures, treatment of root

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canal effects, assessing canal structure and pre-surgical review [2].

CBCT provides an excellent level of precision in determining canal architecture [2]. As a result, it is regarded to be an appropriate and sufficient therapeutic tool to evaluate tooth canal anatomy [2].

The present paper discusses the effective root canal therapy of permanent maxillary second molar having four canals and four roots.

Case Presentation

A 41-year-old Indian female patient came to the dentistry division having a significant symptom regarding persistent discomfort in her uppermost posterior teeth area. The individual described pain that had been ongoing for a period of two days. The patient was in great overall wellness and having no previous serious medical conditions.

A dental exam revealed that tooth 17 showed profound proximal decay along with a cavitated condition. It had hardly extraoral/ intraoral swelling, nor was present a drainage channel related with the diagnosed tooth. Connected gingiva appeared and palpated normally. Percussion made the pulp of the tooth sore. Cold test revealed that tooth 17 had a response that was tardy. Tooth 17 had symptomatic irreversible pulpitis and healthy apical structures. Therefore, regarding tooth 17, conventional root canal therapy was intended to be accompanied by complete covering crown.

Following receiving the individual's written agreement, local anesthetic was delivered with articaine four percent and adrenaline

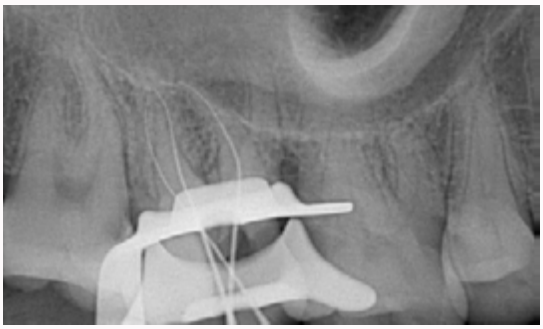

Figure 1: Radiograph image showing the presence of additional root it tooth 17.

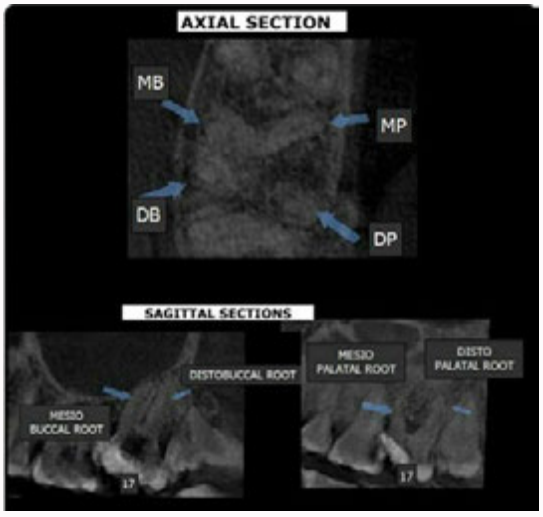

Figure 2: For confirmation: CBCT images showing 2 distinct buccal roots and 2 distinct palatal roots.

1:80,000. The access opening was then created with microscopy using a rubber dam. The existence of 4 openings in the cavity was established by evaluation: 2 in the buccal region and 2 in the palatal region. For easy uninterrupted accessibility to every canal, cavity was altered from being triangular into a square form (Figure 3A). The existence of another palatal canal was established using an operational microscopy and a DG-16 probe.

Coronal flaring was carried out following navigating the canals employing no. 10K file (Mani Inc. ltd Tochigi, Japan). Cavity had been temporarily closed, and the individual was directed to have a CBCT imaging to validate the results.

Four-rooted maxillary second molar comprising a pair of separate palatal roots and canals and a pair of separate buccal roots and canals was found by CBCT (Figure 2).

During the subsequent appointment, an electronic apex finder (J Morita Root ZX Mini) was employed to measure working length, which was then verified using radiographs of apical region with multiple angulations (Figure 4). Dentsply Protaper Gold files were employed to form the canals. MB, DB, MP, and DP orifices were formed to a size F3. Subsequent to acquiring a master cone imaging (Figure 4), a specific irrigation routine was used: 5.25% sodium hypochlorite (Nice Chemical PVT Ltd, Kochi, India) was stimulated with Endoactivator, then replaced with 17% ethylenediaminetetraacetic acid (Nice Chemical PVT Ltd, Kochi, India) over one minute in each canal. The very last rinse was normal saline (Infutec Healthcare Limited, Indore, Madhya Pradesh, India). Paper points have been employed to dry canals. Canals were sealed with an AH Plus sealer (Dentsply Sirona) and a heated vertical compaction method (Figure 3B). Composite resin had been employed for restoring the access opening (Figures 1-3).

Discussion

Four-rooted maxillary second molars are unusual in study [3-5]. Around 1.4% of maxillary molars, Peikoff et al. detected an additional palatal root [6]. In an *in vivo* investigation, Hartwell revealed 9.6% among 176 maxillary second molars contained 4 canals. [7]. Fortunately, the existence of 2 distinct palatal roots are still not recognized. Alani demonstrated the treatment for 2 palatal roots of contralateral maxillary second molars [8].

Christie et al. established method in categorizing 4-rooted maxillary second molar abnormalities according to the extent of roots separation and deviation (Table 1), [9].

Upon radiological assessment, the case presented in this research demonstrated maxillary second molars having 4 independent roots of two distinct palatal roots which are generally lengthy and tortuous, indicating Type I maxillary second molar characteristic.

Inner framework of maxillary second molar is hard to analyze owing to backward positioning. Owing to the overlapped anatomical components upon this region's imaging, additional palatal root canal cannot be identified [10,11]. Imaging collected from various angles assist in eliminating superimpositions and enable the professional to identify this unusual aberration [4].

For acknowledging and handling intricate tooth canal patterns, magnification is presently required [3]. It contributed to the effective resolution of the current incident [3].

For dental treatment, CBCT is an important method of diagnosis

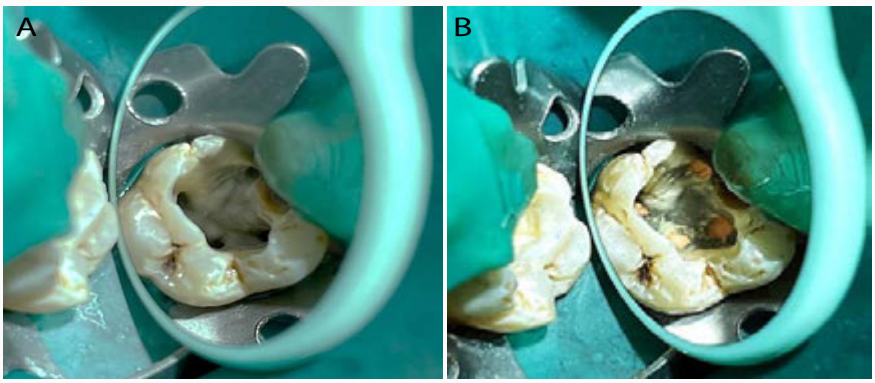

Figure 3: (A) Access opening on maxillary right second molar showing four root canal orifices (B) Shows complete obturation.

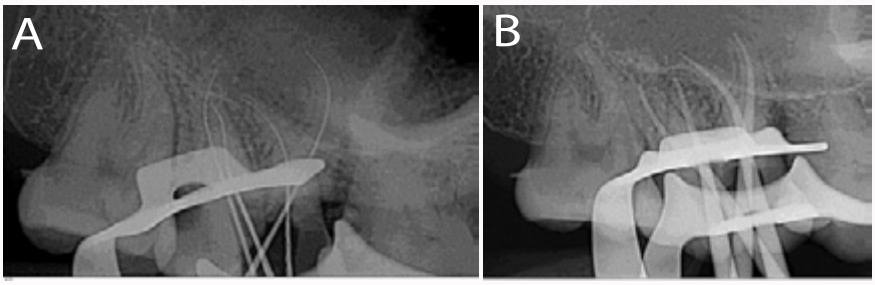

Figure 4: Radiograph images showing working length determination and master cone.

Table 1: Classification of four-rooted maxillary second molar [5].

Type	Characteristics
I	Two widely divergent palatal roots that are often long and tortuous. Buccal roots of tooth are often cow horned and less divergent. Four separate root apices are seen on radiograph.
II	Four separate roots seen, but are often shorter, run parallel have buccal and lingual root morphology, and have blunt apices. Radiograph with buccolingual superimposition may make this appear as having only a mesial and distal root.
III	Constricted in root morphology with MB, MP, and DP canal engaged in a web of root dentin. The DB root in these cases appears to stand alone and may even diverge.

[3]. This aided us in distinguishing two distinct palatal canals. According to the information available, maxillary second molar exhibits a greater frequency of anatomical changes than the maxillary first molar, suggesting that its anatomy is considerably more complicated than maxillary first molar.

Conclusion

Comprising the use of CBCT, the present instance illustrates without surgery endodontic treatment on a maxillary second molar containing a pair of different palatal canals and roots, along with 2 distinct buccal roots and canals. The current study provides a precise comprehension of canal architecture of maxillary second molar using CBCT scanning. It will assist clinicians understand and foresee the challenges of multidimensional endodontic treatment, particularly when performing chemo-mechanical preparation. Complicated canal architecture may be effectively identified, controlled, and addressed using microscope and CBCT.

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