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Case Report

Non surgical retreatment three rooted maxillary premolars: A case report

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ABSTRACT

Effective and successful endodontic treatment requires dentists to have adequate information on the clinical variations in root canal anatomy. Maxillary premolars exhibit anatomical variations in the numbers of roots and canals, which pose a challenge during root canal therapy these variations must be considered for successful endodontic therapy. Herein, we illustrate the diagnosis and clinical management of previously endodontically treated three rooted maxillary premolars using Cone Beam Computed Tomography (CBCT).

1. Introduction

The anatomy of the root canal system is unique and complex, which provides a conducive environment for the microbial flora.[1,2] Variations in the root canal morphology may pose challenges to the clinician during the operative stages, including access cavity design, bio-mechanical debridement and obturation. One of the primary factors for endodontic treatment failure is undetected extra canals.[3] Therefore, clinicians must have a keen eye/be observant of the morphological variations in the root canal system of the teeth.

In routine dental practice, the root canal anatomy and configuration are determined using preoperative radiographs. However, these present which potential drawbacks, such as superimposition of structures and image distortion.[4] Recently, cone-beam computed tomography (CBCT) has been used for the diagnosis of contentious cases in endodontics. CBCT images provide a three-dimensional evaluation of the root canal system, teeth, hard tissues, and the adjacent structures.[5,6]

Several in vitro studies have reported anatomical variations in the root canal morphology of maxillary premolars.[3,7,8]. Vertucci reported an incidence of 0.3 to 2% of three root canals in maxillary second premolars.[9] The prevalence of three roots in maxillary first premolars is 0.6%, and in general, one root contains one canal.[8,10] Three-rooted maxillary premolars have root canal morphology similar to maxillary molars, and were termed as "mini molars" or "radiculous" by Maibum[11] and Goon[12] respectively.

This case report discusses the endodontic management of previously treated maxillary first and second premolars with three separate roots confirmed with CBCT.

2. Case Report

A 30-year-old male patient was referred to the Post Graduate Department of Conservative Dentistry and Endodontics, by his general dentist for the retreatment of maxillary premolars in the second quadrant.

Patient complained of pain and food lodgement in the upper left back tooth region for two weeks. The pain was mild, intermittent, and non-radiating in nature. Patient gave a history of endodontic treatment of both the first

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and second maxillary left premolars, 1 year back. Clinical examination revealed tenderness on vertical percussion, no extra or intraoral soft tissue abnormalities, and normal probing depths. Crowns of both the premolars were removed by the general dentist. Preoperative radiographs revealed widening of the periodontal ligament (PDL), unsatisfactory obturation, and the presence of an extra root outline suggestive of an additional root (Figure 1).

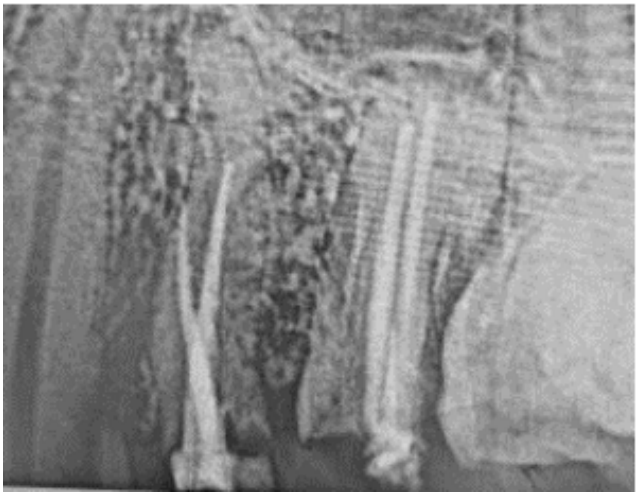

Fig. 1: Preoperative intraoral periapical radiograph of#24 & #25 showing unsatisfactory obturation and widening of the PDL space

2.1. CBCT images were analysed and showed the following findings

Tooth 24 was a morphologic variant with three distinct mesiobuccal, distobuccal, and palatal roots. The apical third of the unobturated distal root was curved palatally and exhibited periapical rarefying osteitis. The buccal cortical plate adjacent to the periapical lesion was thinned and partially dehiscent, suggesting chronic endodontic pathology (Figure 2).

Tooth 25 was a morphologic variant with fused mesiobuccal, distobuccal, and palatal roots and exhibited periapical rarefying osteitis. Mild hypercementosis was present on the mesial aspect of the root apex. The contiguous buccal cortical plate and sinus floor were thinned, but appeared to remain intact. The existing obturation in the mesiobuccal and palatal canals were short of its radiographic ends. Distobuccal canal was unfilled and heavily calcified. These findings suggested the presence of chronic endodontic pathology (Figure 3).

A diagnosis of symptomatic apical periodontitis was established with respect to 24 and 25. Medical history was non-contributory. Therefore, non-surgical endodontic retreatment was planned. Patient was acquainted with the treatment steps, and a written informed consent was obtained prior to the initiation of therapy.

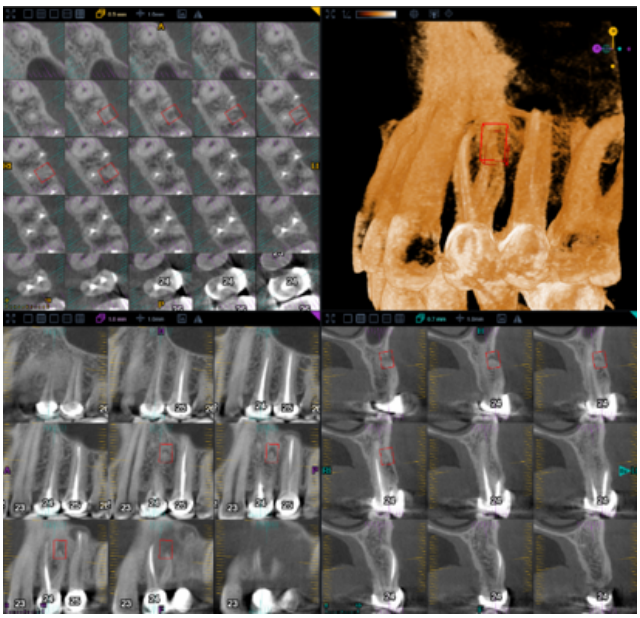

Fig. 2: Three-dimensional cone-beam computed tomographic (CBCT) images of tooth #24 showing three distinct roots

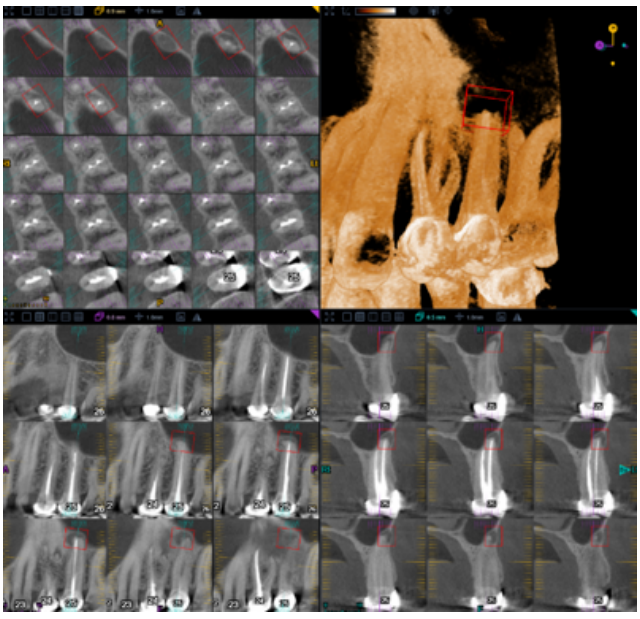

Fig. 3: Three-dimensional cone-beam computed tomographic (CBCT) of tooth #25 showing three fused roots and periapical pathology in relation to the buccal roots.

The tooth was anesthetized with 2% lignocaine (Xicaine, ICPA health products Ltd, Gujarat, India). The retreatment procedure was initiated under rubber dam isolation in the left maxillary first premolar. The access cavity was re-entered using a number 2 round carbide bur. Coronal flaring was done using gates glidden drill (#1 and #2, Mani Inc, Japan). Previous root canal filling material was removed using Hedstrom file (#15–40, Mani Inc, Japan) and xylene (Fischer scientific, Thermo Electron LLS India Pvt Ltd) using the crown-down technique. Clinical examination of the access cavity revealed an eccentric buccal orifice. The access cavity was modified into a T-shaped outline. Bifurcation of the buccal canal into mesiobuccal and distobuccal canals was observed bifurcating 5 mm below the level of pulpal floor. The working length was determined using the Root ZX electronic apex locator (J. Morita Corporation, Tokyo, Japan), and confirmed by a periapical radiograph (Figure 4). A glide path was established using K files (#8, #10, and #15) (Dentsply Maillefer, Ballaigues, Switzerland). Root canal preparation was completed with the NT Gold rotary files (NineTen) till 30.04 size in the buccal canals and 35.04 size in the palatal canal. Irrigation was performed with 5% sodium hypochlorite (J.L.Morrison India Ltd.) using the EndoVac system (SybronEndo Corporation; Orange, CA, USA) (Figure 5). An intracanal medicament of sterile calcium hydroxide powder mixed to a thick consistency with 2% chlorhexidine (SafePlus, Neelkanth Pvt Ltd, Jodhpur, India) was placed in the canals for one week. A cotton pellet was placed in the pulp chamber and the access cavity was temporized with cavit (3M ESPE).

Fig. 4: Radiographic confirmation of working length of 24 after removal of the gutta percha cones from themesiobuccal and palatal canals.

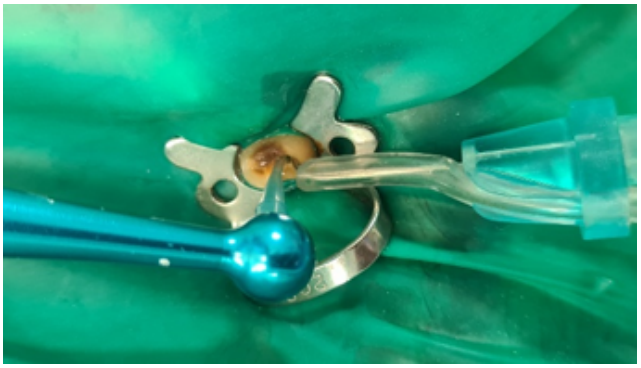

Fig. 5: Apical negative pressure irrigation with Master delivery Tip and Macrocannula of EndoVac.

In the following appointment, intracanal medicament was removed using H files and copious saline irrigation. Final flush was performed with 17% EDTA (Prevest DenPro; Jammu) followed by 5% sodium hypochlorite. A sonic activator was used to activate the irrigants (Figure 6) and copious saline irrigation was done before each irrigant change. The canals were dried using absorbent points (Meta Biomed Co.Ltd.; Korea) and master cone confirmation radiograph was obtained (Figure 7). Subsequently, the canals were obturated with laterally condensed gutta-percha (DENSTPLY Maillefer; Switzerland) and Sealapex sealer (Sybron-Kerr, Romulus, MI, USA). Postobturation radiograph showed satisfactory filling of all three canals (Figure 8). Postendodontic coronal seal was established using nanohybrid resin composite (Tetric Evo Ceram, Ivoclar Vivadent).

Similar procedure was performed for the maxillary left second premolar in subsequent visits (Figure 9).

Fig. 6: Activation ofirrigant with sonic activator.

3. Discussion

Endodontic therapy of premolar teeth is particularly challenging due to the high probability of supernumerary root canals.[13,14]premolars were found at a frequency of 0.5%–6% and 0.3%-2% respectively.[8–10,15] Bellizzi found

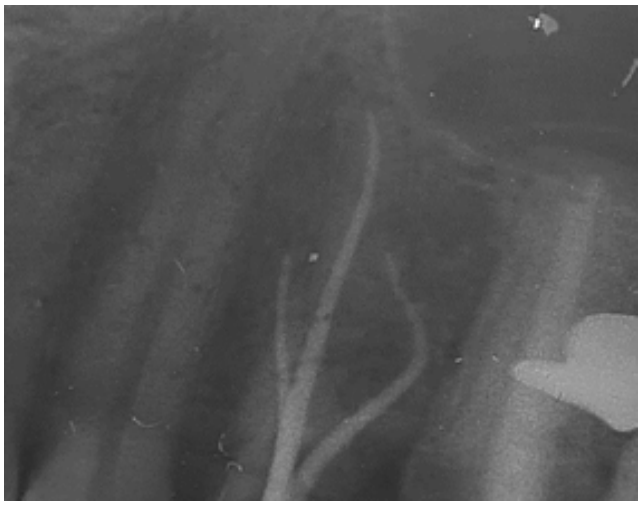

Fig. 7: Radiograph confirmation of master cone for 24.

Fig. 8: Postobturation radiograph showing adequate filling of the three canals of 24.

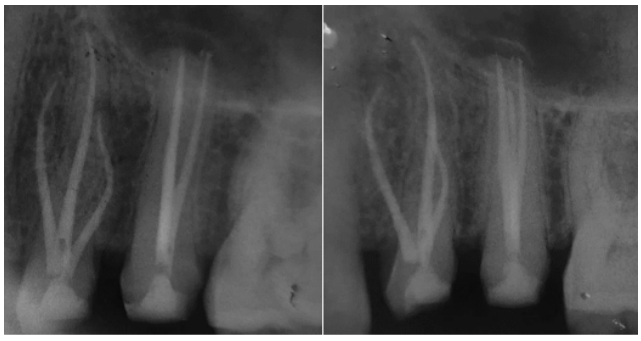

Fig. 9: Postobturation radiographs of 24 and 25 with different horizontal angulations.

that only 1.1% of teeth with three canals in 630 maxillary premolars and did not report any with three roots.[16] There were only a few case reports of maxillary second premolars with three canals and three independent roots.[3,17]Failing to recognize the presence of a canal and leaving it untreated, is one of the main causes for root canal treatment failure.[18] Since an additional third canal is one of the most common variations in the maxillary first premolar, anticipating the same before initiation of therapy will greatly facilitate subsequent treatment. Classified the root morphology of maxillary second premolars into three following groups: (a) three fused roots or fused buccal roots and a partially fused or separated palatal root; (b) buccal roots fused at the middle or apical third, with a separated or partially fused palatal root; and (c) all three roots separated at the cervical third.[16]

Visualization of the three canals in maxillary premolars on preoperative radiographs can often be difficult. The conventional periapical radiograph is a two dimensional image of a three dimensional object and therefore, may not be sufficient to give a complete overview of the internal root canal anatomy. However, a detailed radiographic examination of the tooth may facilitate the clinician in recognising any additional roots from the external root outline. Radiographically, an abrupt loss of the radiolucent pulp canal space is highly suggestive of an extra canal either in the same root or in other independent roots. Additionally, in case of maxillary premolars an equal or greater mesiodistal width of a root in the middle-third as compared to the mesiodistal width of the crown, may indicate a three-rooted anatomy.[17]

CBCT images provide a three-dimensional view of the teeth and supporting structures. In addition, CBCT can be used to assess the internal anatomy of the root canal system as in this case report.[6,7]

Careful clinical examination of the pulpal floor is imperative for a well-designed access and successful root canal treatment. Eccentric canal orifice is an important sign for the presence of an additional canal. In addition, a third canal must be suspected when the pulpal floor is not aligned in its expected bucco-palatal relationship.[9,19] Successful endodontic management depends on an early diagnosis of the anatomical variations, modification of the access cavity design, and accurate canal location. Balleri et al., advocated the mesiodistal extension of the access cavity along the buccal aspect for a "T" shaped access.[19] This modified preparation outline for the three canaled maxillary premolars favors a good access to each of the two buccal canals, which was followed in the above mentioned case.

4. Conclusion

Not knowing the anatomy of tooth, we are treating is like setting out on an unknown journey without a road map. Thus, endodontists must carry out a comprehensive radiographic evaluation to interpret the root canal anatomy.

Furthermore, any morphological variations must be verified using spiral CT and CBCT.

5. Conflict of Interest

The authors declare no relevant conflicts of interest.

6. Source of Funding

None.

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