

Endodontic Management of Maxillary Second Premolar with Three Canals and Three Roots by Using CBCT: A Case Report

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Abstract

Knowledge of root canal anatomy and morphology is one of the significant elements for the successful result of endodontic therapy. Absence of knowledge relating to internal anatomy will lead to mistakes like access, localization of canals, cleaning and shaping and obturation of the root canal. Slowey expressed that root canal morphology has boundless variations and clinicians ought to consistently know that anatomic variations contribute a great challenge to the successful finishing of endodontic treatment.

Keywords: Premolar • CBCT • Endodontic therapy

Introduction

Maxillary second premolars are among the troublesome teeth to be treated endodontically in the human dentition and this could be because of various variables like the number of roots, the number of root canals, the course of the roots and different pulp cavity configuration [1-4]. Most maxillary premolars normally have one root with one canal. However, single-rooted maxillary second premolar with two canals are also reported and when two canals are present they are either separated or joined at the apex [3]. The maxillary second premolar is the tooth that presents the eight configurations of vertucci classification [5]. Maxillary first premolar having three separate roots has a frequency of 0.5% to 6% [5,6]. The maxillary second premolar shows considerably lesser rate of 0.3%-2% in laboratory studies [7,8]. Three rooted maxillary premolars look anatomically like molars and are sometimes called as small molars or radicolous [9,10]. Whenever there is an unexpected loss or straightening of a radiolucent canal in the pulp cavity, an additional canal ought to be suspected that could be in the same root or other independent roots [11]. During the endodontic procedure, the utilization of periapical x-ray as a complimentary assessment is pivotal since they show up at a correct diagnosis, determine the treatment plan, control the various stages and assess the outcome [12]. Data provided by x-ray is restricted to the 2D image of a three-dimensional structure and poses distortional superimposition issues of anatomical structures. These restrictions can be overcome with cone-beam computed tomography which provides a 3D image of the root canal system [12]. The current study aimed to describe the complex endodontic management of a maxillary second premolar with three canals and three distinct roots with the help of CBCT as a diagnostic tool.

Case Presentation

A 22-year-old male patient reported to the emergency clinic of the college

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Received 10 June 2020; **Accepted** 25 June 2020; **Published** 02 July 2020

of dentistry, King Saud university medical city, Riyadh, Saudi Arabia of pain in maxillary right second premolar. The patient complained of continuous pain past two weeks. The extraoral examination did not reveal any specific finding. Radiograph did not reveal any changes in the peri-radicular area and periodontal ligament spaces associated with the tooth. Vitality thermal test showed lingering pain but other abnormalities like palpation, percussion, probing depth, or mobility were not seen. The tooth was diagnosed as symptomatic irreversible pulpitis with normal apical tissue. The tooth would be rehabilitated with a crown after completion of root canal treatment. The tooth was isolated with a rubber dam after administering infiltration with local anesthesia (2% lidocaine with 1:80000 epinephrine). Number 4 round carbide bur was used to prepare access cavity with an ovoid outline. Three orifices were located with the help of DG 16 explorer, two buccal and one palatal. The root canals were routinely instrumented with K file till #25 and then rotary profile series was used till 04 sizes 35 in both the buccal and palatal canal. Debridement of the canals was done with EDTA 17% and sodium hypochlorite solution 5.25%. The last irrigant was normal saline. They were then obturated with single cone technique using AH Plus sealer (Dentsply USA), a temporary glass ionomer (G C Fuji II) cement restoration was placed and a radiograph was taken (Figures 1-6).

Discussion

The prevalence of three roots in maxillary second premolar is uncommon. In literature, it is mainly described by way of case reports [13-15]. Previous studies conducted on extracted teeth have described the chances of finding an upper second premolar with three roots and three canals as being less than 1.1% [16,17]. Three rooted maxillary second premolar is likewise named as ridiculous premolars or small molars that have two buccal roots and one palatal root, similar to maxillary molar [13]. According to Bellizzi [16], the root morphology of maxillary second premolar is divided into three groups:

- Three fused roots or fused buccal roots and a partially fused or separated palatal root.
- Buccal root fused at the middle or apical third and with a separated or partially fused palatal root.
- All three roots separated at the cervical third. In this case, the root canal system was group



Figure 1. Access cavity.

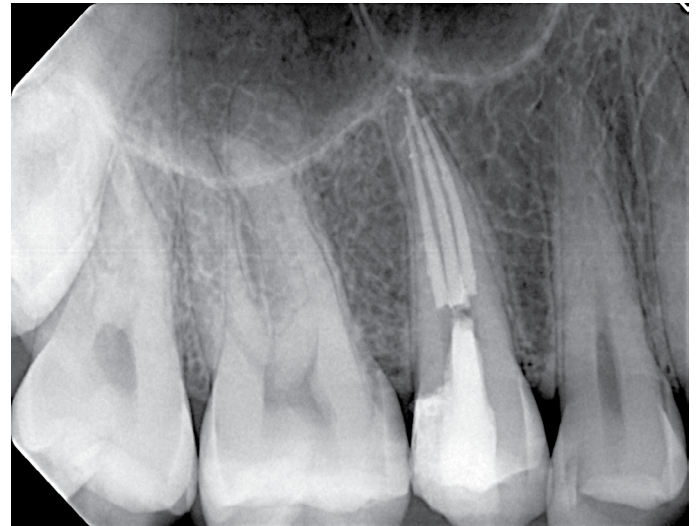


Figure 4. Post-operative radiograph.

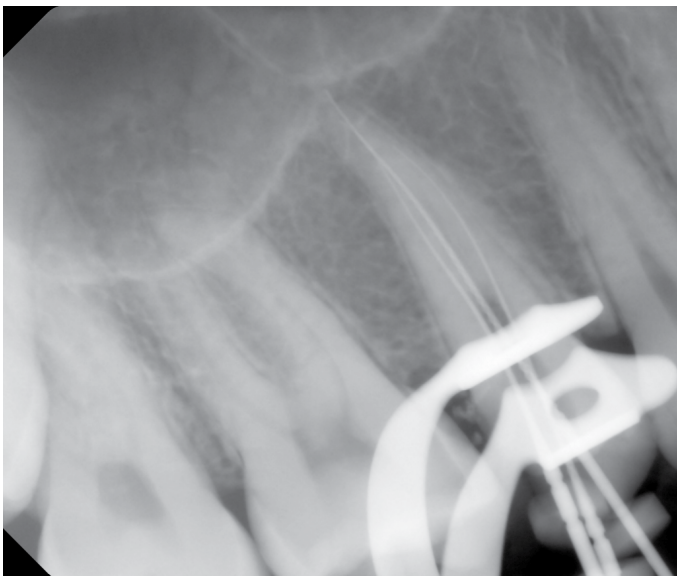


Figure 2. Working length radiographs for the initial files.

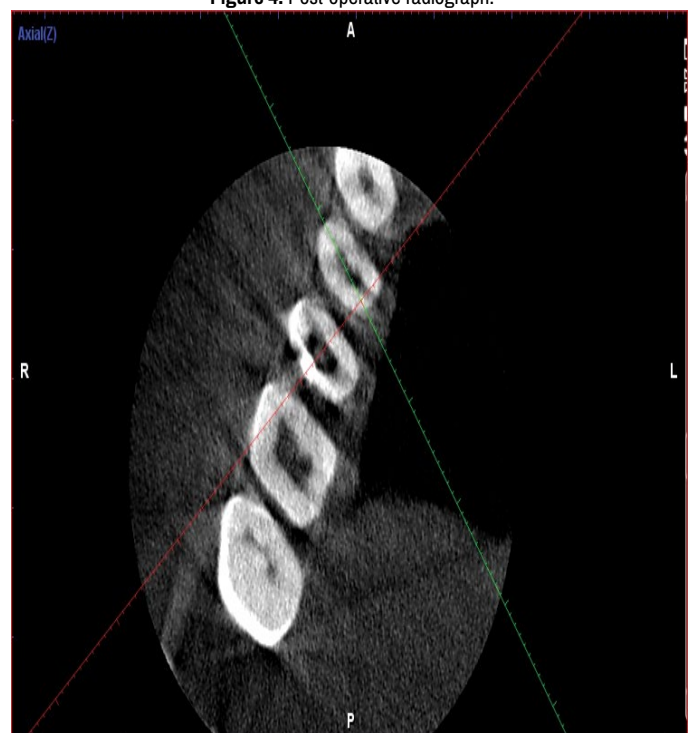


Figure 5. Horizontal cut from CBCT.

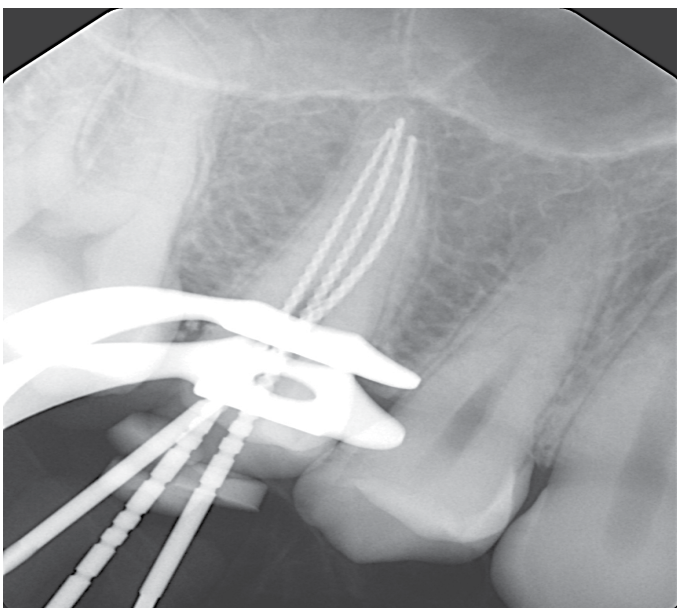


Figure 3. Master apical file radiograph.



Figure 6. Sagittal cut from CBCT.

- Sieraski et al. proposed that when the mesiodistal width of the mid-root image is equal to or greater than the mesiodistal width of the crown, the tooth most likely has three roots.

The straight angled radiograph should be enhanced with an angled x-ray, thus any extra roots or canals might be noticeable. However, may not generally be satisfactory for evaluating morphological varieties in root anatomy. Advanced diagnostic tools like a Cone-Beam Computed Tomography (CBCT) may give a progressively precise image of root canal morphology. Balleri et al. proposed a T-shaped outline for three rooted maxillary first premolar. This adjustment permits a great access to the two buccal canals. The presence of a third root canal should be suspected if at the working length radiograph the instrument is displaced in either the mesial or distal direction. Setting up straight-line access to the three canals is of essential significance. This can be accomplished with gates glidden drill set on a slow hand piece at 750-1000 rpm in the crown down fashion. This assists to diminishing the stresses in the root canal instruments, thus, decreasing the fracture risk and extent of canal transportation [18]. The utilization of magnification and fiber optic illumination offers a noteworthy bit of merit while locating and treating extra canals. In looking into the literature, the incidence of maxillary second premolars with three root canals seems to be distributed among specific regions of the world: with most being in South America (Brazil) followed by middle east (three in Saudi Arabia and two in turkey) [14-21]. It would be fascinating to dissect whether there were any conceivable contributing variables to this like inheritance pattern or ethnic origin. Successful endodontic treatment is dependent on adequate removal and prevention of recolonization of microorganisms from the canal system by the placement of root fillings that obturates the full space and then a restoration that produces a satisfactory coronal seal.

Conclusion

The case in this report was presented for its rarity. Variations in the number of roots and root canals may occur in any teeth. Clinicians doing root canal treatment should be aware of this and should always look for aberrant anatomy during each step of root canal treatment. The present case report emphasizes the same.

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How to cite this article: Khaled Mohammed Alwehaiby, Waleed Khalaf Alanazi, Ahmed Ibrahim Alzahrani, Turki Ez'Aldeen Almasloki, et al. "Endodontic Management of Maxillary Second Premolar with Three Canals and Three Roots by Using CBCT: A Case Report." *Clin Case Rep* 10 (2020): 1369