



MANDIBULAR 2ND PREMOLAR WITH TWO ROOTS AND THREE CANALS: A CASE REPORT

Endodontics

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ABSTRACT

Mandibular premolars have earned the reputation for having an aberrant anatomy. Literature is replete with reports of extra canals in mandibular second premolars, but reports about the incidence of extra roots in these teeth are quite rare. Before initiating any endodontic therapy, probability of extra canals should be considered. The Incidence of three canals in mandibular second premolar has been reported to be 0.46-0.5%. The present report describes nonsurgical endodontic treatment of mandibular second premolars with three canals. This case report explains non-surgical endodontic treatment of a mandibular second premolar with two separate roots and two separate buccal, and lingual canal orifices and three canals namely Mesio-buccal, Disto-buccal and Lingual. Close attention to anatomic variations, thorough advance radiographic method like CBCT, thorough evaluation of the pulp chamber floor, and use of magnifying and optical devices have been recommended for the success of endodontic treatment of mandibular second premolars with complicated root canal system anatomy.

KEYWORDS

Dental Pulp Cavity/Abnormality, Bicuspid, CBCT.

Introduction:

Mandibular premolars have earned the reputation for having the most aberrant anatomy. Numerous reports of root canal variations in these teeth have been reported in the literature. [1],[2] Vertucci in his series of studies conducted on extracted teeth, reported 2.5% incidence of a second canal. [3] Zilich and Dawson reported 11.7% occurrence of two canals and 0.4% of three canals. [5] According to Ingle, mandibular second premolars have only 12% chance of a second canal, 0.4% of a third canal and Harty has reported 11% possibility of second canal. In most instances they have had one canal, but teeth with two or more canals have also been reported. [4],[5],[6],[7],[8] Cone Beam Computed Tomography (CBCT) is a diagnostic imaging modality that provides high-quality, accurate three-dimensional (3D) representations of the osseous elements of the maxillofacial skeleton. CBCT systems are available that provide small field of view images at low dose with sufficient spatial resolution for applications in endodontic diagnosis, treatment guidance, and posttreatment evaluation.

Case report:

The patient was a 50-year-old male with no history of any systemic diseases. The patient had referred to the Department of Conservative and Endodontics Dentistry at Darshan Dental College and Hospital, with a chief complaint of pain in the posterior area of the right lower arch. Clinical evaluations revealed a carious lesion in the mandibular second premolar. Pulp vitality tests showed sensitivity to heat, cold, and electric pulp tests. Sensitivity to percussion was in the normal range. Radiographic evaluation revealed normal periodontium and presence of more than one root. (fig. 1a)

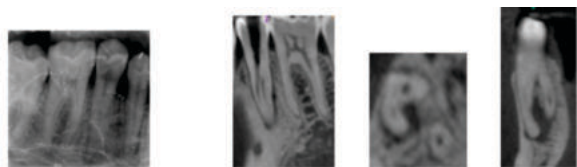


Fig. 1A: Pre-op IOPAR

Fig. 1B: CBCT sections confirming 3 canals with 2 roots

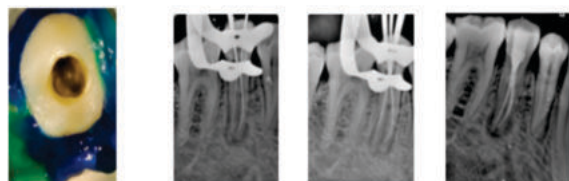


Fig. 2: Access cavity

Fig. 3: Working length

Fig. 4: Master cone

Fig. 5: Post-op

Symptomatic apical periodontitis diagnosis was made for tooth 45 and nonsurgical endodontic treatment was planned with two-session. After the administration of the local anaesthetic agent (2% lidocaine with 1: 100,000 epinephrine), under rubber dam isolation 45 tooth access was gained and the conventional access opening was modified in the way that it was wider Bucco-lingually, Mesio-distally (fig.2) and Extra 2 canals were found and then was confirmed using CBCT (fig 1b). Total 2 Roots: Buccal and lingual and 3 root canals were found namely Mesio-buccal, Disto-buccal and Lingual with 2 canal orifices: Buccal and Lingual in which the buccal canals were merging at middle third of the radicular portion showing vertucci's type II canal configuration for Buccal root and tooth shows type IV configuration of root canal system.

Working length was determined with an apex locator (Root ZX, J Morita Inc, Japan) and confirmed by radiograph (fig.3). Cleaning and shaping of the canals were carried out by Pro-taper Gold Rotary files (Dentsply Maillefer-USA) and Hyflex CM rotary files (Coltene, Germany) using the crown-down technique up to the final sizes of F1, 0.04/25 and F1 in the Mesio-buccal, Disto-buccal, and Lingual canal respectively. The canals were irrigated with 2.5% sodium hypochlorite and 17% EDTA during instrumentation and master cone was confirmed using radiograph (fig.4).

After final irrigation with normal saline solution, the canals were dried with paper points and obturated with gutta-percha and AH26 (Dentsply, De Trey, Konstanz, Germany) sealer using Single Cone technique and was thoroughly down-packed with Fi-p device (Woodpecker) and then post-endo restoration was done using composite (fig.5).

Discussion:

Mandibular second premolar is one of the most difficult teeth for the endodontic treatment [9] because of the variations in internal morphology, extra root canals, apical deltas and lateral canals [10][11]. Straight and angled preoperative radiographs using parallel technique are essential in providing insight into the number of existing root canals [12]. Generally, in mandibular premolars with three canals, the cervical half of the root is wider than usual, with little or no taper [9].

Root canals may not be evident in radiographs and may look unusual. Sudden change in radiographic density and sudden narrowing of root canal space usually indicates an additional canal [13]. Therefore, careful interpretation of the periodontal ligament space and angled views may suggest the presence of an extra root or canal. In the presented cases, unusual root shape was observed in pre-treatment radiographs, which recommended the possibility of extra roots and canals.

Using magnifier loupe, fibre-optic illumination for observation of anatomical landmarks in the pulp chamber, sodium hypochlorite bubbling in the extra canals and dyes may be helpful in locating additional canals [12][13]. For better visualization, we used a surgical operating microscope as well as staining with methylene blue, which could penetrate into the orifice to detect developmental grooves, and then according to pulpal floor map, we were able to predict suspected location of canal orifices. In the pulp chamber floor of the mandibular premolars with three canals, many authors have reported one orifice in the lingual side and two in the buccal [9][14][15]. In our reported cases, such a pulpal map was observed.

The success of endodontic treatment depends on the identification of all root canals so that they can be accessed, cleaned, shaped, and obturated so with the help of advancement in Radiographic method 3D view from CBCT helps the practitioner to assess the complexity root canal anatomy before initiating the root canal treatment and which results in better treatment outcome.

Conclusion:

Successful and predictable endodontic treatment requires knowledge of normal anatomy and variations. In the case where radiographic images are not helpful to clarify root canal anatomy and aberrations, magnification devices and CBCT are recommended. Also, enhancement of colour contrast by means of dye may be helpful to visualize deeply situated orifice and aberrations.

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