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Curious Case of Unusual Root Canal Morphology of Entire Mandibular Posterior Arch Treated with CBCT Assistance: A Case Report

Rao AS*

Department of Conservative dentistry & Endodontics, K M Shah Dental College and Hospital, India

***Corresponding author:** Ajay Singh Rao, Department of Conservative Dentistry and Endodontics, KM Shah Dental College and Hospital, Sumandeep Vidyapeeth, India, Tel: 8385017307; Email: drajayinendo@gmail.com

Case Report
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Abstract

Sometimes most of the Clinicians, especially Endodontists, encounter the variations in conventional or usual anatomy of the root canal systems. One of those unconventional and also strange complexities of canal morphology has been discussed in the present case. A 35-year-old female patient referred to the Department of Conservative Dentistry & Endodontics. On intraoral hard-tissue examination, deep occlusal caries was observed in relation to tooth number #34. After taking pre-operative IOPA radiograph it was noticed that both the premolars; #34 & #35 had two roots and also #35, which had a full crown restoration on it, was poorly obturated. So for this reason a primary root canal treatment was planned for #34 and Retreatment was planned for #35 (after removal of the full crown). Before starting any treatment a CBCT scan was done to see the three dimensional morphology of the concern teeth and that's when a strange configuration of root as well as canal morphology was noticed. #34 had two roots; one mesial and one distal whereas #35 had two roots; one buccal root and one lingual root. Also tooth #36 showed multiple canals in distal root and after crown removal secondary caries was seen approaching the distal pulp horn with #36. So all three teeth went under Endodontic therapy under magnification using Dental operating microscope and were treated successfully.

Keywords: Unusual root canal morphology; Double rooted Mandibular premolars; CBCT

Abbreviations: CBCT: Cone Beam Computed Tomography.

Introduction

The chief objective of endodontic therapy is thorough cleaning & shaping of the entire root canal followed by a three dimensional obturation with an inert filling material and final restoration thereby providing a tight coronal seal [1]. Weine has cited the major causes of endodontic treatment failure are incorrect canal instrumentation, incomplete obturation and untreated major canals [2]. Failure to recognise the presence of an additional root and or root canal in any tooth may result in failed treatment and may be the source of any flare ups during and/or after treatment and interestingly, premolar teeth show considerable variations in root canal morphology [3]. Vertucci described five different types of canal configuration for Mandibular first Premolar [4].

The presence of extra roots or canals in Mandibular Premolars is undoubtedly an endodontic challenge. Numerous studies have reported the prevalence of multiple canals in premolars. Jain A, et al. reported the prevalence of 11.59%, while Sharma D, et al. reported 26.6% and Cleghorn BM, et al. showed 27% chances of finding two canals in

Mandibular Premolars [5]. The root morphology and canal morphology of the mandibular premolars can be extremely complex and highly variable [6]. The incidence of two roots and two canals in the mandibular second premolar was 0.0-0.4% & 13.5-20% respectively [7]. In their radiographic survey, Serman and Hasselgren concluded that roots and root canals of mandibular premolar teeth were mostly situated buccally and lingually. The incidence of two roots in mesial and distal location is an uncommon appearance [8].

Cone beam computed tomography (CBCT) has become very popular in the field of Endodontics as it helps the clinician to assess the Preoperative, Intraoperative and Postoperative phases of treatment procedure. Conventional Radiographs produce 2D image of a 3D object whereas CBCT unit reconstructs the projection data to provide interrelational images in three orthogonal planes (axial, sagittal, and coronal) and this data can be reoriented in their true spatial relationships [9-11].

The purpose of presenting this case report is to bring this strange anatomy of two adjacent Mandibular premolars with just opposite and root configuration which was identified only with the help of CBCT.

Case Presentation

A 35 years old female patient was referred to the Department of Conservative Dentistry & Endodontics, K.M. Shah Dental College and hospital for root canal treatment of tooth #34. Her medical history was non-contributory. The patient's chief complaint was pain in the lower left Mandibular region. Clinical examination showed large carious lesions in the lower left first premolar tooth. On intraoral hard-tissue examination, deep occlusal caries was observed in relation to tooth number #34. After taking pre-operative IOPA radiograph it was noticed that both the premolars; #34 & #35 had two roots and also #35, which had a full crown restoration on it, was poorly obturated. So for this reason a Conventional primary root canal treatment was planned for #34 and Retreatment was planned for #35 (after removal of the full crown). Before starting any treatment a preoperative CBCT scan was done to see the three dimensional morphology of the concerned teeth and that's when we saw a strange configuration of roots as well as canal morphology. Tooth #34 had two roots; one mesial and one distal whereas #35 had two roots; one buccal root and one lingual root. Also tooth #36 showed multiple canals in distal root and after crown removal secondary caries was seen approaching the distal pulp horn with #36.

Since, radiographically; by both IOPA and CBCT, it was seen that both the teeth had bifurcation of the roots & canals at the mid-root level. So, as a standard protocol, this treatment was decided to be carried out under magnification. Therefore, Under Dental Operating Microscope (Labomed, Prima), Root canal access was gained to the pulp chamber with the help of round bur after administration of local anaesthesia (2% Lidocaine with1:80,000 adrenaline) under rubber dam isolation. To gain adequate access to the canals, the conventional access opening was modified because in tooth #34 the canals were buccal and lingual but in tooth #35 canals were mesial and distal. Also in tooth #36 the additional canal was present somewhere in the middle of distobuccal & distolingual canal. The canal orifices were identified with the help of a DG-16 Endodontic explorer and confirmed with a radiograph. After the confirmation, the Gates Glidden drills (Dentsply, Maillefer, USA) were used with brushing motion in a crown down fashion to enlarge the orifice to achieve a straight line access. After that, the canals were negotiated with no. 10 C+ files (Dentsply, maillefer, USA) which were worked slowly down each wall of the canal and a working length radiograph was taken. Using standard crowndown technique after preflaring of the canals, all the teeth were cleaned & shaped with NiTi rotary endodontic instruments along with 3% sodium hypochlorite as an irrigating solution. Tooth #34 & #35 were prepared till 30/06 and in #36, the mesial canals were prepared till 25/04 and distal canals were prepared till 30/06. Smear layer was removed EDTA soultion and a final rinse of normal saline performed. The canals were dried with paper points (Dentsply, Maillefer, USA), and obturated with the help of AH plus sealer and Gutta percha points according to the size of the preparations of the canal and confirmed with a post-operative radiograph. The access cavity as filled with Composite restoration and Recalled for crown preparation. Patient was kept on observation for a week and since the teeth were totally asymptomatic on next visit, she given the full crown restorations the very next week.

Discussion

Clinically each endodontic treatment is unique due to the high variability of the root canal system [3]. The presence of extra roots and/or canals in Mandibular premolars is undoubtedly an endodontic challenge. Numerous studies have reported the prevalence of multiple canals in premolars. Jain A, et al. reported the prevalence of 11.59%, while Sharma D et al, reported 26.6% and Velmurgan N et al 5, showed 27% chances of finding two canals in Mandibular Premolars. Case reports that describe two or more roots or two or more canal systems in Mandibular premolar teeth are described. The incidence of two roots in mesial and distal location is an uncommon appearance [8]. This present case shows an entirely different case where two adjacent premolars having totally opposite root configuration; #34 has two roots mesial and distal and #35 has two roots buccal & lingual. CBCT is a relatively new diagnostic imaging modality having been used in endodontic imaging. It offers high resolution images

in a 3D format. In the present case the identification of the location as well as bifurcation of the roots could only be made out with the help of CBCT. However its high cost, accessibility to patient and extra radiation as compared to radiographs makes its routine used limited but slowly 3D imaging is finding more applications in endodontics from routine Root canal therapy to complicated surgical or retreatment cases.

Conclusion

A thorough knowledge of root canal anatomy and its variations, careful interpretation of the radiograph, close clinical inspection of the floor of the chamber, proper access preparation and a detailed exploration of the interior of the tooth are essential for a successful treatment outcome. Also, the clinicians should be aware of all the basic principles along with the latest instruments and armamentarium to treat any case which is a little unusual than routine Endodontic therapy to manage these kinds of cases; for example this case was treated successfully only because of the help of the Dental operating microscope and CBCT.

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