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RESEARCH ARTICLE

SUCCESSFUL ENDODONTIC MANAGEMENT OF AN ANOMALOUS MANDIBULAR 1ST PREMOLAR WITH CBCT AS A DIAGNOSTIC AID

***Dr. Arpit Viradiya, Dr. Poorvin Prajapati, Dr. Shashank Kumar Mishra, Dr. Ravindra J. Choudhary and Dr. Mukundi Dhaduk**

Pacific Dental College & Hospital, Udaipur, India

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ABSTRACT

Missed canal is a collapse of success for a root canal treatment. Where the discussion of the anomalous anatomy comes, mandibular premolars have gained the credit for having it. When the tooth is having two canals, the buccal canal is much easier to be negotiated as compared to lingual canal. This report justifies a rare case of successful endodontic management of a mandibular first premolar with three roots along side diagnostic, inter-operative and postoperative IOPA radiographic and CBCT records along with a significant data on the incidence of extra roots in these teeth.

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INTRODUCTION

In mandibular premolar teeth, understanding of the complete root canal anatomy and various diagnostic procedures are mandatory for success ofthe root canal treatment (England, 1991). Though various authorshave explained tooth anatomy of human dentition appropriately, they failed to describe internal root canal system anatomy alteration in depth.Any tooth can have unusual root and root canal morphology with various degrees and incidence. Generally, mandibular premolars contain one root and one canal, though there are evidence of having more than one root and one canal in the literature (Baisden, 1992). Radiographs shows only two dimensional view of the object which is actually of the three dimensional in nature. Due to owing of this property they have limited observational effect of the uncommon root canal anatomy. Sometimes the flare ups occurred due to the failure to observe the extra canal or the root during or after the root canal treatment. Cone Beam Computerized Tomography is useful for such cases in the field of the endodontics (Lofthag-Hansen, 2007). Here, the case report contains mandibular premolar with three roots and three canals which had been referred for intentional root canal treatment. This case report is a rare case of successful endodontic management of a mandibular first premolar with three roots alongside diagnostic, inter-operative and postoperative IOPA radiographic records along with a significant data on the incidence of extra roots in these teeth.

****Corresponding author: Arpit Viradiya,***
Pacific Dental College & Hospital, Udaipur, India.

Case

A 35 year old female patient reported to the department of conservative dentistry and endodonticsat Pacific Dental College and Hospital, Udaipur by referral from department of periodontics with the chief complaint of mobility and dull pain in the lower right back tooth region from past six months. The clinical examination irt #44 also revealeda normal 2 cuspal anatomy, no dental caries, deep periodontal pocket, type 2 gingival recession, grade II mobility and was tender on percussion. For better diagnosis, a conventional periapical radiograph film of the right mandibular second premolar was made from mesial and distal direction for viewing the internal root canal anatomy. The radiographic examination revealed deep infrabony defect extending to root apex, crestal bone loss, loss of lamina dura, and an unusual anatomy of three roots. (Fig.1). A CBCT was planned. The affected tooth was focused and in axial sections of 0.59 mm thickness, the morphology was observed at the apical, coronal and middle third of the roots along with the three dimensional reconstructed image. To allow enough observation of the enamel, dentin and pulp, they all could be made transparent. CBCT showed uncommon anatomy of mandibular right first premolar with having three

completely formed root: Mesiobuccal, distobuccal and lingual. All the roots and their corresponding canals divided below the middle third of the root. (Fig.2) Vitality tests on the involved tooth (#44), showed no response to cold and heat tests and suggested the tooth to be non vital. Adjacent teeth (#43 &#45) responded positively to the vitality tests. The clinical, radiographic examination and vitality tests led to a diagnosis of 'Primary periodontal disease with secondary endodontic involvement in relation to #44'.

Fig. 1. Pre-operative radiograph

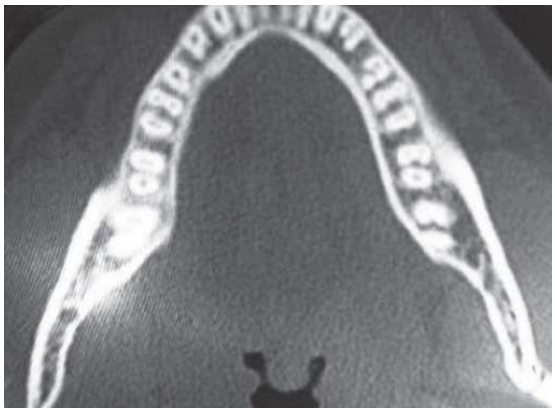

Fig. 2. Individual three roots in CBCT

Treatment plan included non surgical root canal treatment in relation to #44 followed by periodontal therapy. After explaining the prognosis of affected tooth, the patient's consent was taken. The tooth was isolated with 2A premolar clamp. and rubber dam sheet of 6/6"size (Hygenic, Coltene). Local anaesthesia was not administered as the affected tooth was non-vital.With a no.2 round diamond abrasive (Dentsply, Maillefer) access cavity was prepared with a high speed air-rotor hand piece. To locate the canal orifices a sharp DG16 explorer was used and the access was modified accordingly.To obtain the canal patency a pre curved #10 K file (Dentsply, Maillefer) was inserted. By using gates glidden drills (Dentsply, Maillefer) straight line access was obtained.To obtain the working length, #15 K file (Dentsply, Maillefer) was used with propex-II (Dentsply, Maillefer) apex locator and was confirmed by radiograph. (Fig-3) Cleaning and shaping of the canals were performed using step back technique up to size 35k file. Recapitulation was done with # 10 K file (Dentsply, Maillefer) after using each instruments.5.25% NaOCl, 2% chlorhexidine, 17% EDTA and normal salinewas used for irrigation. Calcium hydroxide intracanal medicament was placed inside the canals as inter appointment dressing and sealed with IRM. After one week, # 35 gutta purcha point (Dentsply, Maillefer) were selected as master cone in all the canals & confirmed with the IOPA radiograph. All canals were dried with paper points eachand obturated with cold lateral condensation and then vertical condensation technique with AH Plussealer (Dentsply, Maillefer). Patient was recalled after 2 weeks for follow-up examination and post endodontic restoration was done with composite resin (Fig. 4).

Fig. 3. Working length radiograph

Fig. 4. Post-operative radiograph

DISCUSSION

This case report enlightens the unusual number of the roots and its canals with in it of the right mandibular first premolar in a young adulthood patient. No morphological abnormalities were marked during clinical examination of the tooth and provided no indication of the unusual structure of the radicular portion in mandibular first premolar.

There are various other methods for detection of the extra canal.

- Access cavity preparation must be modified enough for better visualisation
- Appearance of pinpoint bleeding spots.

- Discerning visualisation of the dentinal map
- Canal openings have staining ability so apply the stains like 1% methylene blue in the pulp chamber.
- Attentive investigation of the canal orificeswith a sharp explorer like DG16(API)
- Under careful compliance, Champange or bubble testwith warmed 2.4% NaOCl.
- Removal of the pulp stone may alleviate the chances of finding the extra canal.
- IOPA radiographs with various angulation while having different type of instruments within the canal.
- FOTI-Fiber Optic Transillumination to trace the developmental line between the canals (Bhargavi, 2005).

Mandibular first premolar is having three roots-Buccal, Mesiolingual and Distolingual, which was diagnosed after viewing the tooth in three various directions: regular direction, Mesialdirection and Distal direction. Bjørndal *et al*. showed the applicability of the computerized X-ray microtomography in reconstructing the root anatomy. This ex vivo method gave the result of the definite correlation between internal root canal system and external morphology of the tooth. The three dimensional view of the tooth is a useful tool for learning and teaching purpose of the emerging dental students and practitioners as well. It has gained more popularity in representing the both the internal and external morphology of the tooth as it does not contain any type of destructive property (Bjørndal, 1999). Nielsen *et al*. had used the micro CT technique to observe the complete root canal system including the shapes of the major diameter before and after biomechanical preparation and obturation (Peters *et al*., 2001). Bergmans *et al*had used the micro CT to determine the estimation of root canal instrumentation and describe the need of the hardware and software for this process[7]Matherne *et al*.identified the multiple root canal systems in mandibular incisor, mandibular first premolar and maxillary first molar teeth and concluded that the Cone beam computed tomography had better results than other digital radiography technique (Kottoor, 2010). Serman & Hasslgren submitted a data on the multiple roots and canals in the mandibular first premolar that the incidence rate was 18.1 %. Here, in the mesiodistal and buccolingualview, the presence of the multiple roots and its canals were identified too.The deep groove on the mesial side of the mandibular first premolar showed more chances of 2 canals and buccal root contains C-shaped canal. This microscopic survey was performed by Baisden *et al*. in 1992. Sikri in 1994, didn't found any of this type of canal within the mandibular second premolar (Stern, 2012). In 2002, Robinson *et al* found almost the same results of 10% in mandibular first premolar with two roots and two separate canals by routine dental computer tomography scans, here they found only a case which was had three separate canals with three different roots, but due to having poorresolution, the condition wasn't accessible to diagnose it as a C-shaped canal (Cleghorn, 2008).

Conclusion

Mandibular first premolar with three roots and three canals treated as successful root canal treatment non surgically. The better view of the extra root and canal can be elevated by the use of microscope. A thorough knowledge of root canal anatomy and its variations, careful interpretation of the radiograph, close clinical inspection of the floor of the chamber and proper modification of accessopening are essential for a successful treatment outcome.

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