Case Report

AHB Advances in Human Biology

Adv Hum Biol 2013; 3(3):78-81.

A Mandibular Second Premolar with Three Canals and Atypical Orifices

Neha Agarwal[1] Hardik Mevada[2] Sagar Bumtaria[3*]

[1]Senior Lecturer, Department of Conservative Dentistry, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.
[2] Senior Lecturer, Department of Conservative Dentistry, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.
[3] Post Graduate Student, Department of Conservative Dentistry, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.

ABSTRACT

Background: Mandibular second premolars with three canals (Type V, Vertucci) and separate foramina are very rare. The anatomy of the pulp chamber floor in these premolars usually reveals one lingual and two buccal orifices at the same level. This case report describes a second premolar with three canals and an unusual pulpal floor anatomy with one mesiobuccal and one distobuccal orifice at the same level and an orifice on the distolingual wall. Very careful examination of the pulpal space with an optical device and preoperative spiral computed tomography is recommended to locate any unusual orifices.

Keywords: Bicuspid, Dental pulp, Endodontics.

INTRODUCTION

A thorough understanding of root canal anatomy & morphology is required for achieving success in endodontic treatment. Failure to identify variations in root canal anatomy may result in failure of endodontic treatment. To achieve satisfactory root canal therapy, a proper and in-depth knowledge of complex and abnormal root canal morphology is essential.

The main objectives of root canal treatment are thorough shaping and cleaning of all pulp spaces and their complete obturation with an inert filling material. The presence of untreated canal may be a reason for failure of endodontic therapy[1]. To achieve satisfactory root canal therapy, a proper and in-depth knowledge of complex and abnormal root canal morphology is more than essential. Pineda and Kutler, Green, Zillich and Dowson, Vertucci and Pécora et al. have studied the canal anatomy and configuration of mandibular premolars[2-5]. Peora et al. observed that 22.3% of the mandibular first premolars possessed two canals and two separate foramina while 5.12% had two canals and one foramen. Comparatively 5.3% of the mandibular second premolars examined had two canals with two foramina and 4.4% had two canals with one foramen. Only 0.46% of the first and second premolars examined showed a three-canal and three-foramen configuration. Zillich and Dawson reported that a second or third canal existed in at least 23% of first premolars[4]. Mandibular premolars have gained a reputation for having aberrant anatomy.

Different studies have looked at the root canal morphology of mandibular premolars over the years and reported a fairly high percentage of these teeth to have more than one canal[6-9]. Cases of mandibular second premolars with three canals have been described by many investigators[10-17]. The purpose of this article was to describe a mandibular second premolar with three canals having three dustings orifice and foramina with confirmed diagnosis by spiral computed tomography and 3D reconstruction.

Received: Oct. 19, 2013: **Accepted**: Nov. 8, 2013
***Correspondence**: **Dr. Sagar Bumtaria.**
Department of Conservative Dentistry, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.
E-mail: sagar.bumtaria@gmail.com

pISSN 2321-8568
eISSN 2348-4691

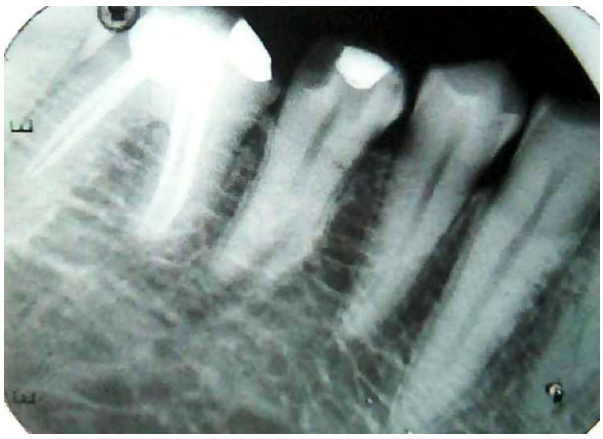

Fig 1: Showing Pre Operative Photograph.

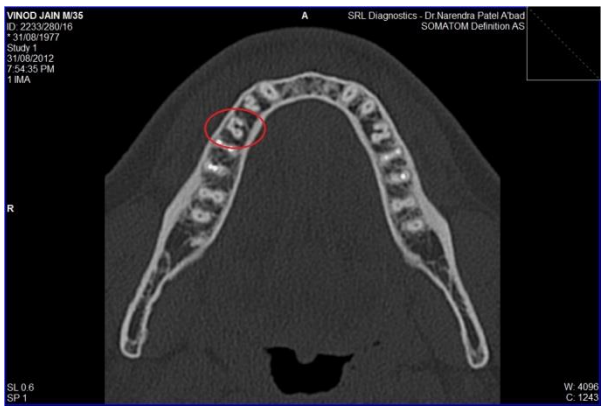

Fig 2: CT Scan Section showing root anatomy.

Fig 3: Vertical CT scan section showing root canal anatomy.

CASE REPORT

A 29 year old male patient reported to the Department of Endodontics, Karnavati School of Dentistry referred by a private practitioner because of unusual anatomy on radiograph & with a complaint of pain in lower right mandibular second premolar. On clinical examination, lower right

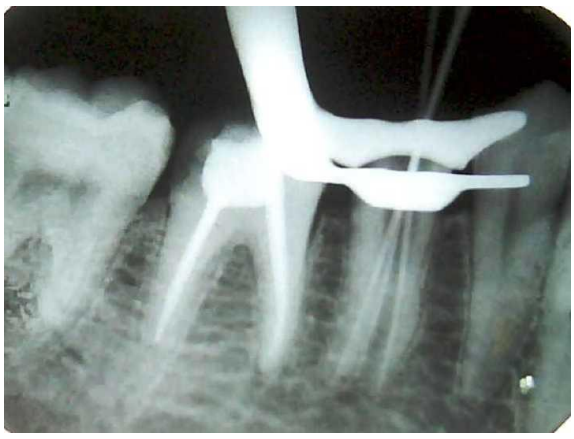

Fig 4: Showing working length determination.

Fig 5: Showing obturated premolar with three canals.

mandibular second premolar did not exhibit any morphological variation and temporary restoration was found. Patient had undergone root canal treatment of the same tooth which was left incomplete. There was absence of periodontal probing and mobility was within physiologic limits. Preoperative radiograph revealed the presence of two roots with no visible root canal space in lower right mandibular second premolar and access cavity preparation was already done (Figure 1). It was hence decided to perform root canal treatment under microscope and preoperative spiral computed tomography was done to establish the rare root canal anatomy (Figure 2 & 3).

Access cavity preparation was modified with access cavity preparation set (Dentsply-Maillefer, Rio de Janeiro, RJ, Brazil) under surgical operating microscope (Seiler Revelation, St. Louis, MO, USA) with 8X magnification. One main canal was located upon access opening initially. Under rubber dam isolation, the dressing was removed and access cavity modified. One main canal orifice

was found which split into two independent canal orifices in the mid root level (mesiolingual and distolingual) (Figure 3). In order to carefully inspect the pulp chamber space, Gates-Glidden drills (Maillefer, Ballaigues, Switzerland) 5, 4 and 3 set on a slow hand piece rotating at 1,000 rpm with brushing motion under copious irrigation with 2.5% sodium hypochlorite were used to enlarge the main orifice to the level of the furcation. Two canals were located one is mesial and one is distal. Both were located in the buccal half of the tooth. Careful inspection of the pulpal floor and walls revealed a black spot in the distolingual wall that could be negotiated with a 0.08 K file (Dentsply-Maillefer, Rio de Janeiro, RJ, Brazil). Working lengths were determined by an Apex locator (Denta port ZX, J. Morita Inc.) and confirmed by a radiograph (Figure 4).

Chemomechanical preparation was done by the Crown-Down Technique with K-File system (Dentsply-Maillefer, Rio de Janeiro, RJ, Brazil) upto 25 number K-File. For irrigation 3% sodium hypochlorite and 17% EDTA were used. Tooth was obturated by using lateral condensation technique with AH Plus sealer (Dentsply, Rio de Janeiro, RJ, Brazil). A radiograph was taken to assess the quality of obturation (Figure 5).

DISCUSSION

The morphology of the root and canals of the mandibular second premolar can be complex and variable[16]. Because of the varied morphology, endodontic treatment in second mandibular premolar is a challenging task. Therefore, the internal morphology must be identified precisely to achieve successful treatment. The anatomical landmark of the pulp chamber floor may help to identify supplementary root canals or root canal aberrations[18].

Many authors who located orifices in the pulp chamber of the lower second premolar reported one orifice in the lingual side and two in the buccal[13,15,17]. One case had three atypical orifices, of which two merged in the distal half of the furcation area while the other opened on the mesial wall of the pulp chamber[16]. In this case, we encountered the same situation and another unusual orifice was observed. Pulpal floor anatomy demonstrated one distobuccal and one distolingual orifice at the same level and one orifice on the mesiobuccal wall.

The root shape, root position and relative root outline should be carefully determined from the radiograph. Good quality preoperative radiographs and thorough radiographic examination are essential for the detection of additional root canals. Sudden narrowing or a disappearing pulp space may indicate the presence of another canal or canals[19].

In the present case, the radiographic features suggested the possibility of three canals. However, because of the superimposition of roots, radiographic diagnosis of three canals is not always possible in all cases. Because of this a spiral computed tomography was taken which clearly showed three distinct canals going in different paths and dustings canal orifice. According to another case report[16] detecting orifices, especially of the third canal, is a great challenge for the dentist. Many practitioners recommended using Gates-Glidden drills to open the main canal for better visualization. In the present case, Gate-Glidden drills were used to improve visualization; only after using Gates-Glidden drills was the third orifice found.

Microscopes are commonly used to explore the pulp chamber in order to find orifices. The advantages of using a microscope for conventional endodontics include better visualization of the pulp chamber floor and walls that prevents inadvertent missing of orifices. So a microscope with 8X magnification was used for the procedure. It is assumed that careful observation and inspection of the pulpal floor and also pulpal wall is mandatory to avoid the unexpected missing of orifices that may cause unsuccessful endodontic treatment.

CONCLUSION

It becomes a challenging task even for the astute clinician to identify the presence of an unusual number of roots and their morphology. Thus a thorough knowledge of the pulp space morphology and the use of the latest armamentarium are essential for successful outcome of endodontic treatment. Unusual pathways may result in frustration for some and fascination for others.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Vertucci FJ. Root canal morphology and its relationship to endodontic procedures. Endod Topics 2005;10:3-29.
2. Pineda F, Kutler Y. Mesiodistal and buccolingual roentgenographic investigation of 7275 root canals. Oral Surg Oral Med Oral Pathol 1972;33:101-10.
3. Green D. Double canals in single roots. Oral Surg Oral Med Oral Pathol 1973;35:689-96.
4. Zillich R, Dowson J. Root canal morphology of the mandibular first and second premolars. Oral Surg Oral Med Oral Pathol 1973;36:738-44.
5. Vertucci FJ. Root canal anatomy of the human permanent teeth. Oral Surg Oral Med Oral Pathol 1984;58:589-99.
6. Barrett MT. The internal anatomy of teeth with special reference to the pulp and its branches. Dental Cosmos 1925;67:581-92.
7. Amos ER. Incidence of bifurcated root canals in mandibular bicuspids. J Am Dent Assoc 1955;50:70-1.
8. England MC Jr, Hartwell GR, Lance JR. Detection and treatment of multiple canals in mandibular premolars. J Endod 1991;17:174-8.
9. Baisden MF, Kulild JC, Weller RN. Root canal configuration of the mandibular first premolar. J Endod 1992;18:505-8.
10. Kaffe I, Kaufman AY, Littner MM. Diagnosis of premolars with multiple canals using radiography. Quintessence 1985;36:1121-6 (in German).
11. Singh RP, Stamps HF, Tatum RC. Endodontic considerations of a tricanaled mandibular second premolar: case report and literature review. J Md State Dent Assoc 1987;30:13-6.
12. Glassman GD. Flare-up with associated paresthesia of a mandibular second premolar with three root canals. Oral Surg Oral Med Oral Pathol 1987;64:110-3.
13. Chan K, Yew SC, Chao SY. Mandibular premolar with three root canals – two case reports. Int Endod J 1992;25:261-4.
14. Fischer GM, Evans CE. A three-rooted mandibular second premolar. Gen Dent 1992;40:139-40.
15. Rodig T, Hülsmann M. Diagnosis and root canal treatment of a mandibular second premolar with three root canals. Int Endod J 2003;36:912-9.
16. De Moor RJ, Calberson FL. Root canal treatment in a mandibular second premolar with three root canals. J Endod 2005;31:310-3.
17. Nallapati S. Three canal mandibular first and second premolars: a treatment approach. J Endod 2005;31:474-6.
18. Ash MM Jr. Wheeler's dental anatomy, physiology and occlusion. 8th ed, W. B. Saunders, Philadelphia 2003;151-6.
19. Vertucci FJ. Root canal morphology of mandibular premolars. J Am Dent Assoc 1978;97:47-50.