

TWO-ROOTED MANDIBULAR FIRST PREMOLAR : CASE REPORT

*Kishore Raju Kothapalli

**Department of Conservative Dentistry and Endodontics, Sree Sai Dental College & Research Centre, Srikakulam, Andhra Pradesh, India*

ABSTRACT

Abnormalities in the root canal anatomy are a commonly occurring phenomenon. A thorough knowledge of the root canal anatomy and its variations is necessary for successful completion of the endodontic treatment. Mandibular second premolars usually have a single root and a single root canal. The incidence of two separate roots itself in this tooth is quite rare. Mandibular premolars are known for having an aberrant anatomy. Often considered an enigma to the endodontist, the mandibular first premolar with dual canals dividing at various levels of the root can generate complex mechanical problems. Reports about the incidence of extra roots in these teeth are quite rare. This paper attempts at explaining a rare case of successful endodontic management of a two-rooted mandibular second premolar with awareness of data pertaining to the number of canals, knowledge of canal morphology, correct radiographic interpretation, and tactile examination of canal walls which are important in detecting the presence of multiple canals.

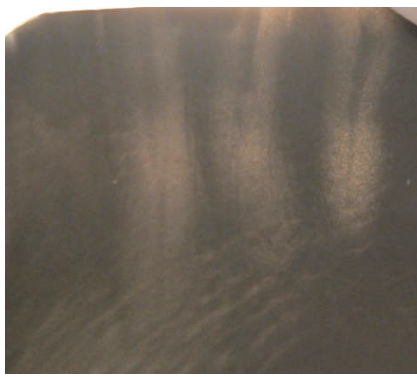
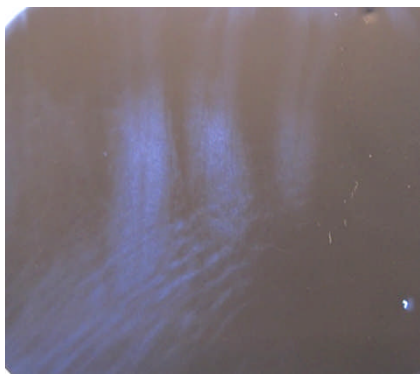
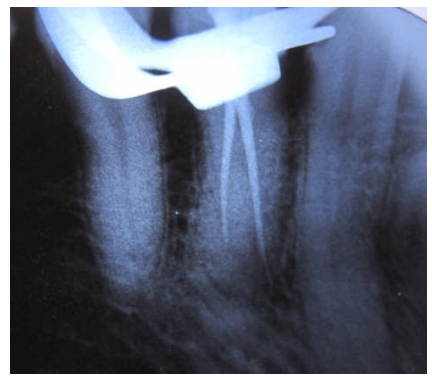
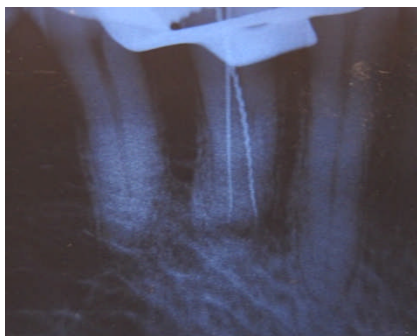
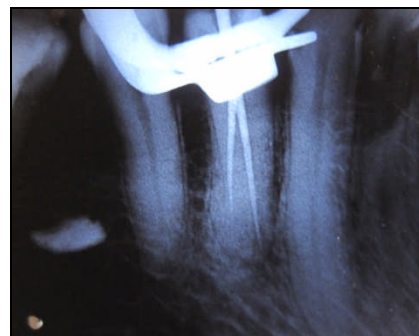
KEY WORDS: *Mandibular second premolar, Two roots, Modified access cavity.*

INTRODUCTION

Detailed knowledge of root canal anatomy and awareness of the configuration of the pulp canal are essential when practicing root canal therapy. There are evident indications that root canal morphology is almost limitless in its variability. The unusual number of canals should always be expected in various teeth. Untreated root canals may cause failure of the treatment. Mandibular first premolars are known to have a single canal. A thorough understanding of root canal anatomy and morphology is required for achieving high levels of success in endodontic treatment. Inability to recognize variations in root or root canal anatomy can result in unsuccessful endodontic treatment. According to El-Deeb the mandibular premolars may show wide variation in their root canal anatomy¹. Thus, the recognition of atypical anatomy is important even though it is not usually encountered. Various reports of root canal variations in these teeth have been reported in the literature^{2,3}. Vertucci in his series of studies conducted on extracted teeth, reported 2.5% incidence of a second canal⁴. Zilich and Dawson reported 11.7% occurrence of two canals and 0.4% of three canals^{5,6}.

Case report

A 33-year-old female patient was referred to our endodontic department for management of lower right first premolar. History revealed that the patient had experienced sensitivity to cold drinks for the past four months and reported pain for the past ten days. Pain was spontaneous in nature and aggravated on food impaction and in the nights and was relieved on taking pain killers. On intraoral clinical examination, there was a carious exposure of the pulp and the tooth was tender to percussion. The tooth was subjected to routine clinical tests and a provisional diagnosis of acute irreversible pulpitis was made. On radiographic examination preoperative radiograph [Fig.1], the periodontal ligament outline suggested an abnormal anatomical feature and hence a second radiograph with a more mesial angulation was taken for a clear view (tube shift technique). Two roots were found and were distinguished as buccal and lingual based on the Clark's SLOB rule [Fig.2], which states that if the object moves from its reference point towards the distal side, while the tube is shifted mesially, then the object lies on the buccal aspect and vice versa.

**Fig. 1: preoperative radiograph****Fig. 2: Tube shift radiograph****Fig. 3: Working length radiograph****Fig. 4: Mastercone radiograph****Fig. 5: post obturation radiograph**

Access was gained to the pulp chamber after administration of local anesthesia, under rubber dam isolation. To obtain a proper straight line access the conventional access opening was modified into one that was wider bucco-lingually as the roots were bucco-lingually oriented. After careful inspection, two canal orifices were located and patency was ascertained using a small 15size K file. Then the working length radiograph was taken and measured [Fig.3]. Gates-Glidden drills 3,2 were used to enlarge the orifices to achieve a straight line access to the apex. The canal were sequentially irrigated using 5.25% Sodium hypochlorite and 17% EDTA during the cleaning and shaping procedure. Protaper hand files are used for the biomechanical preparation. Calcium hydroxide intracanal medicament was placed inside the canals as intra canal medicament and sealed with IRM. In the next appointment canals were cleaned once again with 5.25% Sodium hypochlorite and 17% EDTA and normal saline and protaper hand files. The canals were thoroughly dried and obturation was done using standardized 6% taper protaper Gutta-percha and Zinc Oxide

Eugenol sealer. Occlusal access

opening was sealed with temporary filling material and a final radiograph was taken. post-obturation radiograph revealed thorough sealing of the canals[Fig.4].The patient was reviewed for one week and the post-endodontic permanent restoration was completed with amalgam and was referred to the department of Prosthodontia for further management.

Discussion

The primary cause of endodontic failure is overlooked root canals⁷⁻¹³. The presence of extra roots or canals in mandibular premolars is undoubtedly an endodontic challenge. Together with diagnosis and treatment planning, a knowledge of common root canal morphology and its frequent variations is a basic requirement for endodontic success. The clinician must be familiar with the various pathways root canals take to the apex. The pulp canal system is complex and canals may branch, divide and rejoin...according to Ingle the percentage of two canals and one

foramen in mandibular first premolar is 6.5%. mandibular first premolar usually has one root and one canal. However a second canal has been identified in up to a third of teeth, and three canals occasionally. The pulp chamber has two pulp horns, the buccal horn being most prominent. In cross-section the chamber is oval, with the greatest dimension buccolingually. The average root length is 21.5 mm and the average mature pulp volume 14.9 mm. Root canal cross-sections tend to be oval until the most apical extents, where they become round. In the very comprehensive classification by Vertucci, the **number of canals** is differentiated into those that (1) begin at the floor of the pulp chamber; (2) emerge throughout the course of the canal; and (3) open at the apical foramen. Clearly, these findings are clinically important, as in a study at the University of Washington assessing the results of endodontic therapy, the mandibular premolars showed the highest failure rate of all types of teeth¹³. These findings could be due to the complex root canal anatomy of a large number of these teeth. There have been many reports in the literature regarding the number of root canals, but there are very few reports on the variations in the number of roots that occur in the mandibular first premolars.^{7,9} Zillich R, and Dowson J reported that "a second or third canal exists in at least 23% of first mandibular bicuspid." The canals may divide almost anywhere down the root".^{6,9}. Because of the absence of direct access, cleaning, shaping, and filling of these teeth can be extremely difficult. A recent study by Vertucci revealed that the mandibular first premolar had one canal at the apex in 74.0% of the teeth studied, two canals at the apex in 25.5%, and three canals at the apex in the remaining 0.5%. According to Green et al the incidence of two roots and two foramina is 4%.⁴ Failure to recognize the presence of extra root or canals can often lead to acute flare-ups during treatment and subsequent failure of endodontic therapy.

CONCLUSION

The clinician should have an accurate knowledge about the Anatomy of each tooth as well as the possibility of variations, to identify the presence of unusual numbers of roots and their morphology. Careful interpretation of the radiograph, close clinical inspection of the floor of the chamber and

proper modification of access opening are essential for a successful treatment outcome

References

1. Bram SM, and Fleisher R; Endodontic therapy in a mandibular second bicuspid with Four canals, *J Endod* 17:513, 1991.
2. Hoen MM, Pink FE. Contemporary endodontic retreatments: An analysis based on clinical treatment findings. *J Endod* 2002;28:834-6.
3. Green D: Double canals in single roots, *Oral Surg* 35:689, 1973.
4. Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol* 1984;58:589-99.
5. Trope M, Elfenbein L, Tronstad L. Mandibular premolars with more than one root canal in different race groups. *J Endod* 1986;12:343-5.
6. Vertucci FJ: Root canal morphology of mandibular premolars, *J Am Dent Assoc* 97:47, 1978.
7. Goswami M, Chandra S, Chandra S, Singh S. Mandibular premolar with two roots. *J Endod* 1997;23:187.
8. Ingle JI, Simon JH, Machatou P, Bogaerts P. Outcome of endodontic treatment and re-treatment - "Textbook of Endodontics". Ingle JI, Bakland LK, editors. 5th ed. BC Decker Inc: 2002. p. 747-57.
9. Shapira Y, Delivanis P. Multiple rooted mandibular second premolars. *J Endod* 1982;8:231-2.
10. Stephen Cohen :Pathways of pulp, 8th edition. 2002
11. Tilashalski KR, Gilbert GH, Boykin MJ, Shelton BJ : Root canal treatment in a population-based adult sample: status of teeth after endodontic treatment , *J Endod*. 2004 Aug;30(8):577-81.
12. Messer HH : Clinical judgement and decision making in endodontics , *Aust Endod J*. 1999 Dec;25(3):124-32.
13. Montgomery S, Ferguson CD : Endodontics. Diagnostic, treatment planning, and prognostic considerations , *Dent Clin North Am*. 1986 Jul;30(3):533-48.

Corresponding Author :

Dr. Kishore Raju.k. M. D. S.,

Senior Lecturer

Department of Conservative Dentistry

And Endodontics

Sree Sai Dental College & Research centre

Srikakulam, Andhra Pradesh, INDIA

Ph: 91-900-092-2422.

Email: drkishoreraju@gmail.com