



## Rare Occurrence: Mandibular Second Premolar with Three Canals

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### Abstract

The pulpal anatomy of the mandibular premolar can be complicated. Aside from the standard single root and single canal, there are several other variants. As a result, understanding root canal anatomy, as well as its variations, is a must for the successful completion of any endodontic therapy. In mandibular second premolars, three canals are said to occur 0.46-0.5 times. This article depicts an instance of a mandibular second premolar with an atypical canal design that was successfully treated endodontically. Three canals were found in this investigation: mesiobuccal, distobuccal, and lingual. Even in teeth with incredibly puzzled root canal morphologies, excellent endodontic therapy combined with a complete understanding of anatomy will result in ideal treatment.

**Keywords:** Dental pulp, Endodontic therapy, Mandibular premolar, Periapical radiolucency

### INTRODUCTION

The dental pulp has a variety of forms and configurations. The assessment of the internal arrangement of the teeth in three dimensions is still difficult. It has been shown that roots with a delicate tapering canal and a single apical foramen are the rarity rather than the standard, ranging from the work of Hess & Zurcher et al to the most recent research on the root canal anatomy. The mandibular premolars are teeth of unique morphology <sup>[1]</sup>. Different experiments over a number of years have shown that these teeth have many canals <sup>[2]</sup>. 42 percent of missing roots or canals recorded by Hoen and Pink<sup>[3]</sup> in teeth that need correction. The largest occurrence (47 percent) of accessory foramina in mandibular second premolars was detected, according to Green<sup>[4]</sup>. Rahimi et al.<sup>[5]</sup> have documented higher prevalence in mandibular 2<sup>nd</sup> premolars of lateral

(38.7percent) & apical delta (4.38percent) canals. According to Vertucci et al., 97.5 percent of mandibular second premolars have 1 canal at the apex & just 2.5 percent have 2 canals; however, 3 canals were relatively rare. <sup>[6]</sup>. The prevalence of three channels in second premolars was observed by Zillich and Dowson to be 0.4 percent, which highlights that this is a rare phenomenon <sup>[7]</sup>. The appearance of two or three canals in mandibular premolars seems to be an ethnic distinction. Incidence is slightly higher in Negroids (32.8 per cent) than in Caucasians with greater than one root canal (13.7 percent) <sup>[8]</sup>. In one report, mandibular premolars were seen in 1.6% of the Caucasians with two canals & 2.6 percent in Negroids <sup>[2]</sup>. Despite the limited occurrence, these variants, their clinical and radiographic structure and arrangement of orifices

should be known to the clinician. The second premolar with three canals is presented in this case study and addresses the importance of handling similar cases.

### CASE REPORT

A 60-year-old male patient with no relevant medical history was referred to a clinic for endodontic care of the left mandibular second premolar. The patient's chief complaint was "pain in the left lower back tooth region". Clinical examination revealed distal caries in 20 (mandibular second premolar). Tooth no 19 (mandibular 1<sup>st</sup> molar) was missing and RCT was attempted in 21 (mandibular 1<sup>st</sup> Premolar) at some other clinic. An intraoral periapical radiograph was done which revealed radiolucency in distal aspect of 20 which was involving pulp and separated instrument in 21 (Figure 1).



Figure-1

Intra oral radiographic examination revealed two roots with more than two canals in 20 with periapical radiolucency. Periapical abscess in 20 was established, and it was determined that endodontic therapy would be needed. The patient rendered informed consent for endodontic care of the affected tooth. The tooth was anaesthetized with a local anesthetic solution (2 percent Lignocaine with 1:80,000 epinephrine) through inferior alveolar nerve block on the left side. Three distinct canal grooves were located after removal of the pulpal tissue in the coronal area of the tooth. K-stainless steel files were employed to navigate the three canals (Dentsply, Switzerland). Working length was established with apex locator (E-Pex pro, Orikam) and periapical radiograph (Figure 2). Biomechanical preparation was done till 6%/ 25 in lingual canal, 6%/20 in

Mesiobuccal & Distobuccal canal using rotary file (NeoEndo Flex, Orikam) in crown down manner.

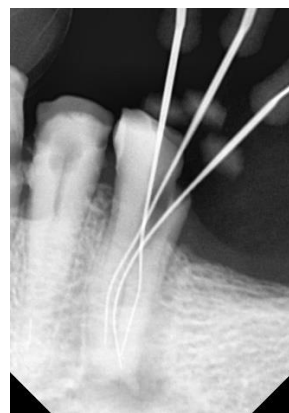


Figure-2

The canal was irrigated with a large volume of 5 percent sodium hypochlorite, 17 percent ethylenediamine tetraacetic acid & last irrigation was done using saline. The canals were dried with absorbing paper points and later a temporary cement (Cavit G) was applied to the entry of access cavity. After five days, the patient was called and the dental painful symptoms were not reported. After removing the temporary cement, canals were irrigated with 5% sodium hypochlorite followed by saline irrigation. The master cones were elected and was verified for their snug fit using x-ray (Figure 3).

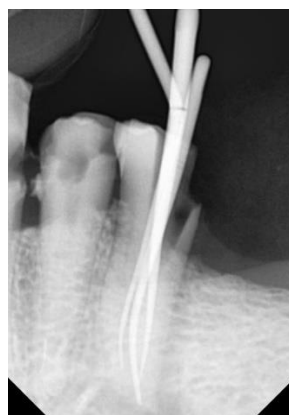


Figure-3

Again the absorbent paper points were utilized to remove moisture content from the canals and were obturated with the help of gutta percha and Sealapex (SybronEndo) as sealer by lateral condensation technique. A radiograph was obtained to validate the obturation and covered with the same temporary cement. (Figure 4). After three days, the individual was called in and confirmed to be asymptomatic.

Later, it was decided to go forward with the permanent filling, and a crown for the treated tooth was advised.



Figure-4

## DISCUSSION

Endodontic therapy for various morphologies in the mandibular second premolar is a difficult process. As a consequence, the internal anatomy must be addressed in an attempt to ensure successful care. Intraoral periapical radiographs are commonly used to study the root canal anatomy but they are ultimately a three-dimensional anatomy on a two-dimensional picture, making it difficult to assess intricate endodontic morphology precisely<sup>[9]</sup>. Straight and tilted pre-operative x-rays are important in order to provide inputs into the amount of root canals present<sup>[10]</sup>. The presence of an additional canal is normally shown by a sudden shift in radiographic intensity and a narrowing of the root canal space<sup>[12]</sup>. A close look at the periodontal ligament area and angular views may also demonstrate the existence of an additional root or canal. In this case presented, pretreatment radiographs revealed an irregular root form, indicating the likelihood of additional roots and canals. Anatomical points of interest in the pulp chamber can be seen with loupes, fibre-optic illumination, sodium hypochlorite bubbling and dyes can be effective in finding additional canals.<sup>[13][14]</sup> We employed sodium hypochlorite in our research, which induced bubbling on the canal orifices, and we were able to estimate suspected canal orifice locations using the pulpal floor diagram. Varying number of scholars established two canals on buccal side & one canal on the lingual side of the pulp

chamber in mandibular premolars<sup>[11][15]</sup>. This pulpal map was sighted in our case.

Studies on the root canals morphologies of mandibular premolars indicated that premolars had a reasonably higher percent of more than one canal, the prevalence of 3 root canals with 3 separate orifices observed by Zillich and Dowson<sup>[7]</sup> and El Deeb<sup>[16]</sup> was 0.4%. The existence of atypical 3 canals in the mandibular 2<sup>nd</sup> premolar, with two located in the distal half of the furcation region and one in the mesial wall of the pulp chamber was recorded by De Moor.<sup>[17]</sup> In vivo premolar research by Trope et al.<sup>[8]</sup>, Sabala et al. and Amos<sup>[2]</sup> recorded two or more root canal morphology by the treated patients rather than the overall number of teeth. The results were 5.2%, 4.4% and 2.5% respectively.

Findings have also been published on the morphological variation in ethnicity. In the African American & Caucasian patients, Trope et al.<sup>[8]</sup> compared the number of roots & canals among mandibular premolars. Instead of overall teeth, they listed findings by number of patients. In African America, the occurrence of two or three roots in the second premolar mandibular tooth was 4.8 percent compared to 1.5 percent in the white population of patients.

There have also been records on findings of gender-based difference in the number of roots and canals. In the study of radiographical samples of 547 patients, Serman and Hasselgren<sup>[18]</sup> found variations between the gender and the number of channels and roots. There were more women with more roots or canals in the first premolar mandibular than men (50 women versus 29 men), yet there were more men with more roots or canals (29 men versus 15 women) with the second premolar mandibular one.

Two roots with three distinct canals were seen in this case. The clinician would be guided by various hints to diagnose additional roots or canals. Pre-operative radiographs taken in a parallel procedure, straight and angled, will show the number of roots present. On a parallel radiograph, Yoshioka et al. noticed that unexpected narrowing of the root canal and recommended that additional canals maybe present in such cases. We used an apex locator in conjunction with radiographs to provide a more accurate working length measurement. As indicated by Vertucci's

classification, two canal in the buccal root and one in the lingual had type IV arrangement. For improved results, we used a lateral compaction method to obturate all three canals at the same time. Canal patency was also retained during obturation by compacting the compacted gutta purcha with a file or a spreader of appropriate taper.

## CONCLUSION

It can be difficult for a clinician to treat multiple canals. The current case demonstrates that mandibular premolars may have several canals. The importance of understanding root canal anatomy and instrumentation procedures is highlighted in this case study. The use of a CBCT scan and good magnification would undoubtedly help in the treatment of these difficult root canals. As a result, for a good endodontic operation, it is important to make any effort to find and treat all root canals

## REFERENCES

1. Paul B, Dube K. Endodontic treatment of a mandibular second premolar with three roots and three canals. *Case Rep Dent* 2014;2014.
2. Amos ER. Incidence of bifurcated root canals in mandibular bicuspid. *J Am Dent Assoc* 1955;50(1):70–1.
3. Hoen MM, Pink FE. Contemporary endodontic retreatments: an analysis based on clinical treatment findings. *J Endod* 2002;28(12):834–6.
4. Green D. Stereomicroscopic study of 700 root apices of maxillary and mandibular posterior teeth. *Oral Surgery, Oral Med Oral Pathol* 1960;13(6):728–33.
5. Rahimi S, Shahi S, Yavari HR, Reyhani MF, Ebrahimi ME, Rajabi E. A stereomicroscopy study of root apices of human maxillary central incisors and mandibular second premolars in an Iranian population. *J Oral Sci* 2009;51(3):411–5.
6. Vertucci F, Seelig A, Gillis R. Root canal morphology of the human maxillary second premolar. *Oral Surgery, Oral Med Oral Pathol* 1974;38(3):456–64.
7. Zillich R, Dowson J. Root canal morphology of mandibular first and second premolars. *Oral Surgery, Oral Med Oral Pathol* 1973;36(5):738–44.
8. Trope M, Elfenbein L, Tronstad L. Mandibular premolars with more than one root canal in different race groups. *J Endod* 1986;12(8):343–5.
9. Walton RE. Endodontic radiographic technics. *Dent Radiogr Photogr* 1973;46(3):51–9.
10. Silha RE. Paralleling long cone technic. *Dent Radiogr Photogr* 1968;41:3–19.
11. Nallapati S. Three canal mandibular first and second premolars: a treatment approach. A case report. *J Endod* 2005;31(6):474–6.
12. Slowey RR. Root canal anatomy: road map to successful endodontics. *Dent Clin North Am* 1979;23:555–73.
13. Carr GB, Murgel CAF. The use of the operating microscope in endodontics. *Dent Clin* 2010;54(2):191–214.
14. Nallapati S, Glassman G. Use of ophthalmic dyes in root canal location. *Endod Prac* 2004;7:21–8.
15. Rödigg T, Hülsmann M. Diagnosis and root canal treatment of a mandibular second premolar with three root canals. *Int Endod J* 2003;36(12):912–9.
16. ElDeeb ME. Three root canals in mandibular second premolars: literature review and a case report. *J Endod* 1982;8(8):376–7.
17. De Moor RJG, Calberson FLG. Root canal treatment in a mandibular second premolar with three root canals. *J Endod* 2005;31(4):310–3.
18. Serman NJ, Hasselgren G. The radiographic incidence of multiple roots and canals in human mandibular premolars. *Int Endod J* 1992;25(5):234–7.