

Endodontic Oddity: A Case Report on Mandibular Premolar with Two Roots and Two Canals

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ABSTRACT

Background: Thorough knowledge of the root canal morphology, appropriate assessment of the pulp chamber floor, special root canal preparation and obturation techniques. Mandibular premolars frequently exhibit variable and complex root canal morphology and are one of the most difficult cases to treat endodontically. This article reports on a case of mandibular first premolar with two roots, which was successfully treated with root canal therapy.

Keywords: Mandibular first premolar, root canal anatomy, abnormal morphology, root canal therapy.

INTRODUCTION

A thorough understanding of root canal anatomy and morphology is required for achieving high levels of success in endodontic treatment. Failure to recognize these variations in root or root canal anatomy can result in unsuccessful endodontic treatment. Hence, it is imperative that the clinician be well informed about the commonest possible variations. Hoen and Pink in their analysis on teeth requiring re-treatment, found a 42% incidence of missed roots or canals.ⁱ

Mandibular premolars have on multiple occasions been stated to be the most challenging teeth to be treated endodontically, especially when they present with multiple roots or canals. Mandibular premolars have earned the reputation for having the most aberrant anatomy & numerous reports of root canal variations in these teeth have been reported in the literature.^{ii,iii} Vertucci in his series of studies conducted on extracted teeth, reported 2.5% incidence of a second canal.^{iv} Zilich and Dawson reported 11.7% occurrence of two

canals and 0.4% of three canals.^v According to Ingle, mandibular second premolars have only 12% chance of a second canal, 0.4% of a third canal and Harty has reported 11% possibility of second canal. In most instances, they have had one canal, but teeth with two or more canals have also been reported.^{vi,vii,viii,ix} Slowey has suggested that mandibular first premolars, often called as “Endodontist's enigma,” may present the greatest difficulty of all teeth to perform successful endodontic treatment.^x This is because they are anatomically unpredictable, and often present with a wide variety of morphological rarities. One such morphological oddity is the presence of two roots, with a reported incidence of 1.8%. This article reports on the clinical case of a mandibular left second premolar with two roots.

CASE REPORT

A 38-year-old female patient presented to the department of conservative dentistry and endodontics with a chief complaint of pain and discomfort in the lower left back tooth region for

Received: May. 13, 2017: Accepted: July. 19, 2017

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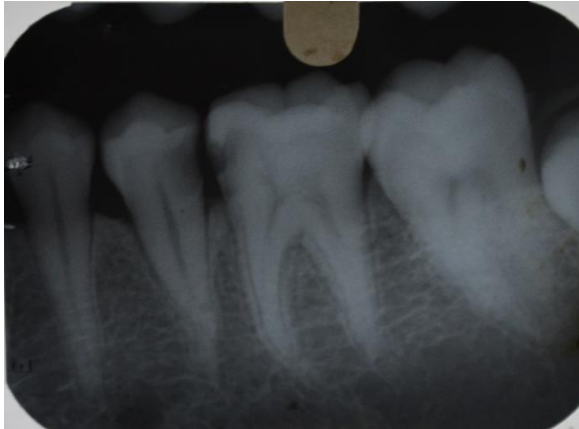


Fig 1: Diagnostic radiograph with tooth #35.



Fig 2: Access cavity preparation with tooth#35.

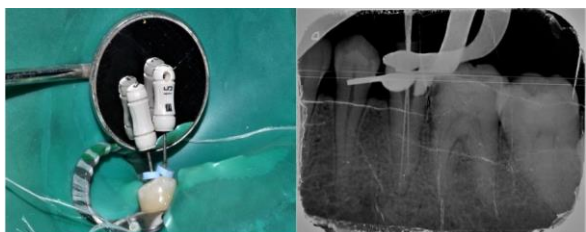


Fig 3: Working length radiograph of with tooth #35.

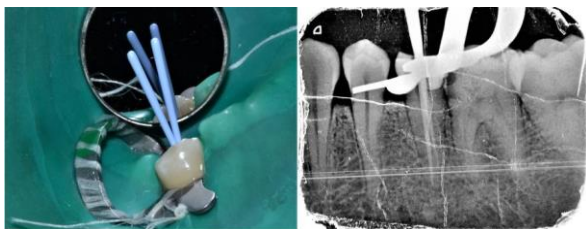


Fig 4: Master cone radiovisiography with tooth #35.

past 1 month. History of presenting illness reveals that patient had pain in her lower left back tooth region for past 1 month and it aggravated from past 1 week on taking hot and cold food and the pain is

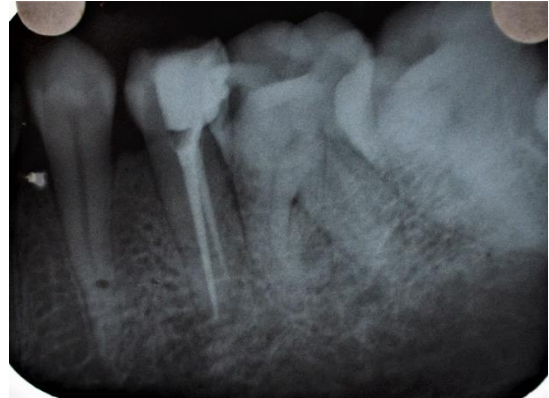


Fig 5: Post-operative radiograph with tooth #35.

dull, intermittent in nature. On careful clinical examination, there was presence of deep distoproximal caries in relation to lower left second premolar tooth 35 and the tooth was tender to percussion. The preoperative intraoral periapical radiograph reveals distoproximal radiolucency approaching pulp and widening of periodontal ligament space in relation to 35(Fig. 1). The diagnostic radiograph also revealed disappearance of the main canal from the middle third of the root suggestive of variation in root canal morphology which was later confirmed as two roots during working length confirmation. On co-relating the clinical and radiographical evaluations, a diagnosis of symptomatic irreversible pulpitis with apical periodontitis in relation to 35.

Under rubber dam isolation and local anaesthesia, root canal treatment was initiated with respect to 35. Access cavity preparation was done using Endoaccess bur (Dentsply-Maillefer, Ballaigues, Switzerland) and to gain sufficient access to the canals, the conventional access opening was modified into one that was wider bucco-lingually as the roots were bucco-lingually oriented(Fig 2). Orifice location was not easy as the coronal pulp chamber was unusually long and the separation of the roots was from the middle third of the root. After careful inspection, two canal orifices were located and patency was ascertained using a small size K-file. To distinguish between the two roots and canals, one H-file and one K-file was inserted into each of the canals. Then the working length radiograph was measured and confirmed with apex locator (Canal Pro™ Coltene/Whaledent) and radiovisiography(Fig .3). Biomechanical preparation was completed using Protaper rotary

file following crown-down approach under copious irrigation alternatively with 5.25% sodium hypochlorite solution and normal saline. The canals were dried with paper points and after confirming master cone fit with radiovisiography(Fig. 4).Obturation was done using cold, lateral compaction of gutta percha cones (Dentsply-Maillefer, Ballaigues, Switzerland) and Sealapex sealer (Kerr Dental, Sybron Endo). The post endodontic restoration was done with composite resin (3M Filtek™ Z250Universal Restorative System) and post-operative radiograph was taken for evaluation(Fig .5).

DISCUSSION

Anatomical variations, especially extra canals and roots, should always be kept in mind when treating teeth endodontically & endodontic treatment in second mandibular premolar with a varying morphology is a challenging task & the internal morphology must be identified to achieve successful treatment. Conventional intraoral periapical radiographs are routinely employed to evaluate the root canal anatomy, but it inherently represents only a three-dimensional anatomy on a two-dimensional image.^{xi,xii,xiii} Advances in imaging techniques like spiral computed tomography, operating microscope¹⁴ & cone beam computed tomography provides a more accurate three-dimensional image of the internal complex anatomy of the tooth and thereby assists in formulating the required endodontic treatment approach.

The presence of extra roots or canals in mandibular premolars is undoubtedly an endodontic challenge. Mandibular premolar may have more than one canal in a single root or it may have two roots. Slowey¹⁵ has shown that when the root canal shadow suddenly stops in the radicular region on radiograph, bifurcation or trifurcation of the canal at that point should be suspected. Also, an additional root canal can be identified when the root outline is unclear or has an unusual contour, or deviates from the normal appearance on radiograph.

While locating the root or the canals, it should be considered in mind that the more apically the root canal divides, the more difficult it is to access and obturate efficiently. Hence, smaller K files are initially used as they can deviate buccally or

lingually as the main canal divides. So, a good tactile sense is important and the files have to be precurved appropriately before negotiating the canals. Also during obturation, canal patency was maintained through the apically compacted gutta purcha with a file or with a spreader of suitable taper while each canal is being obturated. Failure to recognize these extra canals and obturate them with care can lead to acute flareups during treatment and subsequent failure in endodontic therapy^{15,16,17} as the anatomic position of the mental foramen is in close proximity to mandibular premolars.

CONCLUSION

This case report emphasizes on the importance of thorough knowledge of the internal root canal anatomy, careful interpretation of angled radiographs, detailed exploration of the tooth and implementation of the modified techniques by the clinician before and during treatment to prevent their subsequent flare up. Mandibular premolar typically has a single root and a single canal but may show numerous anatomic variation.

CONFLICT OF INTEREST

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

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