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Endodontic Management of Mandibular Premolar with Two Roots- Case Report

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Abstract

Mandibular premolars have earned the reputation for having an aberrant anatomy. Literature is replete with reports of extra canals in mandibular second premolars, but reports about the incidence of extra roots in these teeth are quite rare[1].Prior to beginning endodontic operations, it is essential to comprehend the anatomy of the root and canal. In this age of tooth conservation, every missing canal will result in treatment failure and eventually tooth extraction. The clinical treatment of a mandibular premolar with two roots that are split at the mid-root level is described in this article.

Keywords: Aberrant Anatomy, Endodontic Operations, Root Canal Treatment

Introduction

Success in root canal treatment lies in a thorough knowledge of root canal systems and their three-dimensional cleaning and shaping followed by hermetic sealing of the cleaned and shaped canals. Premolars are unique in the way that there have been a lot of

anatomical variations in the root canal system and number of roots. Hoen and pink in their analysis teeth requiring retreatment, found a 42% incidence of missed roots or canals.[2]The failure of root canal therapy may arise from untreated canals caused by a lack of information and comprehension about anatomical variance.

Vertucci in his series of studies conducted on extracted teeth, reported 2.5% incidence of a second canal.[3] Zilich and Dawson reported 11.7% occurrence of two canals and 0.4% of three canals.[4] 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.

The mandibular second premolars have been extensively studied in the literature because of wide-spectrum variations in the root and its canal anatomy. The extra root will possess one or more canals that dental surgeons may neglect. In their systematic review, Wolf et al. reported less than 1.5% occurrence of two rooted mandibular second premolar.[5,6,7,8]

Case Report: A 32-years-old male patient was referred to our postgraduate endodontic department for management of lower left second premolar. History revealed that the patient had experienced sensitivity to cold and hot drinks for the last 1 month and reported a pain for the past 7 days. Pain was spontaneous in nature and aggravated on chewing and lying down. 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 an initial diagnosis of acute apical periodontitis was made. For a clear picture, a second radiograph with a higher mesial angulation was acquired using the tube shift technique after the preoperative radiograph's periodontal ligament outline revealed an uncommon anatomical characteristic. The two roots that were discovered were identified as lingual and buccal using Clark's SLOB criteria. Hence, it was decided to perform root canal treatment on left mandibular second premolar followed by prosthesis.

Treatment Plan

Specialised endodontic treatment was formulated for #35 followed by permanent restoration.

1. Chemo mechanical treatment - ultrasonic agitation and heating of irrigants.
2. Modified access opening was planned as pulp chamber was unusually long and presence of dentin shelf over lingual canal detected on routine radiograph and on cbct investigation.
3. Rehabilitation- Dentin of the area preapared for treating canal is replaced with dentin-like replacement material.

Treatment Done

Under local anesthesia with 2% lidocaine containing 1:100,000 epinephrine, rubber dam was placed on the involved teeth. Access opening was done using Endo-Access bur (Dentsply Maillefer, Ballaigues, Switzerland) which used was restricted to coronal chamber for removal of roof and for gaining access to canals, the conventional access opening was modified into one that was wider bucco-lingually with the help of long tapered fissure bur as the roots were bucco-lingually oriented. Orifice location was not easy as the coronal pulp chamber was unusually long and the lingual canal was covered with the dentinal shelf and the separation of the roots was from the close to middle third of the root. After negotiating buccal canals, the dentinal shelf was removed with the help of long shank tapered fissure bur to locate lingual canal which was beneath it and then patency was ascertained using a small size K-

file for both the canal. Working length was determined using an apex locator (J Morita) and confirmed by an intraoral periodical radiograph.

Orifice shaper with an brushing motion, in a crown down fashion was used to enlarge the orifices to achieve a straight line access to the apex. The canal was cleaned and shaped with K-files and rotary Niti files upto 30 4# . Root canal irrigation was done with 3% sodium hypochlorite (Coltene), followed by 17% EDTA (SEPTODONT) and saline. All irrigation was done with two-sided vented needles (RC Twents; Prime Dental, India) and irrigants were activated with ultrasonic endo activator (Dentsply endo activator) and then root canal were then carefully dried with sterile paper points. Thereafter, obturation was done using standardized Gutta-percha and Resin based sealer. Corresponding was sealed with temporary filling material and a final radiograph was taken. The roots of a second premolar can be appreciated well in this post obturation radiograph.

Discussion

As the complex anatomy of the root and canal systems along with the changes in the internal anatomy of teeth, strategic planning, and aids to diagnose such variable anatomy using preoperative cone beam-computed tomography or multiangle radiographs are very important , incidences of an additional root and canals in mandibular premolars may provide a significant endodontic difficulty, thereby increasing the chances of endodontics failures.[9] A collection of previous studies have been tabulated for better understanding.[10]

Table 1: Incidence of variations in mandibular second premolar root canal morphology

Authors	**1 canal 1 foramina**	**1 canal 2 foramina**	**2 canals 1 foramina**	**2 canals 2 foramina**	**3 canals**
Pineda and Kutler et al.	98.8	1.2	-	-	-
Green et al.	92	-	4.0	4.0	-
Zilch and Dawson et al.	87.9	-	0.9	10.8	0.4
Vertucci et al.	97.5	2.5	-	-	-
Goswami et al.	88	-	8	4	-

Figures in percentage

Recognition of the aberrant anatomy requires thorough knowledge of the root canal morphology, critical interpretation of the diagnostic aids, appropriate assessment of the pulp chamber floor and operative skills of the clinician. The case report presented here refers to the management of endodontic challenge of mandibular second premolars having two roots which are bifurcated close to mid-root level.[3]

For the management of branched canal configuration wherein the clinician encounters difficulty in locating and preparing the canal, the use of magnification was necessary. One of the common reasons for having difficulty in identifying the second canal was inadequate access which leaves a shelf of dentine over the second canal.[11] Also an important step needed in such canal was a modification in access which required an adequate flaring of the canal coronal to the bifurcation for

unobstructed passage of instruments into the second canal. Careful manual exploration of the bifurcated root should be done with a pre curved 10K file which will provide a tactile sensation as the instrument moves in an eccentric direction on deeper penetration into the canal and also prevents the instrument separation. The dentin prepared for treating the canal was replaced with dentin-like replacement material (Glass-ionomer). Obturation of the canals can be done by either thermo plasticized gutta percha or by single cone technique.

Conclusion

The clinician ought to possess the intelligence to recognize the existence of abnormally high numbers of roots and their morphology. A good treatment outcome requires careful radiograph interpretation, a meticulous clinical examination of the chamber floor, a complete understanding of root canal architecture and its variations, and appropriate access opening modification.

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Legend Figures

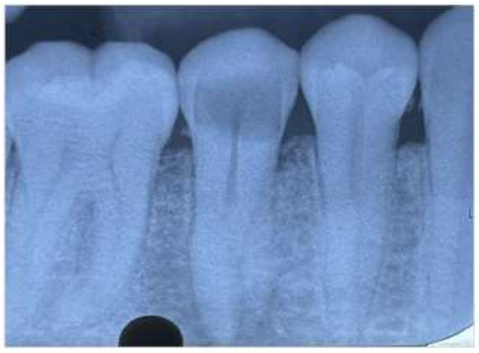

Figure 1: Preop

Figure 2: Buccal and lingual orifices

Figure 3: Gutta Percha

Figure 4: Master Cone

Figure 5: Post Op