

Endodontic Management of a Three Rooted Mandibular Second Premolar Using CBCT- A Case Report

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Abstract

The present case report discusses endodontic management of a three rooted mandibular Second premolar using CBCT. In this study the tooth of interest was right mandibular second premolar. The area was anaesthetized using 2% lignocaine with 1:80,000 adrenaline (Lignox) and isolated with a rubber dam. All the three canals are explored with a size 10 K-file. A working length was determined with an apex locator (Root - ZX) . With Crown down technique, Cleaning and shaping were performed with Hyflex instruments (Dentsply Mailfilter). Abundant irrigation with 3% sodium hypochlorite solution was done. Biomechanical preparation was done up to 20/4%. Before obturation irrigation with 17%, EDTA and saline was done. Obturation was done with gutta-percha and resin sealer (AH Plus, Dentsply) by lateral condensation. The coronal access was restored with resin composite (3M ESPE). A good knowledge of root canal anatomy facilitates successful endodontic treatment. Management of teeth with morphological variations presents a challenge, which requires proper instruments and the knowledge to use the instruments effectively. Advanced imaging techniques like CBCT are valuable tools in diagnosing and managing cases, which deviate from the regular pattern. The present case report emphasizes the need to understand, interpret, and manage a three rooted mandibular second premolar with three roots which has been successfully managed using CBCT.

Keywords: Cone beam computed tomography, endodontic management, mandibular second premolar, three roots.

Introduction

The main objective of endodontic treatment is accurate mechanical and chemical debridement of the entire root canal system, which should be followed by a three-dimensional obturation with an appropriate filling material and a final coronal restoration to prevent microleakage.¹ Through knowledge about the occurrence of unusual external and internal root canal morphologies contributes to successful root canal treatment. Mandibular second premolars have wide variations in root canal anatomy.² Although the incidence of the variations is not as common as that of mandibular first premolars, the root canal aberrations in mandibular second premolars are as diverse as those in mandibular first premolar. According to Slowey³, the mandibular premolars may present the greater difficulty of all teeth for a successful endodontic treatment. Numerous endodontic failures after a routine treatment and flare-ups during the course of NSRCT (Non surgical root canal therapy) are cited as evidence. It could be because of variations in root canal morphology and difficult access to

additional canal systems.⁴

This case report presents a successful, non-surgical management of mandibular right second premolar with three roots and root canals and a first premolar with two roots using a cone beam computed tomography (CBCT).

Case Report

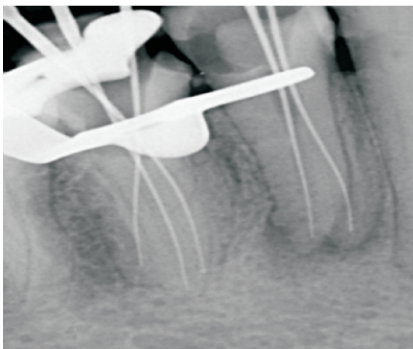
A 31-year-old male patient, reported to the Department of Conservative Dentistry and Endodontics, KD Dental College and Hospital, Mathura with a chief complaint of pain in the lower right back tooth region since 3 months. The patient underwent filling for the same at a private local dental clinic 3 months back. Patient's medical history was non contributory. On clinical examination, the tooth was tender to vertical percussion. Electric pulp testing and thermal testing of the 45 indicated non vitality after removal of the restoration and a positive response was elicited in 44. A confirmatory diagnosis of irreversible pulpitis with apical periodontitis in relation to 44 and necrotic pulp with apical periodontitis in relation to 45 was established and endodontic therapy was planned in relation to 44, 45. Intra oral periapical radiograph revealed deep caries

approaching pulp with PDL space widening in relation to 44. Furthermore it also revealed a morphologic variation suggestive of the presence of an extra root in relation to 44 and 45 and hence after obtaining the patients consent, CBCT imaging with a 3D reconstruction was performed which confirmed the presence of three rooted 45 and two rooted 44. The area was anaesthetized using 2% lignocaine with 1:80,000 adrenaline (Lignox) and isolated with a rubber dam. Access opening was performed using Endo Access bur in relation to 44 and 45. All the three canals were explored with a size 10 K-file. A working length was determined with an apex locator (Root - ZX). With Crown down technique, Cleaning and shaping were performed with Hyflex instruments (Coltene, Whaledent). Biomechanical preparation was done up to 20/0.04. Abundant irrigation with 3% sodium hypochlorite solution (Chemident,India) was done. Before obturation irrigation with 17%, EDTA and saline was done. Obturation was done with gutta-percha and resin based sealer (AH Plus, Dentsply) by cold lateral condensation. The coronal access was restored with resin composite (3M ESPE).

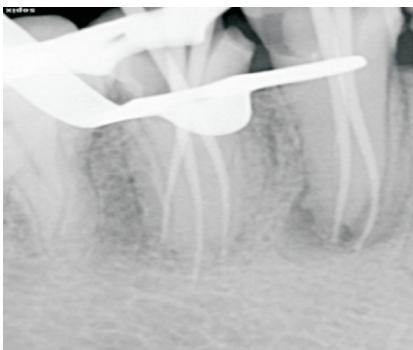




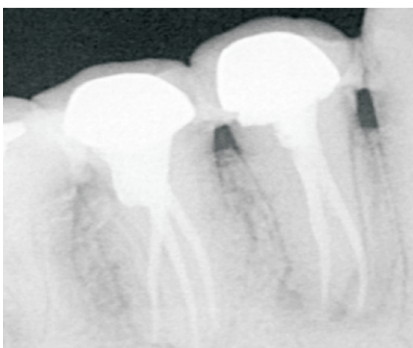
Preoperative Radiograph



Working Length Radiograph



Master Cone Radiograph



Postoperative Radiograph

Discussion

The most common root canal morphology in mandibular second premolars is one canal whose prevalence is reported to be as high as 98.8%. This tooth type also often has two canals, of which the occurrence ranges from 1.2% to 29%.¹ Successful and predictable endodontic treatment requires knowledge of biology, root canal anatomy, and careful radiographic evaluation in order to determine number of roots and root canals. Preoperative parallel radiographs, as well as mesial or distal angled radiographs, can help to determine number of roots. The diagnosis and management of extra roots or root canals in mandibular premolars pose an endodontic challenge. Failing to locate and obturate a root canal is the major cause of failure in endodontic therapy, it is important that all the canals be located and treated during the course of nonsurgical endodontic therapy. Mandibular premolars have gained a reputation of having an aberrant anatomy. a careful understanding and diagnosis of canal anatomy is of utmost importance for successful management of such cases. Accurate preoperative radiographs of good quality along with an occlusal view, into the access opening and down the chamber of a mandibular premolar tooth, rarely shows any chamber floor, even when a suspected bifurcation of the canal is seen on the radiograph. The surgical operating microscope sometimes aids in canal visualization of a canal system, branching off the main canal. A fine, curved stainless steel file with a good Tactile sense is the best guide to the detection of the accessory canals. A modification in the access cavity preparation is often needed for un hiding the additional orifices of the root canals or the orifices of the extra roots for a better instrumentation. When present the roots are usually – mesiobuccal, distobuccal, and a lingual root. At least two radiographs, with the second radiograph angulated from 15° to 20° either mesial or distal from the horizontal long axis of the root, are required to reliably diagnose more than one root or root canal system in premolar teeth. With the advent of advanced imaging techniques, an understanding of complex anatomies is made easier. CBCT is better of digital radiographic techniques in identifying multiple root canal systems in the mandibular incisor, mandibular second premolar, and maxillary first molar teeth. Endodontic treatment of mandibular premolars may require a high level of clinical skills due to their wide anatomical variations. Radiographs yield two-dimensional images of three-dimensional objects, resulting in

superimposition of images. Therefore, they are of rather limited use and value in complex root canal anatomy Cases.²

Conclusion

Exact root canal anatomy could not be depicted by using periapical radiographs alone. Therefore, the use of CBCT helped us make a confirmatory diagnosis. The success of this case might be attributed to accurate diagnosis, complete chemo mechanical debridement, and proper obturation of all the three root canals. Use of CBCT might be beneficial in the assessment of root canal shape and endodontic treatment of the mandibular second premolar with aberrant root canal morphology. Advanced imaging techniques like CBCT are valuable tools in diagnosing and managing cases, which deviate from the regular pattern. The present case report emphasizes the need to understand, interpret, and manage a three rooted mandibular first premolar with three roots which has been successfully managed using CBCT.

Reference

References are available on request at aditiguptya30@gmail.com

S.No.	Author	Year	Tooth No.	No.of Roots	No.of Canals	Imaging Technique
1.	Rodig & Hulsmann	2003	45	3	3	I.O.P.A.
2.	Tzanetakis et al.	2007	35	4	4	Operating Microscope
3.	Pooja Kakker, Anant Singh	2012	34	3	3	Spiral CT

