Article published online: 2021-11-01

CASE REPORT

Use of recent diagnostic methods in locating multiple canals: A case series of six canals in maxillary first molar

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ABSTRACT

The root canal anatomy of maxillary first molars has been described as three roots with three canals, and the commonest variation is the presence of a second mesiobuccal canal. However, some unusual number of canals should always be expected. Careful examination of the pulpal floor is recommended to locate all the canals and should be confirmed with conventional radiographic methods and additional imaging systems. The case reports describe the successful endodontic treatment of two maxillary first molars with six canals, with the help of dental computed tomography imaging system.

Key words
Denta scan, maxillary first molar, operating microscope, six canals, ultrasonic

INTRODUCTION

The foremost goal of endodontics is to treat pulpitis/apical periodontitis. To achieve this sound knowledge of the root canal anatomy is crucial.[1] The morphology of the permanent maxillary first molar has been studied extensively. The maxillary first molar, most commonly, has three roots, with one canal each in both the palatal and distobuccal roots and one or sometimes two in the mesiobuccal root. Bond *et al.* (1988)[2] reported a case of a maxillary first molar with six canals: Two canals with separate foramina in the mesiobuccal root, two canals with separate foramina in the distobuccal root, and two canals joining in the apical third of the palatal root. Radiographic examination is an essential component in the management of endodontic problems. Advanced imaging systems such as micro-CT, and Denta-scan are essential to verify the aberrant anatomy of root canal. The present case report discusses the successful endodontic management of two maxillary first molar presenting with three roots and six root canals.

Access this article online	
Quick Response Code:	Website: www.ejgd.org
	DOI: 10.4103/2278-9626.105390

CASE REPORTS

Case 1

A 19-year-old male presented to the Department of Conservative Dentistry and Endodontics, KGMU, Lucknow, complaining of toothache in his right upper back tooth region for the past 5 days. History revealed the pain was continuous, dull and throbbing in nature and intensifying while chewing food. A clinical examination revealed a deep carious maxillary right first molar, which was tender to percussion. Vitality testing of the involved tooth with heated gutta-percha caused an intense lingering pain, whereas electronic pulp stimulation caused a premature response. From the clinical and radiographic findings [Figure 1], a diagnosis of

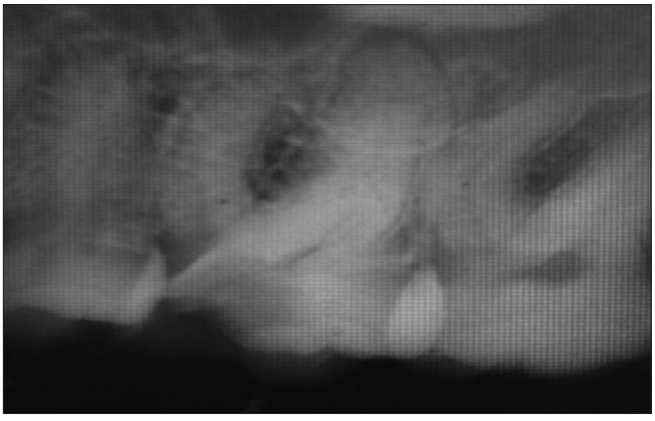

Figure 1: Preoperative radiograph (case 1)

symptomatic irreversible pulpitis with apical periodontitis was made and non-surgical endodontic treatment was planned.

Under local anesthesia, an endodontic access cavity was established and emergency pulpectomy was performed. All the five canals were explored using a size 15 Flexofile and the working length radiograph was taken [Figure 2a and b]. After the cervical preparation of the canals with Gates-Glidden drills, pinpoint bleeding was observed in the pulp chamber floor even after pulp extirpation. The access opening was refined under the operating microscope [Figure 3] with BUC 1 ultrasonic tip and water spray. The dark black color of pulpal floor was examined and explored with a micro-opener file (Maillefer, Ballaigues, Switzerland). After irrigation with 1% sodium hypochlorite and aspiration, one more orifice was discovered. It was located just palatally to the distobuccal canal. After cleaning and shaping was performed an intracanal calcium hydroxide medicament was prescribed for 1 week. Denta-scan was done to confirm the presence of six root canals [Figure 4]. At the third visit canals were filled with gutta-percha cones and sealapex sealer using the lateral condensation technique. A radiograph [Figure 5] was taken to assess the quality of obturation and amalgam restoration was given. The patient was recalled after a week. He was asymptomatic and the crown restoration was performed.

Case 2

A 30-year-old female patient reported with the chief complaint of spontaneous pain in the upper left posterior for the past 7 days. She revealed a history of intermittent moderate pain for the past 2 months, which had increased in intensity since last 7 days. Clinically, the left maxillary first molar had a deep mesio-occlusal carious lesion. The patient's medical history was non-contributory. Thermal testing caused an intense lingering pain, whereas electric pulp testing showed pulpal vitality on same tooth. From the clinical and radiographic examination [Figure 6], a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made, and nonsurgical endodontic treatment was planned.

Under local anesthesia, conventional endodontic access opening was established. Initially, the mesiobuccal (MB1), the distobuccal (DB1), and the two palatal canals (mesiopalatal (MP) and the distopalatal (DP)) were located. The conventional triangular access was modified to a trapezoidal shape to improve access to the additional canals. After removing the overhanging dentin in the mesial aspect of the chamber the second mesiobuccal (MB2) canal was located. On

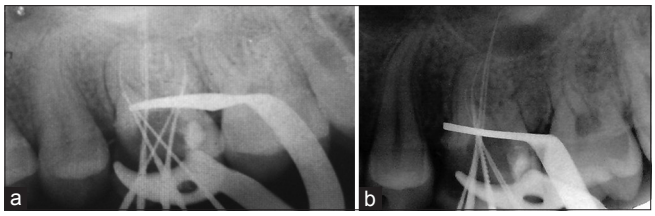

Figure 2 (a,b): Working length determination

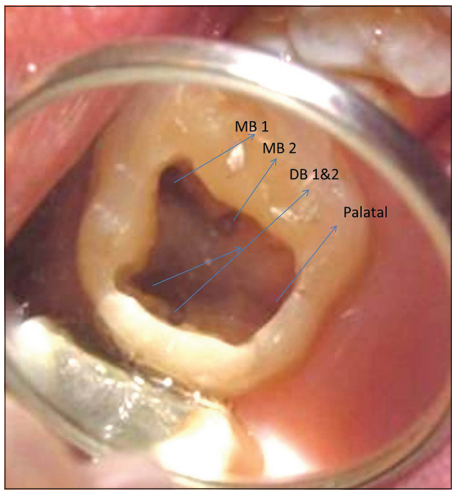

Figure 3: Microscopic view of pulpal floor showing multiple canals

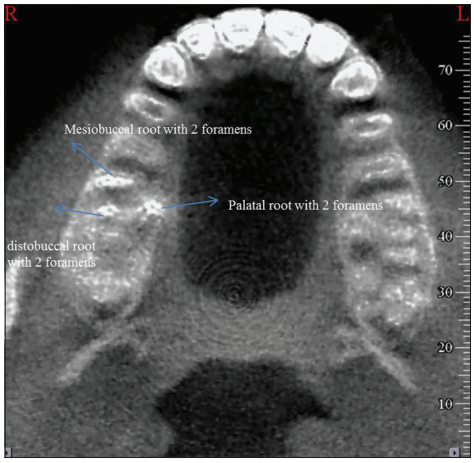

Figure 4: Denta-scan imaging

Figure 5: After obturation

careful observation of the floor, another orifice was located palatally to the distobuccal canal orifice. The working length radiograph was taken with ISO #10 K files [Figure 7]. The extra canals were confirmed with the help of dental computed tomography (CT) scan [Figure 8]. A sterile cotton pellet was placed in the pulp chamber and Cavit G was used to seal the access cavity.

In the second appointment, cleaning and shaping were performed using ProTaper nickel-titanium rotary instruments with a crown-down technique. All the canals were enlarged appropriately and irrigated. The canals were dried and calcium hydroxide intracanal medicament was placed and cavit was used as temporary restoration. After 1 week the patient was asymptomatic and obturation was performed [Figure 9]. The patient experienced no post-treatment discomfort and was subsequently referred for appropriate coronal restoration.

DISCUSSION

A thorough knowledge of the pulp space morphology is essential for successful endodontic therapy. The variations in the root canal morphology should be considered as a rule rather than an exception.[3]

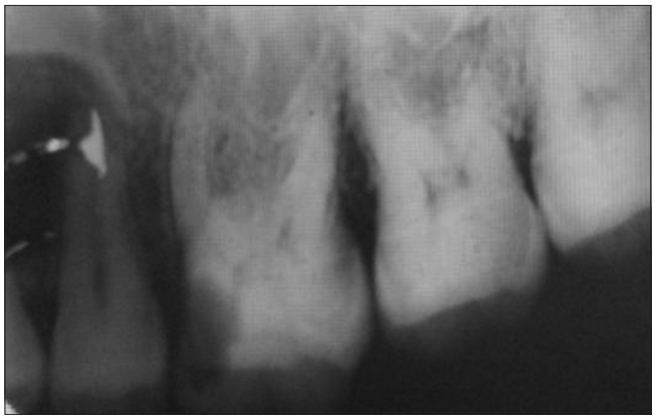

Figure 6: Pre-operative radiograph (case 2)

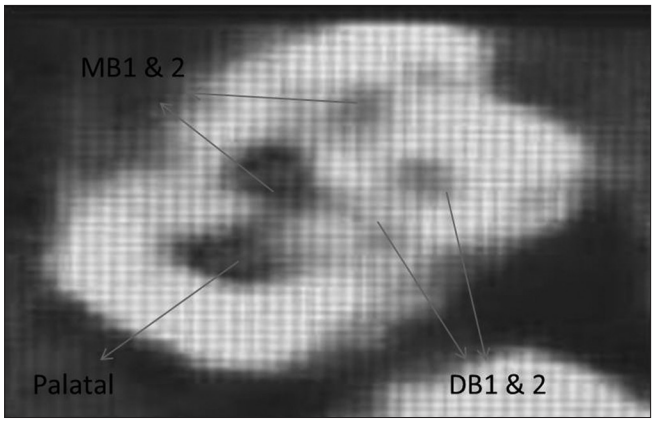

Figure 8: Denta-scan imaging

Usually, the interpretation of the radiograph along with a careful inspection of the pulp chamber floor clinically allows the operator to understand the root canal configuration. Conventional intraoral periapical radiographs are an important diagnostic tool in endodontics for assessing the root canal configuration. Nevertheless, it is not completely reliable because of its inherent limitation.[4] The radiographic findings should be confirmed with any other three-dimensional imaging like dental CT. The main features of this protocol include the acquisition of axial scans of the jaw with the highest possible resolution together with curved and orthoradial multiplanar reconstructions.[5] In this present case this imaging system has helped in confirming the number of canals and treating them successfully.

The combination of ultrasonic instruments with the magnification and illumination provided by surgical operating microscope allow for exposure of any missed or hidden canals or recesses containing necrotic pulp tissue without cutting down tooth structure.[6]

CONCLUSION

The case reports discuss the endodontic treatment of unusual cases of maxillary first molars with three roots and six canals and explains the role of advanced imaging like dental CT scanning and modern endodontic instruments as an indispensable tool to confirm the root canal anatomy.

Figure 7: Working length determination

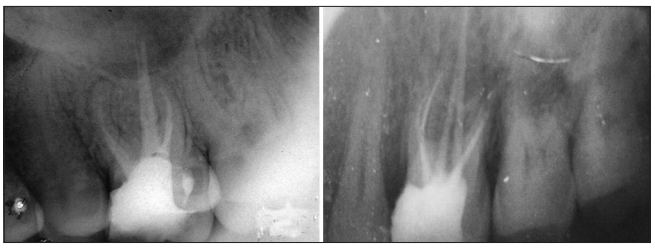

Figure 9: After obturation

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How to cite this article: Yadav RK, Wadhwani KK, Tikku AP, Chandra A, Hasija M. Use of recent diagnostic methods in locating multiple canals: A case series of six canals in maxillary first molar. Eur J Gen Dent 2012;1:207-10.

Source of Support: Nil, **Conflict of Interest:** None declared.