Case Report

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2020;10:3s:244-248.

Endodontic Management of Permanent First Maxillary Molar with 2 Canals

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ABSTRACT

Background: The "hidden" internal root anatomy is the only unpredictable factor of an endodontic treatment; however, the knowledge of the "normal" pulp system and its most frequent variability is basic for a clinical success. It is generally accepted that a major cause for failure of root canal therapy is an inability to recognize the presence of, and to adequately treat, all of the canals in the root canal system .However, the presence of two canals in two-rooted maxillary first molar has rarely been documented in the literature. The present case report discusses the endodontic management of an unusual case of a maxillary first molar with two roots and two canals and the role of CBCT to confirm the presence of number of roots and root canals.

Keywords: Maxillary molar, permanent, CBCT, maxillary molar with 2 canals, variation.

INTRODUCTION

A thorough knowledge of the root canal anatomy is a basic prerequisite for successful completion of the endodontic treatment[1].Awareness and understanding of the presence of unusual external and internal root canal morphology contributes to the successful outcome of the root canal treatment. In past years, the morphology of the permanent maxillary molars has been reviewed extensively. Most of the literature concentrated on the morphological variation of the mesiobuccal root and particularly emphasising on its mesiopalatal canal[2]. Although two roots and two canals have been reported in some studies in relation to the maxillary second molar and very few cases have been recorded in relation to maxillary first molar. When a thorough search of literature using PubMed was conducted, only a few case reports showing the unusual anatomy of two roots: one buccal and one palatal, in a maxillary first molar was found. The root and root canal morphology of teeth varies greatly according to reported literature[3]. Prior knowledge of root and canal anatomy facilitates precise detection of all root canals during endodontic treatment[4] .The failure to detect a missed canal influences the prognosis of the treatment because of the accumulation of debris, bacteria which contaminates the canal which affects the periodontal condition of the tooth . This case report documents the successful endodontic management of a two-rooted maxillary first molars with two canals.

CASE REPORT

A 21-year-old female patient reported to the department of conservative dentistry and endodontics with a chief complaint of food lodgement and pain in upper right back tooth region in the past 10 days. Pain was continuous and radiating in nature. The patient also complained of episodes of sensitivity to hot and cold. On clinical examination, the patient's oral hygiene was found to be fair. Dental examination revealed a tooth no.# 16 with a deep carious lesion. Tooth was tender to percussion.

Received: May. 28, 2020: **Accepted**: July. 19, 2020
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pISSN 2278-0076
eISSN 2321-9270

Fig 1: Pre-operative radiograph in relation to # 16.

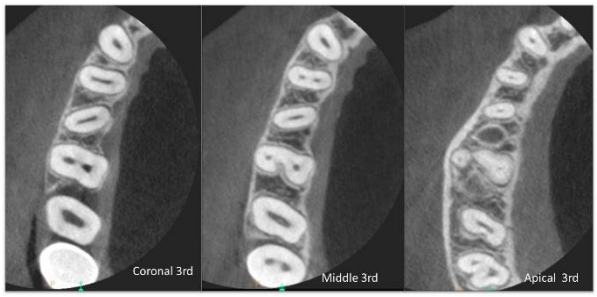

Fig 2: CBCT scans showing 2 canals in maxillary molars in relation to # 16(coronal 3rd , ,middle 3rd and apical 3rd).

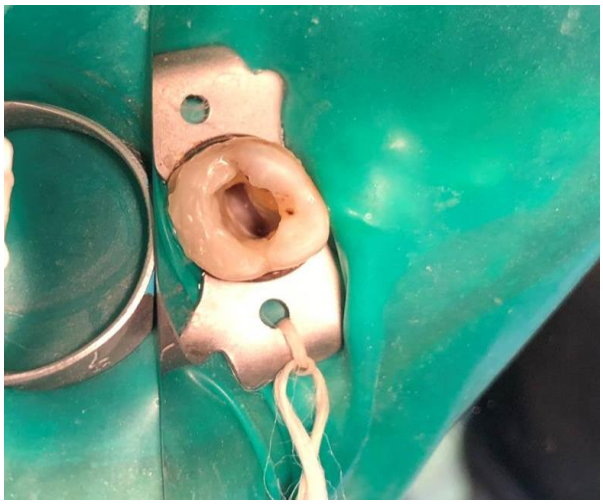

Fig 3: Occlusal photograph showing the access opening with two orifices under rubber dam isolaion in relation to #16.

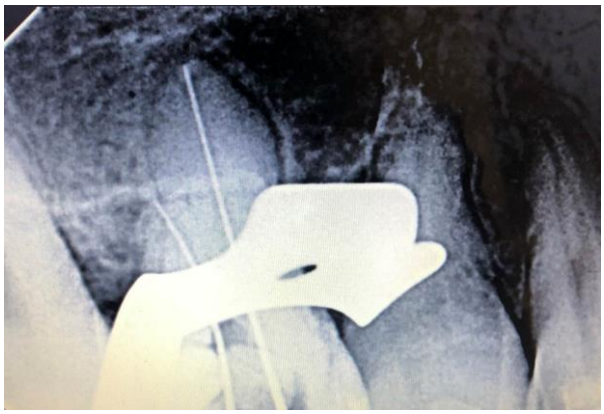

Fig 4: Working length Intra oral radiograph in relation to #16.

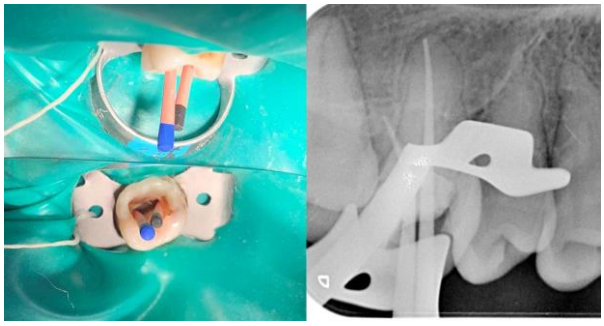

Fig 5: Photograph showing mastercone and IOPA in relation to # 16.

Fig 6: Intra oral radiograph showing obturation of the two canals in relation to #16

A pre-operative radiograph revealed coronal radiolucency involving enamel, dentin and pulp in relation to 16 (Figure 1). Two roots were seen in preoperative radiograph, radicular pattern gave suspicion of the one buccal root and one palatal root and presence of single canal in each root. Diagnosis was symptomatic irreversible pulpitis with apical periodontitis. To determine the exact morphology of the variations, it was decided to perform CBCT of tooth #16(Figure 2). CBCT of tooth #16 revealed two roots, buccal and palatal root with single canal in each root suggestive of Weine's type I morphology.Tooth #16 was prepared for nonsurgical endodontic therapy. After administration of local anesthesia, tooth was isolated with a rubber dam and a conventional endodontic access opening was made. After removing pulp tissue, two orifices were evident – buccal and palatal. Occlusal view of the endodontic access showed dentinal map connecting the two orifices of the buccal and palatal canal after deroofing (Figure 3). One orifice was present in the buccal aspect, and other orifice was present in the palatal aspect. The working length of each canal was estimated by means of an electronic apex locator (Root ZX; Morita, Tokyo, Japan) and then confirmed by a radiograph (Figure 4). The canals were initially instrumented with #10 K- file (Dentsply Maillefer) under irrigation with 5% sodium hypochlorite and 17% EDTA. Coronal flaring was carried out by using orifice widener (Dentsply Maillefer). Cleaning and shaping of the canals were done by using nickel titanium Protaper file system (Dentsply Maillefer) with a crown-down technique. Corresponding master cones were selected and fit was confirmed with the radiograph (Figure 5). The canals were obturated with AH plus resin sealer (Dentsply Maillefer, Ballaigues, Switzerland) and corresponding gutta-percha points using lateral condensation technique. The cavity was then restored with posterior composite filling. (Figure 6)

DISCUSSION

A thorough knowledge of the root canal system is an absolute necessity for the success of root canal treatment. A typical maxillary first molar is considered to have three roots and three or four canals, but the root and root canal morphology of teeth may vary greatly. Fusion of two buccal roots is one of the most common aberrations of maxillary molars. A total of 0.4% of first maxillary molars and 2.2% of second maxillary molars have been reported to have this variation[5]. Root canal morphology should be examined further during treatment by evaluation of radiographs taken from different horizontal angles. The use of a preoperative radiographs and additional radiographic views with 20-degree mesial or distal angulations are good techniques for the assessment of root canal morphology and anatomy[6]. Burns[7] described the maxillary first molar as "possibly the most treated, least understood, posterior tooth." A thorough knowledge of the root canal system is an absolute necessity for the success of root canal treatment. In certain cases, use of multiple preoperative radiographs or an additional radiograph from a 20° mesial or distal projection may be helpful in detecting unusual root canal morphology[8].

Presence of additional root canals has been reported and discussed by several authors.The hidden canals can be diagnosed by:

a. Cervical prominence, where it could be detected through periodontal probing.

b. Extra cusp, which is present in combination with cervical prominence.

c. Radiographic examination[9,10] where radiograph should be taken at different angulation. Multiple radiographs and well angulated periapical films should be taken. (Mesio-angular, disto-angular, straight) when evaluating an endodontic failure.

d. Digital radiography: This affords a variety of software features, significantly enhancing radiographic diagnostics in identifying hidden, calcified or untreated canals.

e. Coronal flaring: This should be done for better visualization of canal orifice.

f. Troughing of grooves with ultrasonic tips (CPR tips).

g. Examination of the pulp chamber floor with a sharp explorer (DG 16).

h. Champagne bubble test using Sodium Hypochlorite: After cleaning and shaping procedures, the access cavity is flooded with

NaOCl and the solution is observed to see if bubbles are emanating toward the occlusal table from canal orifice. A positive bubble reaction signifies that NaOCl is reacting with residual tissue within the instrumented or the missed canal or with the residual chelator present within the prepared canal .

i. Methylene blue dye is irrigated into the pulp chamber and subsequently rinsed thoroughly with water, dried and visualized to see where the dye has been absorbed. Frequently the dyes will be absorbed into the orifices, fins and isthmus areas [11].

j. Spiral CT [12], Cone beam CT[13] .

Magnifying glasses, head lamps, transilluminating devices, Loupes and Operating microscopes [14] are used to improve visualization.

CONCLUSION

Practitioners should keep in mind that all teeth, including maxillary first molars, are likely to present variations in their root canal systems and are challenging for diagnosis and successful endodontic therapy. Although the incidence of presence of two roots and two canals is not high, it is important to take these variations into consideration during root canal treatment of maxillary molar. The author documents the endodontic management of an unusual case of a maxillary first molar with two roots and two canals and also highlights the role of CBCT to confirm the presence of number of roots and root canals leading to a successful treatment outcome.

Practising tips

- Failure of root canal treatment of maxillary molars is very high when the morphological variation is not kept in mind leading to missing out of hidden canals.

- Various investigations other than radiographs can be used for identification of canals such as Champagne bubble effect under magnification and CBCT.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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