Open Journal of Stomatology, 2015, 5, 102-107
Published Online April 2015 in SciRes. http://www.scirp.org/journal/ojst
http://dx.doi.org/10.4236/ojst.2015.54015

A Root Canal Therapy on the Maxillary First Molar Tooth with Five Canals: A Case Report

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Received 17 March 2015; accepted 8 April 2015; published 10 April 2015

Abstract

Maxillary first molar usually exhibits a radicular anatomy of three roots and three or four canals. However, different anatomic variations like extra number of roots and canals are possible. For a successful treatment, clinicians must have well equipment and a thorough knowledge of the external and internal anatomy of teeth and its variation. Using of CBCT may help to locate extra canals by giving a chance to clinicians to see the root canal anatomy in 3-D view. The aim of this study was to present a case report about a diagnosis and treatment in maxillary first molar with three roots and five canals. It is concluded that the diagnosing and the treatment of unusual cases are key factors for successful endodontic treatment of these teeth.

Keywords

Root Canal Therapy, Maxillary First Molar, Anatomy

1. Introduction

Main objective of the root canal treatment is to clean the entire pulp cavity and to obturate it with an inert filling material. For a complete healing of periradicular tissues, all of the root canals must be located and treated. Missing root canals and infected spaces like lateral canals, isthmuses and deltas are one of the reasons of endodontic failure [1]. To eliminate such problems, clinicians must have well equipment and a thorough knowledge of the external and internal anatomy of teeth and its variation.

Maxillary first molar usually exhibits a radicular anatomy of three roots and three or four canals [2]. However, different anatomic variations like abnormal number of roots, canals are possible. Many literatures could be found showing the several types of variations of root canals of maxillary molar teeth. Christie and Deveaux reported a maxillary molar with two palatal roots [3]. Ferguson showed a maxillary molar tooth with the three canals in mesio-buccal root [4]. Moreover, Zmener and Peirano showed maxillary molars with three buccal roots

[5].

Dental operating microscope could help to localize and handle of additional canals as a result of lighter and higher magnification of the field of view [6]. Moreover, Cone beam computed tomography (CBCT) has been very useful in identification of anatomic features and variations of the root canal system. CBCT gives a chance to clinicians to see root canal anatomy in 3D view [7]-[9].

The aim of this case report is to introduce a maxillary first molar with five root canals and its root canal treatment.

2. Case Report

An 11-year-old female with acute pain history presented to the department of Endodontics, İstanbul Mega Medipol Dental Hospital. Patient's medical situation was non-contributory. Oral examination showed that a deep carious lesion on the tooth number 16. Tooth was sensitive at percussion and the vitality test was achieved by cold pulp test and the response was positive. Radiological examination showed that a deep carious lesion on the distal side of the tooth and the pulp chamber was involved by carious lesion (**Figure 1**, Initial radiograph of tooth 16). From the oral and radiological examination findings, the diagnosis was irreversible pulpitis so the endodontic therapy was suggested to the patient.

The patient received local anesthesia of 2.0 ml of 4% articaine with 1:200,000 epinephrine (Ultracain DS Fort, Sanofi-Aventis, İstanbul Turkey) and rubber-dam isolation was performed (**Figure 2**, Rubber Dam Isolation).

Figure 1. Initial radiograph of tooth 16.

Figure 2. Rubber dam isolation.

Access cavity was prepared and three canal orifices (mesio-buccal, disto-buccal and palatal) were identified. Coronal flaring was done with Pro-Taper SX orifice shaper Ni-Ti rotary file (DentsplyMaillefer, Ballaigues, Switzerland) and working length was measured #10 K-file using Propex Pixie apex locator (DentsplyMaillefer, Ballaigues, Switzerland). Rotary instrumentation was finished by Pro-Taper Next™ X3 (DentsplyMaillefer, Ballaigues, Switzerland). After the shaping of root canals there was a little hemorrhage in the access cavity. By the way following the hemorrhage by using #10 K-file disto-palatal (DP) and mesio-palatal (MP) canals were determined. Then instrumentation of these canals was finished by Pro-Taper Next™ X2 (DentsplyMaillefer, Ballaigues, Switzerland). When all the guta-percha set to the root canals MB and MP canals were together in the apical third of the root an DP and DB were the same too. All canals were irrigated by 2.6% NaOCl during the canal preparation. Final irrigation was achieved following by 2 cc 17% EDTA, 2.6% NaOCl, distilled water and finally 2% chlorhexidine. Root canal filling was finished single cone technique with AH Plus Root Canal Sealer (DentsplyMaillefer, Ballaigues, Switzerland) (**Figures 3-5**).

Figure 3. Access cavity after root canal filling.

Figure 4. Maxillary first molar of the right side with three roots and five canals.

3. Discussion

Complex root canal anatomy and missed canals are the most common reasons for the endodontic failures [4] [10]. A thorough knowledge of the root canal anatomy and correct treatment are key factors for a successful endodontic therapy. Untreated root canals affect adversely the treatment success of endodontic treatment of maxillary molars.

Different anatomic variations could be occurred on maxillary first molars. Cleghorn *et al*. reported that the incidence of mesio-palatinal canal is 56.8% and incidence of the distopalatinal canal is 1.7% [11]. Cleghorn *et al*. also reported that the incidence of mesio-buccal one canal is 43% and two canals 56.8% [11]. According to Weine *et al*. [12], many types of root canal configuration are possible, one canal and one apical foramen (Type I), two canal and one apical foramen (Type II), two canal and two apical foramen (Type III), or one canal and two apical foramen (Type IV). In our case, two canals on the mesial and distal side were both Type II (**Figure 6**).

In the present case, two canals were on the mesial and distal side of pulp canal floor and canal configuration was Vertucci Type II [13] (**Figure 7**).

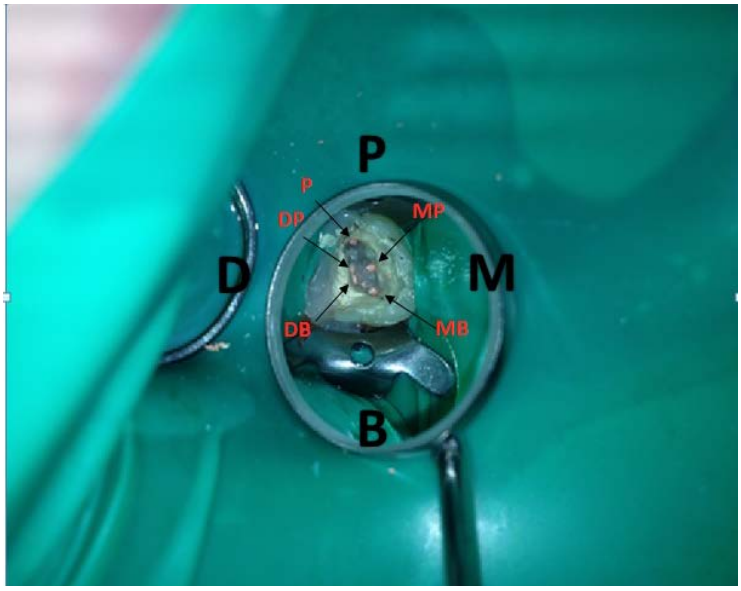

Figure 5. Localization of root canal orifices.

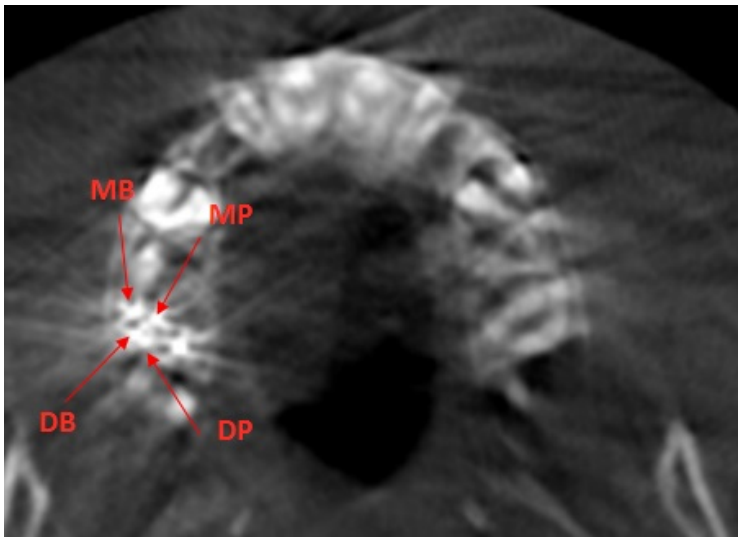

Figure 6. CBCT view of the maxillary right molar at coronal third.

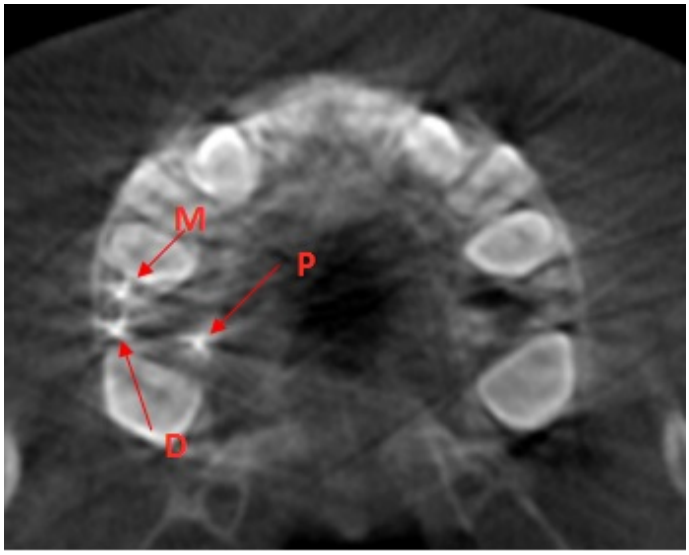

Figure 7. CBCT view of the maxillary right molar at apical third.

Many clinician use an operation microscope during root canal treatment because of its advantages. Several studies showed that it is easier to locate root canal orifices when using magnification.

Radiographic imaging is essential in diagnosis, treatment planning and follow-up in root canal treatment. Periapical radiographs have only two-dimensional view [7] [8]. For a complete diagnosis, CBCT is a three dimensional X-ray imaging so it can be very helpful in indicating extra roots. In the present case, there was still a hemorrhage on the pulp chamber floor after the mechanical instrumentation. Therefore, CBCT helped us to detect other root canals [7]-[10].

4. Conclusion

This case report contributes to our understanding of abnormal variations of the root canal of maxillary first molars. Although such a case rarely occurs, clinicians must be careful of them when performing endodontic treatment of maxillary molars.

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