

Case Report

Confluent middle mesial root canals in mandibular first molar: A case report

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Abstract: Knowledge of both normal and abnormal anatomy of the root canal system can directly affect the outcome of the endodontic therapy. This paper describes the nonsurgical endodontic management of the rare anatomical configuration middle mesial canal in previously treated mandibular first molar. After coronal access, the gutta-percha was eliminated. In precise examination of groove between two mesial canals, the middle mesial orifice was revealed. All root canals prepared chemo mechanically and obturated. After 6 months follow up, the tooth was asymptomatic and functional and apical lesion was healed.

Keywords: confluent, mandibular first molar, middle mesial canal.

INTRODUCTION

Knowledge of both normal and abnormal anatomy of the root canal system dictates the parameters for execution of root canal therapy and can directly affect the outcome of the endodontic therapy[1]. Successful root canal therapy consists of thorough biomechanical instrumentation and chemical debridement, followed by hermetic obturation of the root canal system[2]. Missed canal and spaces within the root canal system may contain microorganisms and their byproducts and may contribute to failure of therapy. A missed canal is neither debrided nor thoroughly sealed, and thus may result in the development or persistence of periapical inflammation[3]. All categories of teeth may have additional root canal /or canals with increased likelihood of finding aberrant canal configurations in premolars and molars[4]. The first mandibular molars typically have two roots, one mesial with two root canals(mesiobuccal and mesiolingual) and another distal, which contains one or two root canals[4,5]. Root canal configuration with two distal canals varies from 20% to 46%in different population[6,7]. The identification of three[8,9] or four canals [10] in the mesial root or three canals in the distal root [11] is still anatomical variations reported in the literature. Vertucci and Williams[12] first reported the presence of a middle mesial canal(MM) in a mandibular molar; there have been multiple case reports of aberrant canal morphology in the mesial root [13-19]. In a clinical

evaluation of 100 mandibular molars,Pomeranz et al [16]found that 12 molars had MM canals in their mesial roots and classified them into three morphologic categories as follows: fin, confluent and independent. According to their classification, an independent canal implies the canal originated as a separate orifice and terminated as a separate foramen, and only two cases were identified as independent. Goel et al [19] reported mandibular first molars had MM canals in 15.0%of specimens. Among these MMcanals, only 6.7% of MM canal were independent. Thus, this case report describes the endodontic management of a mandibular first molar with three confluent mesial canals in the mesial root.

CASE REPORT

A 25-year-old male was referred to dental school of shahid Beheshti University of medical sciences with chief complaint of mandibular buccal abscess on lower right first molar which was previously treated. His past medical history was found to be noncontributory. The clinical examination of the root revealed swelling and severe response to percussion and palpation on tooth 30.Preradicular lesion of tooth 30 was evident in periapical radiography and endodontic treatment seemed insufficient (Figure 1 (A)). Furcation-CEJ relationship was lower than average but not as seen taurodontism. The clinical and radiographic findings led to a diagnosis of acute apical abscess. A treatment plan, included nonsurgical retreatment of tooth 30, the patient was consented to the suggested treatment. During the

first session, the right inferior alveolar nerve blocked and rubber dam was applied. Coronal restoration was removed by high speed bur and ultrasonic tips. An adequate endodontic access cavity was established. The gutta-percha is initially was eliminated from the canal in the coronal one-third, then the middle one-third, and finally was removed from the apical. The hand files and chloroform were used for elimination of gutta-percha. The pulpal floor showed two orifices for distal and two orifices for the mesial root. Precise examination of the groove between two mesial canals, the middle mesial canal orifice was revealed and explored with #10K-file (Maillefer, Dentsply, Ballaigues, Switzerland). Working lengths were determined by using an electronic apex locator (VDW GmbH, Munich, Germany). The radiograph was taken to confirm the working lengths (Figure 1(B)). The radiograph showed three confluent mesial root canals. It is recognized as 3-1 configuration (type 18) by using Vertucci's classification. All canals were prepared in a crown-down technique with ProTaper rotary

instruments (Maillefer, Dentsply, Ballaigues, Switzerland). chemical irrigation was performed with amounts of 5.25% sodium hypochlorite. After preparation, the root canals were dried with sterile paper points (Maillefer, Dentsply, Ballaigues, Switzerland) and filled with calcium hydroxide paste (Cinabartar, Tehran, Iran). The cavity was closed with a temporary filling material (Aria dent, Tehran, Iran). Second session was performed after 2 weeks. Local anesthesia was administered and rubber dam was applied, then temporary restoration was removed. Subsequently, incision and drainage was performed. Irrigation was done with 5.25% sodium hypochlorite. The canal were finally flushed with sterile saline, dried with sterile paper points and obturated with gutta-percha (Aria dent, Tehran, Iran) and AH-26 sealer (Dentsply, DeTrey Konstanz, Germany) using lateral compaction technique (Figure 1(C)). The tooth was restored appropriately. After 6 months follow up, the tooth was asymptomatic and radiographic finding showed the apical lesion was healed (Figure 1(D)).

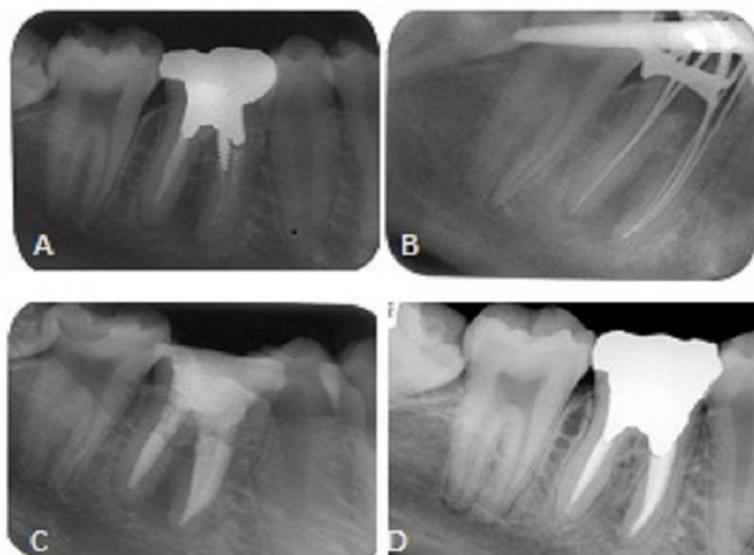


Fig-1: (A) Preoperative radiograph. (B) Working length. (C) Postoperative radiograph. (D) 6 months follow up

DISCUSSION

This report describes the failure of a first mandibular root canal therapy because of middle mesial canal missing. Failure to recognize and development of anatomy of root canal system contributes to unfavorable endodontic retreatment or surgical intervention [5]. Anatomic variation of root canals in mandibular molars reported in several studies. Fabra et al [15] reported that 2.6% of molars had three canals in the mesial root. Pablo et al [2] reported that incidence of this anatomical morphology was 2.6%. They observed that the confluent of MM canal with mesiobuccal or mesiolingual canals having a common apical termination was more frequently observed than a configuration including three distinct, separate apical foramina. Goel et al [19] reported that mandibular first

molar had 13.3% three mesial canals, 3.3% four mesial canals and 1.7% three distal canals. They also showed that one apical foramen was present in 30%, two in 60%, three in 6.7% and four in 3.3% of the cases. The prevalence of intercanal communications was low at young and old ages, but high at intermediate ages. It is important to be familiar with these age-related variations in the root canal system to aid in the location and negotiation of canals as well as their subsequent management [20,21]. At least appropriate radiographs taken from two different horizontal angles can help to prevent the missed anatomy, even though radiographs have limitation in the number of canal assessment.

Molar cases may require 3D diagnostic images to improve the assessing of root canal systems [9,11]. CBCT scanners use a cone-shaped beam instead of the

fan-shaped one used by regular CT scanners. It has been successfully used in endodontics for better understanding of the root canal anatomy[22]. De Toubes et al [8] showed that CBCT was an accurate method of identifying accessory mesial canals in mandibular first molars. La et al [9] proposed clinical detection and management of an independent middle mesial canal in mandibular first molar by using CBCT imaging.

A careful clinical inspection along radiographic interpretation is necessary to detection of additional root canals. A proper access cavity preparation is of central importance in localizing the orifices of the root canals, examination of the pulp chamber floor with a sharp explorer, troughing of grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, and performing the sodium hypochlorite “champagne bubble” test, fiber optictrans-illumination, and visualizing canal bleeding points are important aids in locating root canal orifices. Clinically, the presence of additional canal indicates continuous bleeding in teeth with pulpitis or normal pulps despite complete instrumentationbut maybe it’s not observed in previously tooth treated. Following are the important aids in locating the additional canal such as the presence of apical rarefaction on the lateral side of the root with necrotic pulps, fast break guideline, eccentric location of an endodontic file during working length determination, inconsistent apex locator reading, a sinus tract that traces laterally away from the main canal, or the feeling of a catch on the canal wall during instrumentation [15].

The present report confirms the necessity of the precise exploration of root canal anatomy during treatment to prevent unsuccessful treatment outcomes.

CONCLUSION

The attention to perform steps of preparation carefully is requisite to attain a successful treatment. Radiographic finding is valuable and should always couple with an accurate clinical examination.

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