Mandibular first premolar with three canals and two roots: A case report

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ABSTRACT

Introduction: The possibility of additional root canals should be considered even in teeth with a low frequency of abnormal root canal anatomy, therefore demanding more attention of the clinician during root canal treatment. **Objective:** This article reports a relatively uncommon clinical case of a mandibular first premolar with two roots and three canals which was successfully treated with root canal therapy. **Methods:** After initial radiograph, the presence of two roots was detected. Additional care was taken to explore the root canals, confirming the presence of three canals with the aid of a microscope. The root canals were instrumented using a hybrid rotary technique advocated by the School of Dentistry from Piracicaba, and obturated using Sealer 26 and cold lateral compaction. **Conclusion:** In order to achieve the best possible outcome in root canal treatment it is important to have a good knowledge of the root canal system morphology in addition to appropriately using the diagnostic tools.

Keywords: Root canal therapy. Root canal preparation. Premolar.

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Introduction

The success of nonsurgical endodontic therapy depends on a thorough knowledge of the root and root canal morphology to adequately locate all canals and properly clean, shape and obturate the canal space in its three dimensions.[1,2,3] The internal anatomy of a canal system may reveal isthmuses, lateral and accessory canals or diverse canal shapes, all of which can complicate the cleaning and shaping procedures. Incomplete cleaning and shaping of these areas may leave tissue, bacteria or necrotic debris in the canal. The presence of these irritants can result in persistent periapical inflammation and failure of the root canal treatment.[4]

Some authors have suggested that mandibular premolars may represent the greatest difficulty in performing successful endodontic treatment due to wide variation in root canal morphology.[5] Additionally, the mandibular first premolar was found to have the highest failure rate (11.45%).[3] Previous studies have reported many variations in the internal anatomy of this tooth. The majority of all mandibular first premolar have a single root (97.9%), and only 1.8% of them presented two roots.[6] As for the internal morphology of this group of teeth, Vertucci[7] revealed that 74% had one canal at the apex, 25.5% had two canals and 0.5% had three. Thus, this article reports a case of a mandibular premolar with an unusual morphology: with two roots and three canals.

Case report

A 37-year-old male patient sought the school of Dentistry from Piracicaba (FOP-UNICAMP) with a chief complaint of having spontaneous pain in the posterior right mandibular tooth for one week. The patient was in good health without any systemic involvement. Intraoral clinical examination revealed the presence of a localized edema in the buccal gingiva, the tooth was tender on percussion and sensitive on periapical palpation, no periodontal pockets were found. Furthermore, the cavity had a temporary restorative material and, according to the patient, a local dentist had performed an emergency procedure before referring the patient to the FOP/UNICAMP. A bifurcation could be seen at buccal sight, suggesting the presence of more than one root. Radiographic examination confirmed an unusual anatomy of two roots, as well as widening of the periodontal ligament and apical lesion (Fig 1).

The clinical and radiographic examinations led to a diagnosis of acute periapical abscess. After anaesthetic procedure carried out with 2% lidocaine containing 1:100000 epinephrine (DFL, Rio de Janeiro, Brazil), the tooth was isolated with a rubber dam. For endodontic access, a round #1014 diamond bur (KG Sorensen, Barueri, Brazil) was chosen. Pulp chamber inspection and localization of canal orifices were performed with the aid of a clinical microscope (DM Pro, Opto Eletrônica SA, São Paulo, Brazil) and a sharp explorer (SSWhite, Rio de Janeiro, Brazil). All orifices were in opposite directions (buccal, lingual and distal). Apical foramina of the canals were also separated. Cleaning and shaping of the canals were done by the hybrid rotary technique advocated by the endodontic department of FOP/UNICAMP. Apical patency was obtained for each canal with a #10 K-file and measurement of the working length was electronically taken with Romiapex A-15® apex locator (Romidan, London, UK). Root canal instrumentation was done using 2% chlorhexidine gel as auxiliary chemical substance. Canals were dried with absorbent paper and an intracanal dressing consisting of paste of calcium hydroxide and 2% chlorhexidine gel was placed. Seven days later, obturation of the root canals was not possible due to the presence of purulent exudate. Instrumentation was repeated and a medication consisting of amoxicillin 500 mg and metronidazole 400 mg was prescribed for 7 days. After this period, the tooth was completely asymptomatic, the edema had regressed and the root canal treatment was completed. To this end, the root canals were irrigated with EDTA 17% for three minutes, dried with sterile absorbent paper and obturated with gutta percha and Sealer 26® using cold lateral compaction (Dentsply Maillefer Ind, Petrópolis, Brazil). A final radiograph was taken to access the quality of obturation (Figs 2 and 3).

Discussion

One of the main reasons for endodontic failures is incomplete instrumentation and disinfection of the root canal space.[5,8,9] Knowledge of the complexity of root canal anatomy is essential when performing endodontic therapy and should be recognized before or during treatment. Anatomical variations such as additional canals or root may be missed, resulting in possible treatment failure. This fact becomes important since authors have demonstrated that the mandibular premolar has

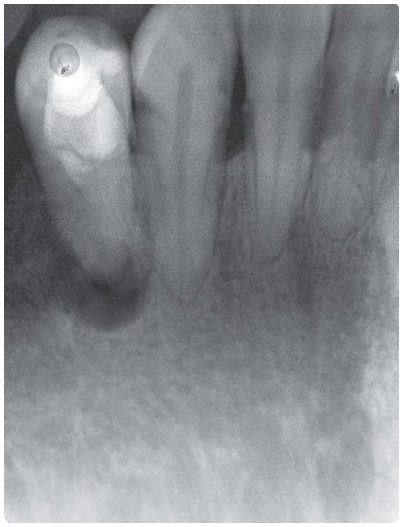

Figure 1. Preoperative radiograph of mandibular first premolar.

Figure 2. Radiograph of root canal filling quality.

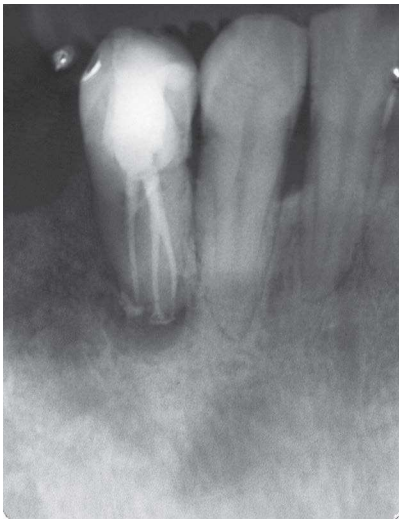

Figure 3. Postoperative radiograph of the root canal obturation.

a disproportional number of flare-ups and endodontic failures.[5] Anatomic variations can result in inadequate debridement which may leave irritants within the canal system and produce an unfavorable environment for healing periapical tissues.[4]

Due to the presence of such anatomic variations, some suggestions can help the clinician identify multiple root canal systems in the mandibular first premolar and, therefore, achieve a successful treatment outcome. In this sense, methods such as multiple preoperative parallel radiographs, as well as mesial or distal shift radiographs, can help to determine the type of canal system present. If the root anatomy has an indistinct definition after several radiographs, it probably indicates a second root or even a possible third.[5] Additionally, it is important to have adequate access opening in order to allow a proper access to all potential root canal systems.[10] Magnification and illumination are absolute prerequisites for evaluating color changes and for working deep inside the tooth. Moreover, clinicians should be prepared to properly use the diagnostic tools available, as it is the case of microscopes. The introduction of magnifying glass and surgical microscopes has revolutionized the practice of Endodontics. The advantages of using these surgical magnifying glasses for conventional Endodontics include enhanced visualization of root canal intricacies, which enables the clinician to investigate the root canal system and to clean and shape it more efficiently.

Conclusion

It is extremely important to use all diagnostic tools available to locate and treat the entire root canal system. Additionally, careful interpretation of angled radiographs, proper access preparation and a detailed exploration of the interior of the tooth, ideally under magnification, are essential prerequisites for a successful treatment outcome.

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