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Magical approach in endodontics: A case report

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Abstract
Recently, there has been an ongoing trend of case reports that highlight the presence of more than four root canals in mandibular first molars. This tendency warns clinicians to be more prudent when dealing with mandibular first molars requiring endodontic treatment.
Moreover, radiographic examination should be taken as a clue providing tool rather than as an absolute guide to anatomy and its associated aberrances. This case reports the successful non-surgical endodontic management of a mandibular first molar with six root canal systems with three canals in the mesial root and three in the distal root. After non-surgical endodontic treatment, the tooth was restored definitively with a resin composite core followed by porcelain fused to the metal crown.

Keywords: Magical approach, endodontics

1. Introduction
The therapeutic success of endodontics depends on several factors such as diagnosis, adequate access and application of skills towards the thorough cleaning, shaping and obturation of the root canal system [1-3]. The endodontic system of human teeth comprises several variations which range from fins, deltas, isthmuses, anastomoses, cul-de-sacs, additional canals to additional roots [4-10]. Therefore, to accomplish thorough cleaning and shaping, it is imperative to develop a good understanding of the root canal anatomy and associated deviations such as additional root canals, as evidence suggests that a missed root canal system may lead to post-treatment disease [11, 12].
The mandibular first molars normally have mesial and distal roots that harbour two mesial canals and one or two distal canals, respectively [13]. One of the major variants of mandibular first molars is the radix entomolaris, which has an accessory third root present on its lingual side [14].
Infrequently, there is an additional canal known as the middle mesial canal, located in the mesial root. This canal is located in the developmental groove present between the mesiolingual and mesiobuccal canals. The reported incidence of a middle mesial (MM) canal ranges from 1% to 15% [4, 15] Another rare occurrence is the presence of three canals within the distal root. The third canal is referred to as the middle distal (MD) canal, which is located between the distolingual and distobuccal canals.
The presence of three canals in the distal root is considered extremely rare and their reported incidence is 0.2–3%. [5-7 11, 14-19] The purpose of this article is to report the successful endodontic treatment of a mandibular first molar exhibiting six root canal systems (three in the mesial root and three in the distal root).

Case Presentation
A 31-year-old man presented with symptoms of food lodgment and sensitivity to hot and cold in his lower left tooth. On examination, he had a deep carious lesion on the mesial surface of the lower left mandibular first molar with a faulty occlusal restoration. Periodontal probing depths were within normal limits. The tooth was −ve to percussion and the thermal tests were +ve with lingering sensitivity to cold. Periapical radiographic examination revealed that the carious lesion was in close proximity to the dental pulp. A diagnosis of chronic irreversible puplitis was established. The patient was given the option of root canal treatment or an extraction followed by a fixed prosthesis; however, the patient elected for endodontic

treatment. The risks and benefits of the treatment were explained to the patient and a written consent was obtained before starting treatment procedure.

Investigations

Pulp vitality testing, periapical radiograph.

Treatment

Treatment was initiated with the administration of local anaesthesia (4.4 mL 2% lidocaine with
1:100 000 epinephrine) and rubber dam isolation. Under magnification, previous restoration was removed from the cavity by a slow speed round carbide. A carious pulpal exposure was readily visible on the mesial wall. The pulp tissue was excavated from the pulp chamber and the orifices identified were mesiobuccal (MB), mesiolingual (ML), distolingual (DL) and distobuccal (DB).

In addition, the presence of the mesiolingual canal was found to be distant to the mesiobuccal canal, which suggested that the mesial root is wider than normal. The developmental groove between the mesiolingual and mesiobuccal canals was further evaluated and an additional orifice was identified, present between the ML and MB canals, and located in close proximity to the MB canal. The canal was identified as the MM canal and was successfully negotiated to full length with #8 and #10 H-type hand files.

Working length was confirmed with the help of an electronic apex locator and periapical radiographs). An evaluation of the area between the distal canals revealed a sixth canal system, the middle distal canal (MD), which initially went unnoticed. A working length radiograph confirmed the presence of this canal. Following the determination of working lengths, pulpectomy was carried out and the access was sealed with a temporary filling. All the canals were prepared using the protaper rotary system (Dentsply-Maillefer, Ballaigues, Switzerland) with RC prep (Hawe Neos Dental, Bioggio, Switzerland) as the lubricant. At regular intervals, copious irrigation with 5% sodium hypochlorite was performed. The mesial and distal canals were finished with F1 and F2 protaper rotary files (Dentsply-Maillefer, Ballaigues, Switzerland), respectively. Following disinfection of the gutta-percha points for 1 min in 5% sodium hypochlorite, the points were cleansed with alcohol to wipe away residual sodium hypochlorite. Later, all canals were subsequently obturated. Sealapex (Kerr Manufacturing Co) was used as the root canal sealer. Post-obturation radiographs were obtained at distal angulations to evaluate all the canals. Following obturation, the tooth was restored with a temporary restoration (Cavit, Espe, Seefeld, Germany) and the patient was rescheduled to receive a coronal build-up.

Fig 1: Pre-operative

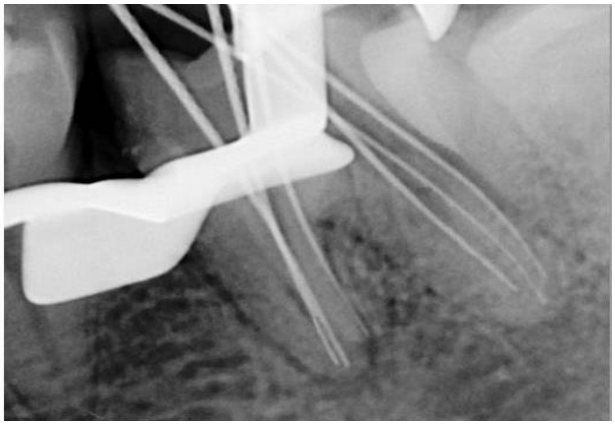

Fig 2: working length

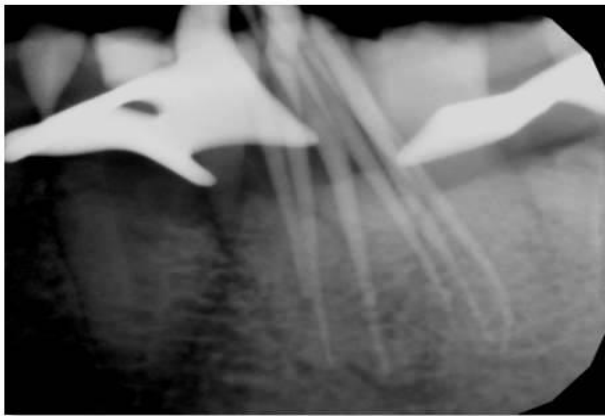

Fig 3: master cone

Fig 4: obturation

Discussion

This report highlights a rare case of a mandibular first molar with six root canals. Three canals were located in the mesial root, while three were found within the distal root. It has been reported in the literature that secondary dentin deposition occurs with age due to which partitions develop leading to progressive differentiation and separation of canals as well as formation of intercanal communications.

The prevalence of such intercanal communications is usually high in the middle age group while being the lowest among young and old age groups [20-22]. Every effort should be made to achieve a proper access cavity keeping the ‘law of concentricity’ in consideration. 23 This would help the operator to follow the outline of the tooth and make adequate sized access cavity.

Once the appropriately flared access cavity is finalised, it is recommended to sequentially irrigate the access cavity with

17% aqueous solution of ethylene diamine tetra acetic acid followed by 95% ethanol to achieve adequate cleaning and drying before visual examination of the pulp cavity floor under magnification.24 The canal may initially not be visible due to the overlying internal triangular dentin which often conceals the orifices. The developmental grooves between the canals should be troughed and inspected for a potential sticky point. If a sticky point is located, it should be carefully 'pecked' towards progressive advancement following the same methods employed for negotiating fine or blocked canals [25-27].

It is imperative to establish a straight line access into the canal as it reduces the chances of instrument separation [28]. Once a glide path is established, the clinician should then proceed with a normal rotary sequence to complete the shaping and cleaning process.

In order to be successful in endodontic treatment, clinicians should also be aware of root canal anatomy and its associated variances. A sceptical approach when searching for additional canals may prove beneficial. Moreover, several diagnostic methods are available that can facilitate detection of additional root canal systems. These measures include radiographs at various angulations [29] appropriate access cavity [30]. good lighting and magnification using a dental operating microscope, [31-33] careful visualisation, inspection of the chamber floor with an endodontic explorer, use of dyes, transillumination, white line test, red line test, bubble test, ultrasonics, chamber floor troughing and advanced imaging techniques such as cone

beam CT (CBCT). 34 CBCT has proven to be a very successful modality as it is not subjected to a two-dimensional view, geometric distortion, image elongation or foreshortening, etc [35-37].

CBCT has been shown to be a powerful tool for evaluating the extent of canal calcification and therefore helps in contributing to the proper sequence of the treatment [38]. Therefore, an intraoperative evaluation with CBCT is highly recommended while managing such atypical cases. However, CBCT imaging was not performed for this case.

Conclusion

- Cone beam CT imaging should ideally be performed for teeth showing additional canals on access in order to avoid left out canals postoperatively.
- Mandibular molars should be considered to have four or more canals unless proven otherwise.
- Use of magnification and adequate flaring of access walls is helpful in providing improved visualisation of the pulp cavity floor.

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