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Endodontic Management Of Mandibular First Molar With An Unusually 28 Mm Root – A Case Report

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Abstract:
One of the most important aspects of endodontic therapy is determining the correct working length. Cleaning, shaping, and obturation cannot be done correctly unless the working length is properly established. As a result, an accurate root canal working length assessment is required for expected endodontic success. Endodontic literature heavily focuses on a plethora of root canal morphologies. However, none has come across a mandibular molar with a 28mm canal length or ever has been reported. To our knowledge, we present the successful endodontic management of the mandibular first molar with an unusually long root length and canal.

Keywords: mandibular first molar, endodontia, working length

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INTRODUCTION

A comprehensive understanding of root canal anatomy and the morphology of human dentition is essential for clinicians and is a prerequisite for conventional endodontic procedures. Total debridement of the pulpal area, correct cleaning and shaping of the canal space, and three-dimensional obturation of the root canal make up the endodontic trinity. The most crucial aspect of endodontic treatment is canal preparation, which can be performed by correctly determining the working length. Untreated canals or canals that are not entirely sealed often fail endodontic treatment 1. Working length is defined as the distance from a coronal reference point to the point at which canal preparation and obturation should terminate. And it usually depends on the root length before the termination of the apical foramen. It affects the degree of pain and discomfort that the patient will experience following an appointment by virtue of over or under-instrumentation. The mandibular first molars normally have mesial and distal roots that harbour two mesial canals and one or two distal canals, respectively. Mandibular first molars commonly have two roots and three root canals. However, due to genetic, ethnic and gender variations, a wide range of anatomic and morphological variations can be encountered 2.

The recent trend in endodontic literature focuses on the treatment of the mandibular molar with diverse root canal morphology; canal variation 3–6. However, none of the cases in the literature reported a mandibular molar whose canal working length was more than 28 mm. To our knowledge, this is the first case that we are reporting a successful non-surgical endodontic management of a mandibular first molar with an unusually long root length.

CASE REPORT

A 32-year-old male reported having pain in the mandibular right first molar (46) for more than 2 weeks. The tooth was sensitive to percussion. Radiographically, there was evidence of radiopaque material suggestive of filling material, radiolucency was also seen beneath the filling material suggestive of secondary caries involving the distal pulp horn. This correlated with the patient's dental history where he had a temporary restoration done 2 weeks back. The patient was then advised single visit root canal treatment for the involved tooth since there was no evidence of periapical infection. Inferior alveolar nerve block anesthesia (2% Lignocaine with 1:200000 epinephrine) was administered. Following isolation with a rubber dam, access cavity preparation was done via endo-access bur and canal orifices were located with a DG 16 endodontic explorer. Upon deroofing and opening the pulp chamber, 3 distinct canal orifices were found and negotiated. Initial negotiation of the root canals was performed with a K-file ISO #10. The working length of these canals was measured with the help of a Root ZX apex locator (Morita Corp., Kyoto, Japan), the mesial canal and distal canal was found to be 28 mm in length. This was confirmed using radiographs taken at different horizontal angulations.

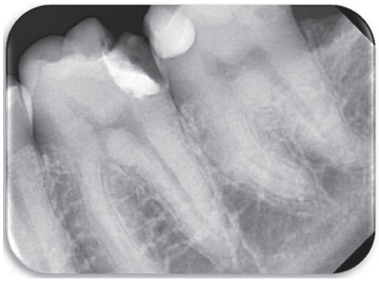

Fig. 1. **Pre operative Intraoral Periapical radiograph of 46.**

The canals were cleaned with sodium hypochlorite (NaOCl 5.25%) + EDTA and shaped with K files (Dentsply, Maillefer) and Neo Endo rotary files (Orikam Healthcare India Private Lim-

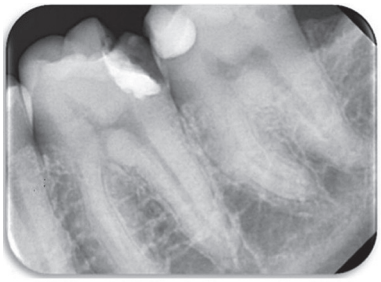

Fig. 2. **Intraoral Periapical radiograph showing determination of working length of the mesiobuccal root canal at 28 mm.**

ited). Irrigation was done with ASEP RC, a 2% chlorhexidine gluconate (CHX) solution. The CHX irrigation of the root canal ensured acceptable antimicrobial activity.

Master cones were selected by placing gutta percha (GP) cones according to the size of the last finishing file used to the working length and were confirmed radiographically. The canals were thoroughly dried and obturation was done using 6% size 20 GP was done. The patient was recalled the following week and remains symptom free.

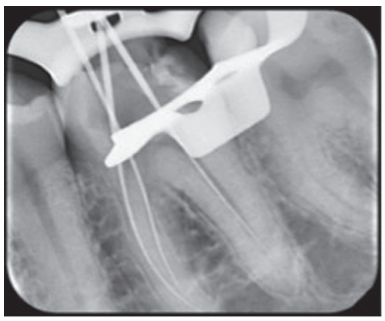

Fig. 3. **Intraoral Periapical radiograph of the master cone placement.**

DISCUSSION

The distance between a coronal reference point and the point at which canal preparation and obturation should cease is defined as working length in the endodontic vocabulary. This anatomical feature is known as the canal's minor diameter. It reflects the transition between pulpal and periodontal tissue, and is located between 0.5 and 1.0 mm from the external foramen or major diameter 7. A working length established beyond the minor diameter may cause apical perforation and overfilling of the root canal system. This may increase postoperative pain and delay or prevent healing. Alternately, a working length established short of the minor diameter may lead to inadequate debridement and underfilling of the canal. Retained pulp tissue may persist and cause prolonged pain. In addition, microleakage into the canal space may result in impaired healing 8. Although it has been a major subject of debate for decades, the exact termination point for root canal therapy is still considered a controversial topic 9. However, in clinical practice, the minor apical foramen, as a more consistent anatomic feature, can be regarded as being the narrowest portion of the canal system and thus the ideal landmark for the apical endpoint for root canal treatment. Different methods have been used for locating the position of the canal terminus and measuring the working length of root canals as a result.

Case studies highlighting mandibular first molars with anatomical abnormalities such as supplementary root canals are becoming more common. Three root canals were seen in 78 % of mandibular permanent molar teeth 10. The mesial root of 40–45 % of two-rooted mandibular first permanent molars have two root canals and one apical foramen. In an in vitro study2, the prevalence of two root canals in the distal root of mandibular first permanent molars were over 30% .6% of the teeth had three roots, with 58 % having four root canals (two mesial and two distal) and 42 % having three root canals (two mesial and one distal). In two-rooted mandibular first permanent molars, four root canals were found in 47 % of cases.

Studies revealed that the average length of the upper 1st molar is 20.62mm and for the lower 1st molar is 20.28mm; the range of length for the upper 1st molar is 17.16mm–25.33mm and for the lower, 16mm–24mm 13. In our case, both the mesial and the distal root of tooth no 46 was found to have a working length of 28 mm, which was a rare occurrence. A careful examination of angled radiographs can reveal variations in the distal root of mandibular first molars. The essential information about the tooth's architecture and root canal system required for endodontic treatment can be found in buccolingual images 20° from mesial and 20° from distal 14. A 2D radiograph's interpretation and assessment may alert the doctor to the existence of abnormal anatomy, but it cannot display the changing morphologic structure of root canals and their interrelationships 15.

CONCLUSION

Mandibular first molars have an intricate root canal system with a wide range of isthmus and morphological variances; they require extra care during access cavity preparation for navigating all root canal orifices, as well as cleaning, shape, and obturation. These variations should be expected by the clinician and treated carefully.

ABBREVIATIONS

1. CHX – Chlorhexidine Gluconate
2. EDTA – Ethylenediamine tetra acetic acid
3. NaOCl – Sodium Hypochlorite
4. GP – Gutta Percha
5. CaOH – Calcium Hydroxide

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