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Case Report

Middle Mesial Canals in Mandibular First Molars: A Clinician's Dilemma

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Abstract

Success in endodontic therapy is achieved after thorough cleaning and shaping of root canal system followed by its complete obturation. However, owing to anatomic perplexities. this therapy at times may be more complicated than expected. The morphological variations of the Mandibular first molar demand careful clinical approach to avoid failures. The introduction of magnification and ultrasonics in endodontics has revolutionized the world and we are now able to manage the anatomical complexities much more predictably.

Keywords: *Endodontic Treatment; Magnification; Middle Mesial Canal; Mandibular First Molar; Ultrasonics*

Introduction

The success of endodontic therapy lies in the cumulative effect of thorough cleaning and shaping, associated with three dimensional obturation of the root canal system. The variation in pulp cavity morphology, especially in multirooted teeth is a constant challenge for diagnosis and successful endodontic therapy [1]. Treating mandibular molars may be considered as not so difficult as compared to their maxillary counterparts, owing to the advantage of having direct vision to the site during the procedure but failures do happen. Many failure cases of mandibular molars have been identified and reported which can be attributed to the presence of extra roots and extra canals, which if left unidentified, may lead to failures [2,3]. Middle mesial canal is an accessory third canal in the mesial root of mandibular first molars. It was described in 1974 by Vertucci and William [4]. Since then, there have been several reports across the world indicating the variable incidence of presence of middle mesial canal from 1% to 37.5% [5,6]. This additional canal may be independent with a separate foramen, or the additional canal may have a separate foramen and join apically with either the mesiobuccal or mesiolingual canal. This case report presents successful management of middle mesial canals in mandibular first molars by utilizing the power of magnification and ultrasonics during endodontic therapy.

Case Report

A 20 years old male came with the complaint of pain and sensitivity in mandibular right first molar. After clinical and radiographic examination (Figure 1) endodontic therapy was advised.

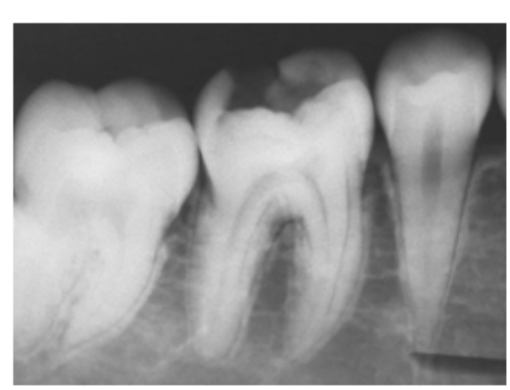

Figure 1: *Pre-operative radiograph showing carious mandibular first molar.*

The tooth was anesthetised using 2% Lignocaine with 1 : 80 000 adrenaline and isolated using rubber dam (Coltene, India). Access preparation was done and canal orifices were located with DG 16 endodontic explorer The pulp chamber was flushed with 5.2% sodium hypochlorite to remove debris. Inspection of the pulp chamber revealed five canal orifices three in the mesial root and two in the distal root (Figure 2). Canal patency was checked with number 10 K-file (Mani, Inc; Tochigi, Japan) and working length was determined using electronic apex locator (CanalPro, Coltene). The middle mesial canal orifice was visible but difficult to negotiate. The tooth was treated under magnification using dental operating microscope (Labomed) and utilizing ultrasonic tips (Biosonic, Coltene) to uncover the orifice of debris and calcification. The canals were prepared up to ISO 15 size file. Thereafter Hyflex CM files (Coltene) were used in a sequential order as per the manufacturer's instructions. A 0.08 taper (25 No., 19 mm length) file was first used to perform the coronal flare. Thereafter, 0.04 taper file (20 No., 21 mm length) was used up to the working length, this was followed by the use of next size 0.04 taper file in sequence (25 No., 21 mm length) At next appointment patient was asymptomatic.

Figure 2: *Access cavity showing middle mesial canal.*

Master cone radiograph revealed proper fitting of cones (Figure 3). Canals were dried with paper point and obturation done by using single cones of corresponding taper and size as MAF, using Gutta Flow 2 sealer (Coltene) (Figure 4).

Figure 3: *Master cone fit radiograph showing middle mesial canal.*

Figure 4: *Post-obturation radiograph.*

Discussion

Root canal treatment should result in the thorough mechanical and chemical debridement of the entire pulp cavity, followed by complete obturation with a hermetic seal. Any additional canal, if present, poses a great endodontic challenge, as incomplete pulp extirpation due to missed canals can result in treatment failure.

Middle mesial canal is an additional canal which is at times present in mesial root of mandibular first molar. Middle mesial canal (MMC) was first described in 1974 by Vertucci and William [7]. It's prevalence varies from 0.26 to 46.15% as per several studies which have been done across the world. This additional canal may be independent with a separate foramen it may have a separate foramen and join apically with either the mesiobuccal or the mesiolingual canal [9].

Presence of these extra canals has clinical importance; it may not be clearly visualized radiographically and may give an artificial impression of perforation. It is very difficult to detect extra roots canals via radiographs, as the roots may be superimposed on the radiograph. Thus, it becomes imperative to have a thorough knowledge of the morphology of root canal system so that the additional canals may not get missed during treatment.

The clinician should accurately observe the pulp chamber floor to locate all the possible canal orifices present. Initially this is to be done using a sharp endodontic explorer, utilizing the basic knowledge of the position of canal orifices. MMC is present in the developmental groove between mesiobuccal and mesiolingual orifices, and so this area must be carefully explored using an endodontic explorer. In this aspect, magnification with illumination has a significant role to play. This could be in the form of a magnification loupe or by use of dental operating microscope [10].

An ultrasonic tip may be used for removal of any protuberance from the mesial axial wall, so as to facilitate the access to the developmental groove between mesiobuccal and mesiolingual orifices, thus enabling the visualisation of the MMC orifice [11].

The present report reveals the presence of the third canal in the mesial root of mandibular first molar, the middle mesial canal. This canal is usually missed by the clinicians owing to their lack of knowledge of its existence. The need of the hour is to ascertain the prevalence of the middle mesial canal and its morphological details, especially in regional populations so that the clinicians may widen their knowledge about this. Once such information is available to the clinicians, they shall be more alert while treating mandibular first molars so that they would never miss treating the middle mesial canal.

Conclusion

Identification of extra canals in teeth holds paramount significance as failure to treat these eventually results in failure of entire endodontic therapy in the long run. The clinicians should be aware of the incidence of extra canals so that never miss out on them. Middle mesial canal is one such additional canal present in mandibular molars that is often missed. Its incidence is more in mandibular first molars as compared to second molars. An accurate understanding of root canal morphology in association with use of magnification and ultrasonics is definitely of immense help in managing the extra canals, thereby ensuring higher success rate of endodontic therapy.

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