



MANAGEMENT OF PREVIOUSLY TREATED SINGLE-ROOTED MANDIBULAR SECOND MOLAR WITH SINGLE CANAL- A CASE REPORT

Dental Science

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ABSTRACT

The mandibular second molar known to have a highly variable in terms of its root canal anatomy. second molar is commonly a bi-rooted tooth with an uncomplicated endodontic anatomy, variations have to be considered every time endodontic therapy is performed. This case report describes the diagnosis and management of previously treated mandibular second molar with unusual root canal anatomy, with one canal in a single conical root, using the contemporary advancements in endodontics. Comprehensive knowledge of anatomy and root canal morphology is crucial to perform root canal treatment. Therefore, an understanding of the canal configuration and anatomy is necessary for the dentist to enhance successful endodontic management.

KEYWORDS

mandibular molars, morphology, root canal anatomy, retreatment

INTRODUCTION

one of the key objectives of endodontic treatment comprises prevention and, when needed, to treat different endodontic disease.¹ morphological variation of root canals has always been a challenge in diagnosis and to perform a successful endodontic treatment. The endodontic intervention in all root canals is necessary to promote effective cleaning, removal of necrotic content and reduction of pathological microbes along with their by-products.² Different variation in root canal system such as additional canal bifurcations/trifurcations, furcal canals, lateral canals, apical deltas, and canal ramifications are frequently encountered during root canal treatment, and their incidence and clinical significance have been reported before. These anatomic complexity presents clinical challenges and difficulties that can often compromise such therapy's primary goal.^{1,3} The anatomic configuration of roots and canals of mandibular first as well as second molars seems diverse. Mandibular second molars have been gracefully evaluated in landmark studies by Vertucci and Weine et al. Similar to the mandibular first molar, this tooth most commonly has two roots; mesial and distal, with two mesial canals and one distal canal.^{1,4} Weine et al. reported that only 1.3% of mandibular second molars had a single canal configuration from an orifice to an apex. C-shaped canal configuration being one of the most common anatomical variants observed in a mandibular second molar. This aberrant morphology of mandibular second molar having horizontal cross section is in the form of a letter C, with canals which may or may not be separate.⁵ There are different variations in root canal anatomy of the mandibular second molar that have been documented for several populations. It is also very evident that root canal anatomy has a definitive racial influence. Asians appear to show Vertucci's type IV configuration in the mesial roots and type I in the distal roots. The high prevalence of C-shaped root canal systems and type IV canal configurations in the mesial roots of mandibular second molars have been referred to as a Mongoloid trait. Also, many studies have reported a high prevalence of C-shaped root canals in the Asian population.⁶ This case report describes the endodontic retreatment of rare root canal configuration of a mandibular second molar, showing one canal in a single conical root diagnosed with a post-treatment disease secondary to bacterial leakage, resulted as a consequence of the failure of the first endodontic treatment performed.

Case Report

A 39-year-old female patient presented with a history of constant throbbing pain from past 5 days with a history of previous endodontic treatment done 4 years ago. The pain kept her awake at night. Clinical examination showed a PFM crown with tooth no.47, a painful tenderness to percussion, and tooth mobility and periodontal pockets

were inconspicuous. No submucosal swelling was observed. Pre-treatment Intraoral periapical radiograph showed single root with apical radiolucency. (Fig.1) Careful examination of radiograph revealed a metal opacity throughout the length of a canal which led to the assumption of metal post throughout the canal length. The decision was made to re-treat the root canal and patient was informed about the procedure to be done and an informed consent was obtained.

After the injection of 1 ml local anaesthesia containing 40 mg articaine hydrochloride and 0.005 mg epinephrine (Septanest, Septodont, Saint-Maur-des-Fossés, France) and isolation with a rubber dam, PFM crown was removed using automated crown remover (GDC Fine Crafted Dental Pvt. Ltd.), the occlusal filling was removed. After removal of post obturation filling material the metal post was visible clinically. The tip of metal post was grasped with a hemostat and using ultrasonic scaler (UDS-A-LED GUILIN WOODPECKER MEDICAL INSTRUMENT CO., LTD) with G4 tips applied directly on the post, ultrasonic scaler was activated while pulling with the hemostat in a coronal direction. The metal post was successfully pulled out with continuous mechanical vibration transmitted to the post. (Fig.2) The pulp chamber was thoroughly rinsed with 3% sodium hypochlorite solution and the pulpal floor was carefully examined, remaining postoperative fillings were removed, the coronal two-thirds of the canal was performed using ProTaper Gold rotary files (Dentsply Maillefer) in the following sequence: SX, S1, and S2. Working length (WL) was determined using a size20K file attached to an electronic apex locator and then confirmed using a digital radiograph. After that, size 10 and 15K files were precurved and placed against the canal walls to further explore the internal anatomy. Root canal shaping was then completed. apical enlargement was performed using Vortex Blue rotary files (Dentsply Tulsa Dental Specialties, Tulsa, OK) in the following sequence: 25/0.06, 30/0.06, 35/0.06, 40/0.06 and 45/0.06. During the shaping procedure, EDTA gel (Glyde File Prep; Dentsply Maillefer, Ballaigues, Switzerland) was utilized as lubricant, and 5.25% NaOCl solution was used to irrigate the canal. Recapitulation and verification of canal patency were frequently performed during the procedure. Final irrigation was done using 17% EDTA (Meta Biomed Co. Ltd., Mandaluyong, Korea), after which the canal was dried using sterile absorbent paper points and an interim dressing of calcium hydroxide (Fig.3) and 2 % chlorhexidine was placed as medication in each root canal for 2 weeks. In the second appointment, the calcium hydroxide dressing was removed, the canal was rinsed, and gauged using hand K-files attached to the apex locator. The canal was irrigated again, dried with sterile -paper points the snug fit of a size 45, taper 0.06 master guttapercha cone was evaluated radiographically. (Fig.4) The canal was then obturated with gutta-percha cone and DIA-ROOT

BIO (DiaDent) bioceramic sealer. (Fig.5) The access cavity was then temporized with Cavit. After one week, the patient reported complete resolution of the symptoms. The tooth was restored using composite buildup and then referred for the fabrication of a full coverage restoration.



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

DISCUSSION

For successful root canal procedure, it is essential to have a prior knowledge of anatomy of the root canal, followed by thorough mechanical and chemical debridement of the entire root canal, and a three-dimensional obturation with an inert filling material and a final coronal restoration, the morphology of root anatomy can vary depending on the age, population, ethnicity, gender, number of teeth, and methodology. Anatomically, the teeth do not always possess a normal shape, number of variations may occur in formation, number of roots, and their shape. However, dentists must have an awareness of the presence of rare anatomical variation; even though abnormalities are rare.^{3,7} Radiographic appearance of a C-shaped root in mandibular second molars may show diversity depending on the exact nature and orientation of the root. It may present as a single fused root with single canal or as two distinct roots with a communication, the latter of which may not be very obvious at first glance.⁸

This case report describes the endodontic management of a previously treated mandibular second molar tooth with a single root canal. Assessment of preoperative periapical radiographs demonstrated the presence of one root with a large canal space suggesting one large round canal. This observation was confirmed upon access cavity preparation as careful inspection of the pulpal floor the retreatment was performed in this case in two appointments only because to achieve proper disinfection of the entire canal in order to kill the micro-organisms un-destroyed by the irrigation protocol. intra-canal medication, calcium hydroxide/ 2% chlorhexidine used as combination which significantly have more antibacterial activity.⁷

Intracanal posts are generally inserted for two reasons; strengthening of the root and retention for coronal build up. Past few years number of investigations have shown that intracanal posts do not strengthen the root canal in endodontically treated tooth in fact weaken it. Misuse of the posts even lead to root fractures. As post removal can compromise the remaining tooth structure many clinicians avoid retreatment and prefer surgical treatment, although many teeth can be treated successfully after proper evaluation of root canal anatomy.⁹

The use of the ultrasonic scaler alone and also in combination with other techniques provides a conservative, efficient approach for retrieval of broken posts from root canal spaces. The primary advantage of these techniques in the removal of posts is the conservation of remaining tooth structure.¹⁰ Different studies have shown there was a high prevalence of C-shaped roots/ canals in mandibular second molars, Conical roots tend to have simple canal systems, whilst flatter/broader roots have more complex canal systems.⁸ clinicians should suspect the presence of a similar anatomic

configuration on the contralateral tooth when examining the preoperative radiograph of a particular case. however, in our case on the contralateral side a careful inspection of a radiograph has clearly shown the presence of a commonly observed two-rooted configuration of mandibular second molar.

CONCLUSION

The main purpose to carry out this case study is to report a successful endodontic retreatment of a mandibular second molar with single root and single canal. Improper cleaning shaping or obturation will lead to endodontic failure, which sooner or later will convert into apical disease. Furthermore, clinician should be aware of the endodontic anatomy and its variations, careful interpretation of pre-operative periapical X-rays, magnification and illumination under the Operating Microscope, improves the predictability as well as the long-term successful outcome of the root canal treatments and retreatments.

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