



Management of Mandibular Second Molar with Rare Entity of Single Canal Using 3D Obturation

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Abstract

A variation in the root canal anatomy of mandibular second molars has been well documented in literature. Tooth with 2 mesial canals and 1 distal canal is most frequently encountered followed by varying entities like 2 canals, 4 canals, and c-shaped canal system. This case report describes the diagnosis and management of unusual morphological entity of mandibular second molar, with single root and single root canal using advanced endodontic procedures. Appropriate knowledge of various root canal morphological entities and usage of advanced equipment available leads to satisfactory results.

Keywords: Mandibular Molar; Single Canal; Obturation

Introduction

The main objective of root canal therapy is thorough cleaning and shaping of all pulp spaces and its complete obturation with an inert filling material. The presence of an untreated or missed canal may be a reason for failure [1]. The anatomy of root canal is complex and difficult to study [2]. The hard tissue repository of human dental pulp takes on numerous configurations and shapes.

Successful root canal therapy demands that dentist should have good knowledge of root canal morphology [5]. Mandibular second molars usually have two roots with three root canals, two in the mesial root and one in the distal root; however, these teeth can present severe anatomical variations, such as the presence of three canals in the mesial root, two canals in the distal root, or supernumerary roots [2]. According to recent studies, 85.5% showed two separated roots, 12.1% single root, 2.6% three roots or radix. 87.7% showed three root canals, 12.1% two root canals, 2.6% four root canals, and 1.6% single root canal [4]. The root canal morphology of the Indian population shows a higher incidence of C-shaped canals with fused roots compared to the Chinese or Korean population [3]. The purpose of this study is to entitle the 3D obturation in unusual morphological entity, mandibular second molar with single root and single root canal.

Case Presentation

A 26-year-old female patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of "pain in the right lower back tooth region since 1 month". There was no relevant medical and dental history. A periapical radiograph was suggested for #47 (Figure 1). Radiographic examination revealed presence of single canal with periapical radiolucency. On the ba-

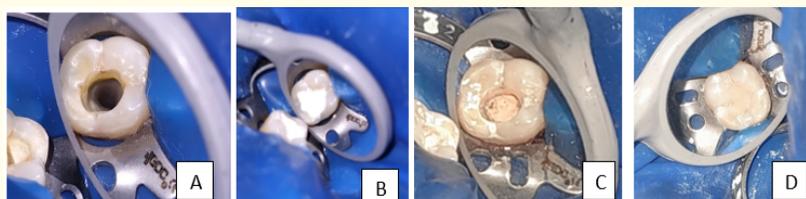
sis of clinical and radiographic examination diagnosis of this tooth suggested 'irreversible pulpitis with apical periodontitis'. Further evaluation was done using angled radiographs to confirm the presence of a single canal.

Treatment was carried out in two visits. During the first visit, the inferior alveolar nerve block was administered with 2% lidocaine with 1:80,000 of epinephrine followed by rubber dam isolation. A conventional endodontic access opening was done using endodontic access bur (Dentsply) and endo z- bur (Dentsply) with regular-shank in a high-speed handpiece. Preliminary radiographs and an J Morita Denta port Zx apex locator (Kyoto, Japan) was used to measure the canal working length, which was later confirmed using final working length IOPA (Figure 2). Cleaning and shaping were carried out using Pro Taper gold rotary system (Dentsply Sirona, USA) up to file size F3. The canal was thoroughly irrigated using 3% sodium hypochlorite (NaOCl) and final irrigation was done using ethylenediaminetetraacetic acid (EDTA). Ultrasonic activation (eighteen, ultrasonic activator) of irrigants was done as the canal is wide and irregular. Calcium hydroxide (Avue cal) intracanal medicament was placed and temporized with cavit.

During the second visit, The temporary restoration was removed. The canal was irrigated and dried with sterile absorbent paper points followed by an application of AH plus sealer. Canals were obturated with a combination of size F3 gutta-percha in the apical root and down pack 3D obturation (beefill, VDW Dental). The access cavity was then sealed with composite restoration. patient was recalled after one week for follow up. Later, patient was referred to the prosthodontic department for the fabrication of a full-coverage restoration.

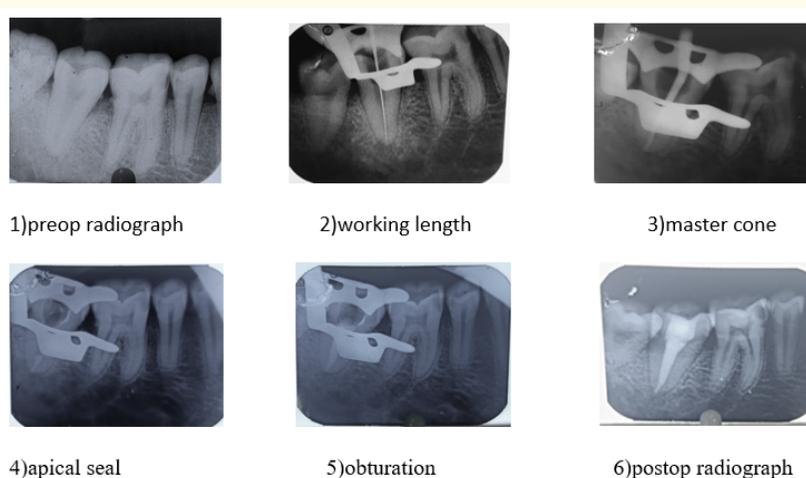


Rubber Dam Application #47



Clinical Photographs Showing

a) access cavity showing single orifice b) temporary restoration c) obturation d) composite restoration.



1)preop radiograph

2)working length

3)master cone

4)apical seal

5)obturation

6)postop radiograph

Discussion

Successful root canal treatment depends on thorough knowledge of operator(Dentist) on root canal morphology [5]. This case report demonstrates a rare morphological entity of mandibular second molar with single root and single root canal and its management using appropriate techniques. A good access cavity preparation is essential and prioritized step for successful root canal therapy which enhances the instrumentation in complex root canal anatomy. It has been noted that aberrant anatomy can develop in any racial group, depending on a variety of characteristics such as sex, ethnicity etc., all of which play a part in creating the root canal configuration [7].

Fava, *et al.* (2001) published a case report demonstrating Four second molars with single roots and single canals present in the same patient [8]. A single root, single canal mandibular second molar has been also demonstrated in [6,7]. According to Pawar, *et al.* (2017) Root canal morphology and variations in mandibular second molar teeth of an Indian population has shown the most common configuration is two-root (79.35%) and three-root canals (53.50%). The incidence of three-rooted molars was 7.53%, whereas 13.12% of the studied have fused roots with C-shaped

canals [3].

These C-shaped canals are presented a challenge to the clinician, both at the diagnosis and treatment level [17]. The large volumetric capacity of the C shaped canal system, housing transverse anastomoses and irregularities makes it difficult for cleaning and shaping. Canal cleaning techniques, such as ultrasonics, would be more effective [14]. The combination of conventional irrigation together with ultrasonic irrigation facilitates the procedure and improves the elimination of bacteria and the smear layer throughout the canal system thereby contributing to higher success rates [16].

To avoid endodontic failure of C-shaped root canals, clinicians should completely remove the pulp debris and microorganisms, and thoroughly seal the root canal system without voids [15]. Void-free obturation carry a lower risk of apical periodontitis [10,11]. In this case, canal was wide and irregular, so obturation with single cone technique was not feasible. A three dimensional seal may not be possible using single cone as it is strenuous to match the size of the canal preparation to the size of the cone due to large volume of the canal [13]. So, other options need to be considered for a better obturation. Several techniques and materials have been introduced for a void free obturation. One among them is three-dimensional

obturation which has higher density and homogeneity [9]. The maximum number of voids was observed in canals obturated with thermo mechanical compaction followed by lateral condensation. Warm vertical compaction (BeeFill) showed lesser number of voids and more of the obturating material when compared to other techniques [12]. Combination of apical seal followed by down pack technique is used to prevent apical extrusion of warm GP which is harmful to the periapical tissues. Thus, 3D obturation is assumed to be the practical and more reliable option in these cases.

Conclusion

The present case report highlighted that the knowledge and diagnosis of complex root canal anatomy has helped in proper planning and successful management of such type of rare cases. The choice of cleaning, shaping and obturation techniques for this uncommon root canal anatomy enabled us to achieve successful management of this case with unusual morphology.

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