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Endodontic Management of Bilateral Single Rooted Mandibular Second Molar with Single Canal: A Case Report

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ABSTRACT: Root canal anatomy of a particular tooth may show different types of variations. Thorough knowledge of such variations is essential for favourable outcome of root canal therapy. Mandibular second molar usually has two roots and three or four root canals. The anatomical variations commonly encountered in mandibular second molar include single root canal, two root canals, five or more root canals and C-shaped canal configuration. This case report describes the endodontic management of a mandibular second molar with single root and single root canal, which is a rare occurrence.

Keywords: Mandibular second molar, Root canal variations, Single Root, Single canal.

I. INTRODUCTION:

The principle objective of endodontic treatment is to prevent and, when needed, to treat endodontic disease, apical periodontitis [1]. In order to accomplish this objective, high quality chemo mechanical cleaning and shaping of the intricate root canal system are required in order to eradicate intracanal microorganisms [2,3]. This task requires elaborate knowledge of pulp space anatomy, including expected and less usual canal morphology. Variations such as additional canals, bi/trifurcations, lateral and furcal canals, apical deltas, and canal ramifications are frequently encountered during root canal treatment, and their incidence and clinical significance have been reported before [4, 5]. Due to the complex and highly variable pulp space anatomy, it is not uncommon to overlook part of this anatomy during the debridement phase resulting in the emergence or persistence of endodontic disease [6,7].

The root canal morphology of mandibular second molars has been elegantly evaluated in landmark studies by Vertucci and Weine et al. using radiographic techniques, respectively [8,9]. Similar to the mandibular first molar, this tooth most commonly has two roots; mesial and distal, with two mesial canals (mesiobuccal and mesiolingual) and one distal canal [8–10]. Nevertheless, other configurations have been reported in mandibular second molar teeth such as four canals, two canals, C-shaped canal, taurodontism, and one canal in a single root [8–12]. Previously published articles agree on the rare occurrence of one canal in a single-rooted (Vertucci Type I) mandibular second molars. For instance, Weine et al. reported that only 1.3% of mandibular second molars had a single canal configuration all the way from an orifice to an apex [9].

In line with that, Demirbuga et al. used advanced imaging technique and found the prevalence of such anatomic variant to be close to 2% [13]. Such high variability in the root canal anatomy of this tooth emphasizes the importance of properly integrating theoretical knowledge of dental morphology with the information obtained from pretreatment radiographs. Furthermore, additional exploration of internal anatomy should be made during treatment in order to avoid the possibility of untreated canal system. Several of the recent advances in imaging and endodontics have contributed to safe, predictable, and efficient root canal treatment. Such developments include digital radiography, cone beam computed tomography (CBCT), microcomputed tomography (micro-CT), dental operating microscope (DOM), thermo mechanically treated nickel-titanium files, and improved obturation devices [14–17]. The aim of this case report was to describe the diagnosis and management of rare root canal configuration of a mandibular second molar, showing one canal in a single conical root, using the contemporary advancements in endodontics.

II. CASE REPORT:

A 29-year-old female reported to the Department of Conservative Dentistry & Endodontics with severe pain in mandibular right second molar. Her medical history was non-contributory. Intra-oral examination revealed occlusal caries in mandibular right and left second molar. The tooth was tender to percussion in respect to #47 and #37. Intraoral periapical

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radiograph (IOPA) revealed a radiolucency on occlusal sarface of #37 and #47, suggestive of deep caries involving pulp.

The obtained preoperative periapical radiographs (Figure1) demonstrated the presence of one large canal along with one conical root and slight widening of the periodontal ligament space around the apex of tooth #37 and #47. A diagnosis of symptomatic irreversible pulpitis with apical periodontitis of tooth #37 and #47 was established, and root canal treatment followed by composite buildup and prosthesis was planned. CBCT (Planmeca Promax, Planmeca, Finland) was obtained in order to enable three-dimensional assessment of pulp space morphology. Further evaluation of sagittal, coronal, and axial slices confirmed the presence of one large round-oval canal extending from the orifice level to the root apex without any evidence of additional canals (Figure 6,7 & 8).

With informed consent, local anaesthesia was administered. Under rubber dam isolation, acess cavity was prepared with #47. A single, round orifice of the canal was located in the central part of pulp chamber floor with the help of magnification. Pulp chamber was explored for presence of any additional root canal orifice, after which, presence of a single root canal was confirmed. (Figure 5). After extirpation of pulp tissue, working length was established radio graphically and using electronic apex locator with 20 no. K file(Figure 2). Cleaning and shaping were done by hybrid technique using ProTaper rotary system upto F3 (Dentsply Maillefer, Switzerland). Circumferential filing with hand files was also done. Glide path was maintained with 17% EDTA (Dentsply Maillefer, Switzerland). Throughout the procedure, canal was irrigated with 3% sodium hypochlorite solution (Prevest Denpro Limited, India), and 0.9% saline(Prevest Denpro Limited, India)was used as a final irrigation. Calcium hydroxide (ApexCal, Ivoclar Vivadent) was used as an intracanal medicament and closed dressing was given for 1 week.

In second visit, the canals were irrigated and dried. Obturation was done by cold lateral compaction technique using guttapercha and AH Plus sealer (Dentsply Maillefer, Switzerland). The post-obturation restoration was done with composite resin.(Figure 4) After completion of treatment of #47 root canal was also performed on #37 in the same manner as of #47 done.

Postoperative instructions were given to the patient and then both the molars were prosthetically rehabilitated with porcelain fused metal crowns (Figure 9). A written consent was obtained from the patient for the publication of case.

The patient was followed up at 6 months and 1 year. The patient was completely asymptomatic and radiographic examination showed absence of any periapical lesion, suggestive of favourable treatment outcome.

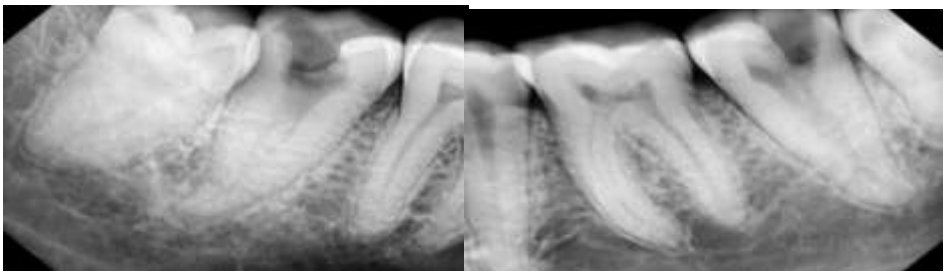

Figure 1 : Preoperative IOPA radiograph#47 and#37

Figure 2 : Working length of#47 and#37

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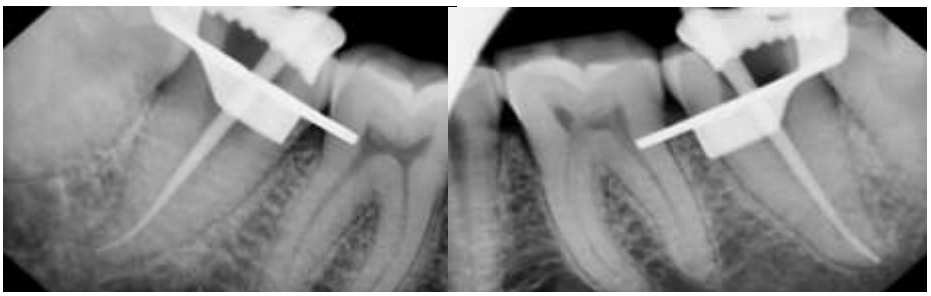

Figure 3 : Mastercone of#47 and#37

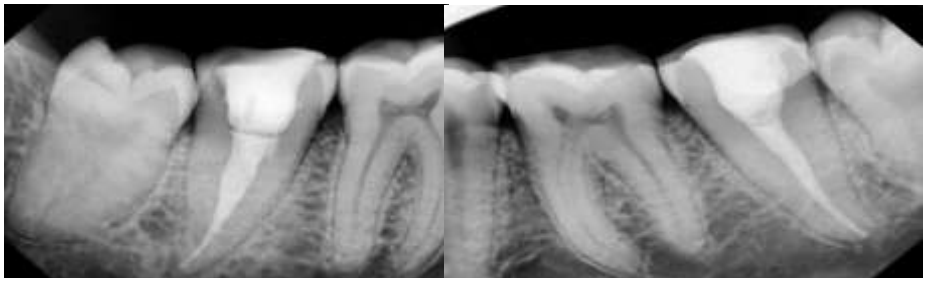

Figure 4 : Post obturation and crown build up with composite resin in respect to#47 and#37.

Figure 5 :Access opening showing single conical c-shaped root canal orifice of#47 and#37.

Figure 6 :3D images of#47 and#37.

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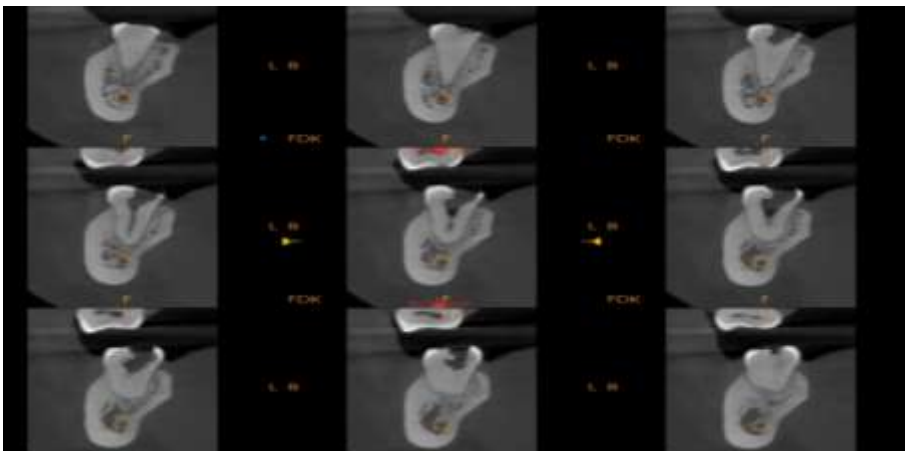

Figure 7 :Saggital cross section of#47 and#37.

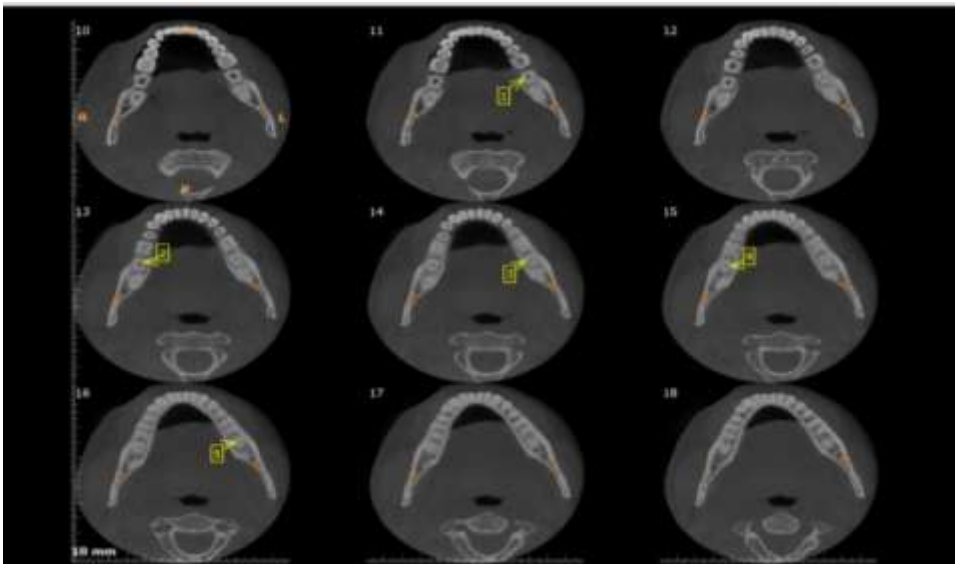

Figure 8 :Axial cross section of#47 and#37.

Figure 9 :Post operative clinical figure after full coverage restoration of#47 and#37.

III. DISCUSSION:

This case report describes the endodontic management of bilateral mandibular second molar tooth with a single root canal aided by the contemporary advancements in the field. Assessment of preoperative periapical radiographs demonstrated the presence of one root with a large canal space suggesting the likelihood of C-shaped canal configuration. In fact, when only one root is present, the root canal system may contain only a single large canal or two root canals that may or may not join within the canal system or a C-shaped canal configuration [18].

However, systematic evaluation of CBCT slices revealed the presence of one large round canal. This observation was confirmed upon access

cavity preparation as careful inspection of the pulpal floor with the dental operating microscope demonstrated the presence of one round orifice.

Cone beam computed tomography (CBCT) is a reliable and non-invasive approach that is often used in the diagnosis and treatment plan of endodontic cases. The American Association of Endodontists and American Academy of Oral and Maxillofacial Radiology published a joint position statement related to the use of CBCT. The need for CBCT should be considered if the evaluation of differently angled periapical radiographs fails to provide conclusive information or if additional information in the buccolingual dimension is required. In cases deemed appropriate for the acquisition of CBCT scan, a narrow field of view which is associated with reduced radiation dose and higher spatial resolution is recommended [19].

Various studies have reported that mandibular second molar with single root & canal is rare to occur [6-8].Very few studies have been conducted on the root canal anatomy of mandibular second molars in Indian population, with varying results. A CBCT study by Pawar et al.examining 983 images found no tooth with single root and single root canal [4]. A study by Sandesh et al reported the prevalence of 5% [9]. Subha et al reported the prevalence of single rooted mandibular second molars in South Indian population to be 5.45%, based on Spiral CT examination of 110 extracted teeth [10]. Felsypremila et al. found 8.7% of mandibular second molars with single root. However, 3.6% ofthese teeth had 3 canals,3.6% had 2 canals, and 92.8% showed C-shaped canal configuration [11].

Sabala et al. reported that the rarer the aberration, the more likely that it was bilateral [20]. Moreover, Mashyakhy et al. assessed the bilateral symmetry of roots and root canal systems of mandibular first molars in Saudi Arabian population using CBCT. Their symmetrical analysis revealed 100% symmetry in the number of roots and 56% in the number of root canals between the right and left teeth in the same person [21].

Hence, clinicians should suspect the presence of a similar anatomic configuration on the contralateral tooth when examining the preoperative radiograph of a particular case. In our case, however, careful inspection of cone beam computed tomography examination has clearly shown the presence of a single rooted mandibular second molar on the contra lateral side.

IV. CONCLUSION:

This case report presented the endodontic management of unusual root canal configuration of bilateral mandibular second molar, with a single root canal from an orifice to an apex, aided by the contemporary digital advancements in endodontics. This report highlighted the importance of textbook knowledge, radiographic examination, and careful intraoperative exploration as the main cornerstones in investigating pulp space anatomy. Clinicians need to employ the diagnostic and therapeutic tools available at their disposal in order to optimize the quality of care provided to their patients. Furthermore, clinicians should be aware of the various root canal configurations of each tooth, as it may impact subsequent treatment procedures as well as the long-term outcome of the case.

REFERENCES:

[1]. D. Ørstavik and T. R. Pitt Ford, “Apical periodontitis. Microbial infection and host responses,” in Essential endodontology: prevention and treatment of apical periodontitis, D. Ørstavik and T. R. Pitt Ford, Eds., Blackwell Science, Oxford, 1998.

[2]. D. Ørstavik, “Time-course and risk analyses of the development and healing of chronic apical periodontitis in man,” International Endodontic Journal, vol. 29, no. 3, pp. 150–155, 1996.

[3]. S. Friedman, “Considerations and concepts of case selection in the management of post-treatment endodontic disease (treatment failure),” Endod Topics, vol. 1, no. 1, pp. 54–78, 2002.

[4]. I. Jung, M. Seo, A. Fouad et al., “Apical Anatomy in Mesial and Mesiobuccal Roots of Permanent First Molars,” Journal of Endodontia, vol. 31, no. 5, pp. 364–368, 2005.

[5]. B. Marroquin, M. Elsayed, and B. Willershausenzonnchen, “Morphology of the Physiological Foramen: I. Maxillary and Mandibular Molars,” Journal of Endodontics, vol. 30, no. 5, pp. 321–328, 2004.

[6]. M. Song, H. C. Kim, W. Lee, and E. Kim, “Analysis of the cause of failure in nonsurgical endodontic treatment by microscopic inspection during endodontic microsurgery,” Journal of Endodontia, vol. 37, no. 11, pp. 1516–1519, 2011.

[7]. G. Cantatore, E. Berutti, and A. Castellucci, “Missed anatomy: frequency

and clinical impact," Endodontic Topics, vol. 15, no. 1, pp. 3–31, 2006.

[8]. F. J. Vertucci, "Root canal anatomy of the human permanent teeth," Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics, vol. 58, no. 5, pp. 589–599, 1984.

[9]. F. S. Weine, R. A. Pasiewicz, and R. T. Rice, "Canal configuration of the mandibular second molar using a clinically oriented Case Reports in Dentistry 5 in vitro method," Journal of Endodontia, vol. 14, no. 5, pp. 207–213, 1988.

[10]. S. Sert and G. Bayirli, "Evaluation of the root canal configurations of the mandibular and maxillary permanent teeth by gender in the Turkish population," Journal of Endodontia, vol. 30, no. 6, pp. 391–398, 2004.

[11]. L. R. G. Fava, I. Weinfeld, F. P. Fabri, and C. R. Pais, "Four second molars with single roots and single canals in the same patient," International Endodontic Journal, vol. 33, no. 2, pp. 138–142, 2000.

[12]. G. Felsypremila, T. S. Vinothkumar, and D. Kandaswamy, "Anatomic symmetry of root and root canal morphology of posterior teeth in Indian subpopulation using cone beam computed tomography: a retrospective study," Eur J Dent, vol. 9, no. 4, pp. 500–507, 2015.

[13]. S. Demirbuga, A. E. Sekerci, A. N. Dinçer, M. Cayabatmaz, and Y. O. Zorba, "Use of cone-beam computed tomography to evaluate root and canal morphology of mandibular first and second molars in Turkish individuals," Medicina Oral, Patología Oral y Cirugía Bucal, vol. 18, no. 4, pp. e737–e744, 2013.

[14]. F. Valenti-Obino, D. Di Nardo, L. Quero et al., "Symmetry of root and root canal morphology of mandibular incisors: a cone-beam computed tomography study in vivo," Journal of Clinical and Experimental Dentistry, vol. 11, no. 6, pp. e527–e533, 2019.

[15]. K. Alfouzan, A. Alfadley, L. Alkadi, A. Alhezam, and A. Jamleh, "Detecting the second mesiobuccal canal in maxillary molars in a Saudi Arabian population: a Micro-CT study," Scanning, vol. 2019, 6 pages, 2019.

[16]. G. Gambarini, M. Seracchiani, L. Piasecki et al., "Measurement of torque generated during intracanal instrumentation in vivo,"International Endodontic Journal, vol. 52, no. 5, pp. 737–745, 2018.

[17]. A. Jamleh, A. Alghaihab, A. Alfadley, H. Alfawaz, A. Alqedairi, and K. Alfouzan, "Cyclic fatigue and torsional failure of EdgeTaper platinum endodontic files at simulated body temperature," Journal of Endodontia, vol. 45, no. 5, pp. 611–614, 201.

[18]. A. Roy, N. Velmurugan, and N. Suresh, "Mandibular second molar with a single root and a single canal: case series," Journal of Clinical and Diagnostic Research, vol. 7, no. 11, pp. 2637- 2638, 2013.

[19]. American Association of Endodontics and American Academy of Oral and Maxillofacial Radiology, "AAE and AAOMR Joint Position Statement: Use of Cone Beam Computed Tomography in Endodontics 2015 Update," Journal of Endodontics, vol. 41, no. 9, pp. 1393–1396, 2015.

[20]. C. L. Sabala, F. W. Benenati, and B. R. Neas, "Bilateral root or root canal aberrations in a dental school patient population," Journal of Endodontics, vol. 20, no. 1, pp. 38–42, 1994.

[21]. M. Mashyakhy, H. R. Chourasia, E. Halboub, A. A. Almashraqi, Y. Khubrani, and G. Gambarini, "Anatomical variations and bilateral symmetry of roots and root canal system of mandibular first permanent molars in Saudi Arabian population utilizing cone- beam computed tomography," The Saudi Dental Journal, vol. 31, no. 4, pp. 481–486, 2019.