

Endodontic Management of Mandibular Second Molar with Vertucci Type II Canal Configuration: A Case Report

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ABSTRACT

The permanent second molars in the mandible typically have two roots, one mesial with two root canals (Mesio Buccal and Distobuccal), and another distal root with one (distal) or two canals (Distobuccal and Distolingual). Multirooted teeth's varied root canal morphology poses an ongoing challenge to endodontic diagnosis and treatment. In this study, the known potential anatomical differences are expanded to include teeth with fewer roots and different root canal morphologies. It's not necessary for root canal systems to be modified by adding additional channels. Clinicians should be aware that there is a chance that fewer roots with different root canal anatomy than the typical root canal anatomy may occur. The diagnosis and endodontic treatment of a permanent mandibular left second molar with a single root and a Vertucci type II canal structure are described in the current case report.

Keywords: Mandibular second molar, root canal, Vertucci type II canal configuration

INTRODUCTION

The root canal system must be completely cleaned, shaped, and obturated as part of endodontic therapy.¹ knowledge gap about the variety of root canal morphology, the clinician's inability to locate the canals, which causes partial obturation, and leaving the canal untreated are the main causes of endodontic failures.²

In endodontics, radiography imaging is used at every stage, from the preoperative evaluation of the case to the final evaluation of healing. Intraoral radiographs in endodontics assist us in determining the quantity, arrangement, and curvature of the root canals. Sound diagnosis and treatment planning require accurate radiographic imaging techniques and interpretation.³ When it comes to the quantity of roots and root canals, human permanent molars exhibit significant anatomical variety and anomalies.⁴

Anatomical variations with Studies and reports in the literature have looked into the mandibular molars. Vertucci asserts that the structure of the mandibular second molar is comparable to that of the first molar, with the exception that the roots and canals are shorter and the extent and range of variations are wider.⁵ There have been research done in the past on the root canal anatomy of mandibular second molars with a single canal in a single conical root.⁶

The mesial root contains two canals quite frequently (64%) compared to 38% and 26%, respectively, for type II and type IV teeth. One independent canal of type I (92%) or type I and type II (3%) or type IV (4%), respectively, are

hardly ever present in the distal root. One canal of type I extends from the pulp chamber to the apex; two canals of type II leave the pulp chamber and unite just before the apex to form a single canal; and two separate and unique canals of type IV run from the pulp chamber to the apex.⁵The Illustration of morphological root canal variations according to Vertucci's classification is given in Figure 1.

The aim of this case report was related with endodontic management of a mandibular second molar with single root and Vertucci type 2 canal configuration.

CASE REPORT

The main complaint of a 49-year-old female patient who visited the conservative dentistry and endodontics section was "spontaneous toothache in her right lower back tooth location for two days." Thermal cues and chewing both make the pain worse. The prior month had been marked by sporadic discomfort in the same tooth brought on by both heat and cold stimuli. The patient's medical background was not relevant. A carious right second molar on the mandible, teeth 47, was discovered during a clinical examination and was sensitive to pressure. There was no indication of any soreness when the buccal and lingual soft tissue of the tooth were palpated. Because the tooth was immobile, periodontal probing around it was safe and within physiological bounds.

Electronic pulp stimulation produced an immediate response, whereas heated ball burnisher and an endofrost cold pulp tester utilised to assess the implicated tooth's vitality. A amalgam filling from a private clinic was discovered on a preoperative radiograph to be close to the pulp space. Endodontic treatment was recommended to the patient for teeth #47 after a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made based on the results of the clinical, radiographic, and sensitivity test.

A rubber dam was put in place after local anaesthesia. Using a no. 2 bur endoaccess, an endodontic access cavity was created on the occlusal surface of tooth. When the pulp chamber was reached, the necrotic pulp tissue was removed using no.10 k files.

The canal was thoroughly débrided with profuse irrigation of sodium hypochlorite (2.5%) and saline (0.9%) the tissue of necrotic pulp. A thorough examination of the pulp chamber revealed two different canal orifices (Mesial, Distal).With K-files ISO 10, the initial negotiation of the root canals was carried out. Working length calculation was done using apex locator and confirmed with radiograph. Radiograph interpretation identified a type II canal layout. Using NiTi rotary protaper gold files, the crown down approach was used for biomechanical preparation.

SX file, shaping file no. 1 (S1), shaping file no. 2 (S2), finishing file no. 1 (F1), and finishing file no. 2 were the order of the instruments (F2). It was done to prepare the apical area. After each file size, irrigation was done using 2ml of sodium hypochlorite 2.5%. With each instrument, RC prep was employed as a chelating agent. Additionally, 3ml of 2% chlorhexidine was used as a final flush. Calcium hydroxide was utilised as an appointment-only medication and remained effective when combined with 2% CHX. About 7 days with cavit filling the coronal access within the root canal systems.

After 7 days, the patient came back to finish the treatment. Since there were no symptoms, isolation and access were performed without the use of anaesthetic. Protaper gold rotary files were used once more for instrumentation, and 2.5% sodium hypochlorite solution was used to properly rinse the canals. Using 17% EDTA, the final watering was completed. With the use of sterile paper tips, root canals were dried. Protaper universal gutta-percha points were used to obturate root canals after master cone selection was completed. Accessory guttapercha were used to fill the canals.

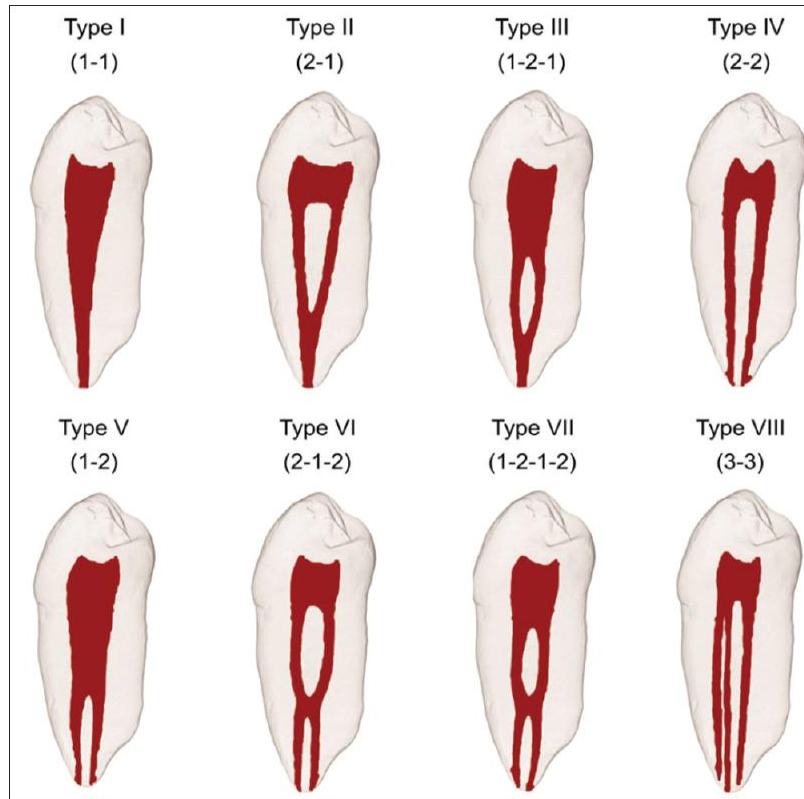


Figure 1: Illustration of morphological root canal variations according to Vertucci's classification

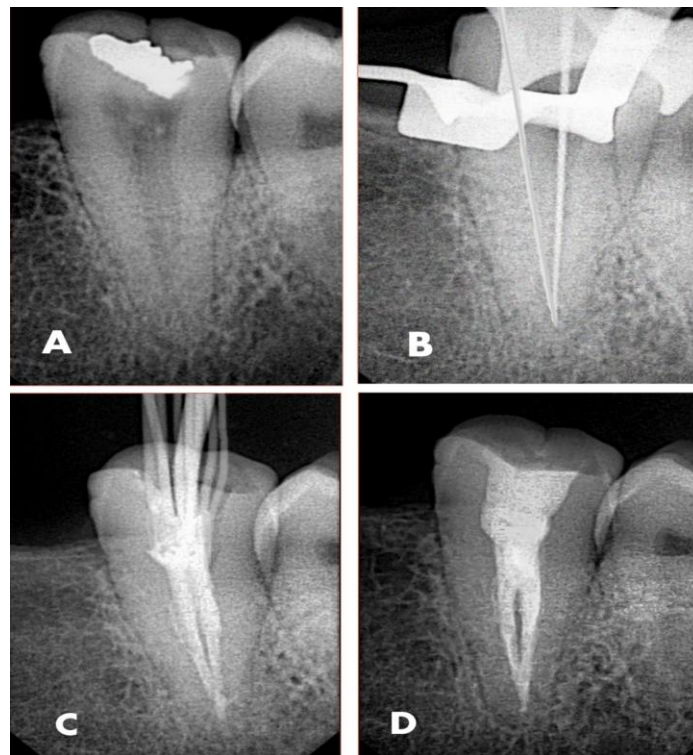


Fig 2: (A) pre-operative diagnostic radiograph showing permanent mandibular right second molar. (B) Working length determination. (C) Master cone selection. (D) Post-obturation radiograph

DISCUSSION

The angled periapical preoperative radiographs can be thoroughly examined in order to determine the morphological variance in the root canal anatomy before surgery. In this particular example, the preoperative radiograph of the single-rooted, Vertucci type II canal-configured second molar on the left mandible itself indicated variance in the root canal morphology.

However, two-dimensional periapical radiographs are unable to evaluate all variances. When we are unable to get clear answers from them, CBCT should be taken into account.⁷ The most prevalent morphology in Indian mandibular second molars, according to a study by Prasanna Neelakantan et al., was the two-rooted teeth (mesial and distal) with two mesial and one distal canals, while the study also discovered that 7.5% of the teeth had C-shaped canals, the majority of which had single canals.⁸ In their study, Manning et al. found that 76% of mandibular second molars had two roots, 22% have one root, and only 2% have none. There are three roots in total, with the mesial root typically having two canals (64%) and the distal root virtually always having just one independent canal (92%). Additionally, he noted that Asians had a higher incidence of single-rooted and C-shaped mandibular second molars.⁹

CONCLUSION

Complete pulp extirpation is required for effective endodontic therapy, which is followed by a three-dimensional closure of the root canal space. The first step is an endodontic diagnostic point for getting treatment to work. When examining the root canal morphology of human teeth, radiographs are a useful diagnostic tool. Additionally, the clinician's understanding of the variety in root canal morphology is essential for locating the canals and for completing successful endodontic therapy. In the current situation, a 2D radiograph assisted us in making a diagnosis and treating the patient. But sometimes two-dimensional periapical radiographs are unable to detect every difference. CBCT should be taken into account if we are unable to get any more or conclusive information from them.

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