

Case Report

Endodontic Management of Mandibular First Premolar with Aberrant Root Morphology – The Enigma of Endodontists

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ABSTRACT

Mandibular premolars have gained the reputation for having aberrant root and root canal anatomy. If one has to treat such teeth predictably, it is necessary to be aware of their clinical and radiographic morphology. The present case reports the presence and endodontic management of two separate roots with Vertucci's Type I configuration in mandibular first premolar.

Key words: Aberrant morphology, mandibular premolars, two roots

INTRODUCTION

Understanding root canal anatomy and morphology is required for successful endodontic treatment. For endodontic success, the entire root canal system must be cleaned, disinfected, and obturated. The clinician must be well-versed in both common variations and normal anatomy. The clinician must also be able to identify teeth that are affected frequently differ significantly from the norm, such as mandibular premolars. The mandibular premolars are also referred to as the endodontists' "Enigma" because of the higher canal and anatomical differences that they display in routine.

Numerous studies that aimed at the typical causes of endodontic failures have been reported in endodontic literature. In a research, Hoen and Pink discovered that 42% of teeth that needed retreatment had missed roots or canals. They concluded that clinical application of a thorough understanding of root canal anatomy and meticulous attention to treatment detail is critical to minimizing failure and the need for subsequent root canal retreatment.^[1]

Due to the vast range of changes in the root and its canal structure, the mandibular premolars have been widely researched in the literature. The extra root will have one or more canals, which the dentists might overlook. Wolf *et al.* discovered that <1.5% of premolars in the mandible had two roots in their systematic review. The author carried out a thorough literature review to look for differences in the root structure of the lower premolars. However, the information or a report about mandibular premolars having multiple roots was insufficient. This demonstrates that the presence of additional roots in the lower premolars may not have been commonly observed by the endodontists. Before beginning an root canal treatment (RCT), it is crucial to be aware of such

deviations from the norm.^[2] Vertucci introduced a standardized and categorized method for differentiating root canal variations into the eight descriptive types [Figure 1]. The previous classifications have been expanded with 14 new forms of canal morphology. However, numerous case reports show various variations that place an emphasis on thorough investigation of each situation. It is challenging to locate, clean, shape, and fill every root canal in the lower premolars, which might result in post-endodontic treatment disease and affect the effectiveness of root canal therapy.^[3,4]

CASE REPORT

A 23-year-old female visited the Department of Conservative Dentistry and Endodontics, Institute of Dental Sciences, Bareilly with the chief complaint of pain and swelling in the left lower back teeth region for 1 week. Pain was intermittent in nature and moderate in intensity which was aggravating on chewing and relieved by medication. Patient's general health condition was good with no signs and symptoms of systemic diseases. Further, on clinical examination, there was mesioproximal caries irt 34 with mild tender on percussion and vestibular tenderness and obliteration. On radiographic examination, the presence of two roots irt 34 with associated periapical radiolucency was evident [Figure 2]. On pulp vitality test (cold test), pulp showed no response clearly indicating the pulpal necrosis. All of these

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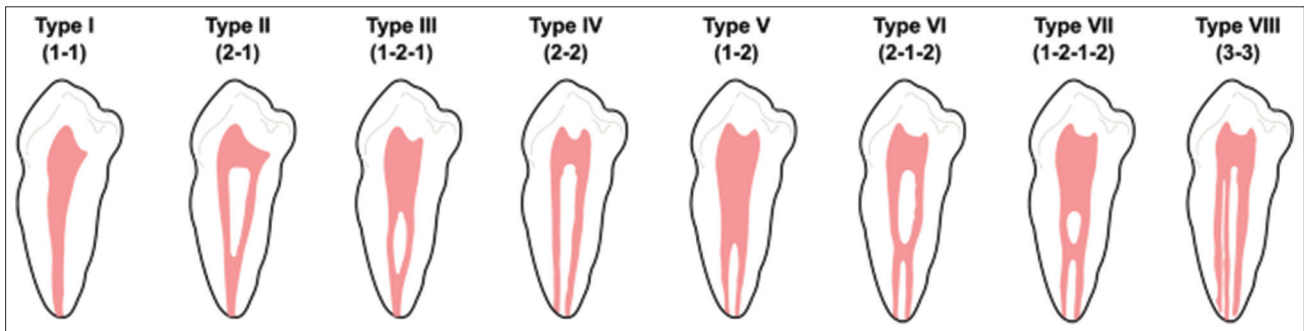


Figure 1: Vertucci's classification of root canal configuration

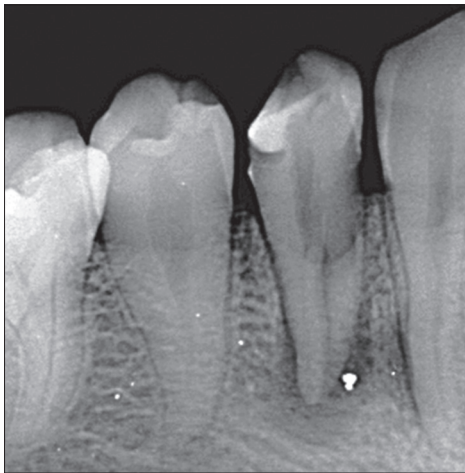


Figure 2: Pre-operative radiograph from mesial angulation depicting the presence of two roots in tooth 34

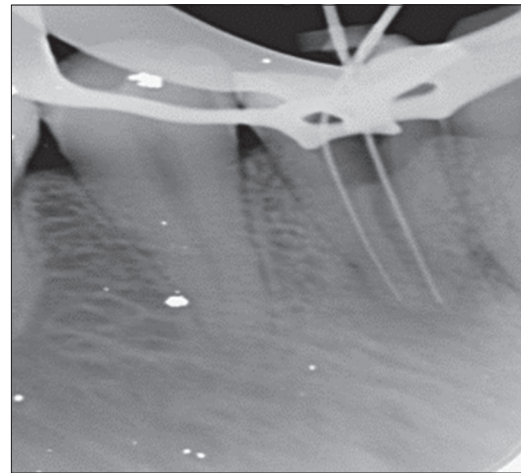


Figure 3: Working length determination

clinical and radiographic investigations confirmed the diagnosis of symptomatic periapical abscess, indicating necrotic debris removal from the pulp and canal space restoration with inert material.

Two roots were discovered and identified as buccal and lingual. Before beginning treatment, the patient's root canal treatment was planned, and informed consent was obtained. The ratio of lignocaine hydrochloride to adrenaline was used to administer profound local anesthesia (1: 1,00,000). Isolation by rubber dam was done, mesio proximal caries was removed, and an oval access in buccolingual direction was gained to expose the root canal orifice using 245, 169-L bur. The patency of both the canals in both buccal and lingual roots was confirmed with the #10 K (MANI, Japan) file. Subsequently, the working length was determined using #15 K file (MANI, Japan) and reconfirmed with electronic apex locator (Propex Pixi, Dentsply). The working length of buccal canal was found to be 19.5 mm and that of lingual canal was 19 mm [Figure 3].

Biomechanical preparation was done using hand-operated files and nickel-titanium rotary instruments (Dentsply ProTaper Gold rotary files 21 mm, Switzerland). Thorough irrigation with 5.25% NaOCl, normal saline, and 0.2% chlorhexidine was also done simultaneously.

Following the final working length determination, the master cone fit was checked and confirmed on the radiograph [Figure 4].

Canals were dried using sterile paper points and obturation was performed using corresponding gutta percha points using Calcium hydroxide based sealer (Apexit Plus, Ivoclar). It was followed by post-endodontic composite restoration (Ivoclar Tetric N Ceram starter kit/Tetric N Bond Universal).

A post-operative radiograph was taken and the complete hermetic seal was verified with a horizontally angulated post-treatment radiograph [Figure 5].

DISCUSSION

The diagnosis and management of multiple roots or root canals in the lower premolars are undoubtedly a challenge for endodontists. To achieve this, the normal root canal anatomy and its frequent deviations must be completely understood by the clinician. The number of root canals is a topic on which a wide range of viewpoints has been expressed in the literature, but there have been very few publications on the variations in the number of roots found in mandibular premolars. Data on the number of roots in the mandibular premolars are reported in the previous anatomic studies that included 4019 teeth^[5,6] [Table 1].^[7-10] In these investigations, the majority of the teeth (99.6%) had just one root. Only 0.3% and 0.1% of the examined teeth had two and three roots, respectively.^[7]

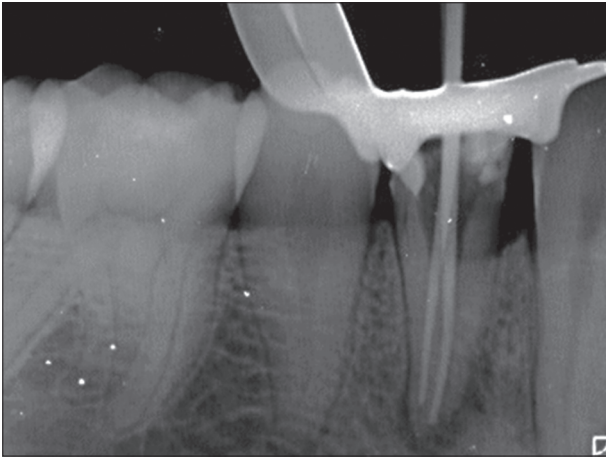


Figure 4: Master cone radiograph

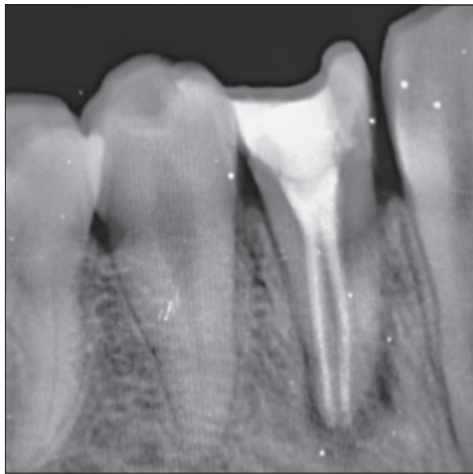


Figure 5: Post-operative radiograph

Table 1: Number of roots in the mandibular premolars according to different authors

Author and Year	One root (%)	Two roots	Three roots
Barrett (1925) ^[10]	100	-	-
Zillich and Dowson (1973) ^[7]	96.6	-	0.04
Çalışkan et al. (1995) ^[8]	100	-	-
Zaatar et al. (1997) ^[9]	95.6	4.7	-
Alenezi et al. (2020) ^[11]	79.2	20.8	-

In context of the numerous anomalies present in these teeth, it is imperative that the doctor detect missed canals when a patient presents with discomfort or sensitivity to heat and cold following root canal therapy. Such difficult circumstances should also take into consideration the prudent usage of advanced diagnostic tools.

CONCLUSION

The root anatomy and canal configuration may exhibit uncommon and unexpected differences, which the physicians must be able to identify. Before initiating root canal treatment, careful radiographic interpretation in conjunction with clinical inspection is essential for achieving a positive clinical outcome and gaining a knowledge of root canal anatomy, including its variation.

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