

# Maxillary First Premolar with Three Roots and Three Root Canals: A Case Report

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## ABSTRACT

Maxillary first premolar is most commonly a bi-rooted tooth, occasionally having three roots. It usually has two canals, but may rarely have three, which can easily be missed, demanding more attention during endodontic intervention. This paper reports this rarity of 3 roots and 3 canals in maxillary first premolar, highlighting the difficulties and special care needed during endodontic treatment. Careful investigation in diagnostic radiograph by professionals along with proper root canal treatment following all the necessary steps in detecting and bringing the possible changes brings about the success of the treatment.

**Keywords:** Maxillary first premolar; root canal treatment, three roots.

## INTRODUCTION

The thorough knowledge of dental anatomy is extremely important for success of endodontic treatment.<sup>1,2</sup> Roots and root canals have varied anatomy which can be identified with periapical radiographs to an extent.<sup>3</sup> Often, the first premolar presents with a buccal and palatal roots, with respective canals.<sup>2,4</sup> However, the tooth may have extra root with a frequency reported at 2.5%<sup>4</sup>, 3.3%<sup>5</sup>, and 5%<sup>6</sup> by various authors.

Thus, the objective of this paper is to present, by means of a clinical case, a rare anatomical variation of the first premolar with three roots and three root canals, and its implications in endodontic treatment.

## CASE REPORT

An 18-years-old male presented to Department of Conservative Dentistry and Endodontics, College of Dental Surgery, BPKIHS, Dharan with the complaint of

spontaneous pain on left side of his upper jaw. His medical history was non-contributory. Clinical and radiographic examination revealed a deep disto-occlusal carious lesion in left maxillary first premolar. The tooth was not sensitive to percussion and exhibited normal mobility. Radiographically, it showed an unusual root anatomy, suggestive of two buccal roots and one palatal root.

Endodontic access cavity was prepared after the administration of local anesthesia and rubber dam isolation (Figure 1). During the inspection of the pulp chamber floor, a second canal orifice was observed in the buccal section of the tooth, finally the three canal orifices were as follows: one mesiobuccal, one distobuccal and one palatal. The exploration of all 3 canals was performed with #10 K-file and the root canal length was determined



**Figure 1:** Access opening revealing 3 canal orifice in 24.

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by means of intraoral periapical radiograph (IOPAR); enabling to confirm the variation in morphology and to assure that all the roots and canals were independent (Figure 2). The instrumentation was mixed, with K-type hand files until #35 file, and then automatized by use of Protaper Universal Rotary System (Dentsply®). Patency was achieved and maintained in all the canals with a #10 K-file using 2.5% sodium hypochlorite (NaOCl) solution

as the main irrigant during biomechanical preparation. Master cone radiograph was taken (Figure 3) and root canal filling was completed by using the cold lateral compaction method with AH Plus sealer and gutta-percha (Figure 4). A post space was prepared for pre-fabricated metal post which was cemented with type I GIC (Figure 5) followed by rehabilitation of the tooth with a porcelain fused to metal (PFM) crown (Figure 6).



**Figure 2:** Working length IOPAR.



**Figure 3:** Master cone IOPAR.



**Figure 4:** Post obturation IOPAR.



**Figure 5:** Prefabricated metal post in palatal canal IOPAR.



**Figure 6:** Post endodontic rehabilitation with PFM crown in 24.

## DISCUSSION

The thorough knowledge of dental anatomy is of utmost importance for the completion of endodontic treatment,<sup>1</sup> because it is through this science that the dentist can estimate a three-dimensional situation of the canal system, from a two-dimensional image provided by radiographs.

Over the years, literature has reported the most varied anatomical changes of several teeth, including premolars.<sup>1</sup> These variations may be related to the number of root canal, its size, shape, divisions, fusions, directions and stages of development.<sup>4</sup>

First Premolars are a group of teeth exclusive of the permanent dentition, and their predecessors are the first deciduous molars. They also have the basic function of crushing and grinding food, in addition to helping the speech and aesthetics.<sup>7</sup> The first premolar has an average length of 21.5 mm, ranging from 17 to 25.5 mm. In most cases, they have two conical roots - one buccal and one palatal -with one canal in each one, and the vestibular root often presents a curvature towards the palatine aspect. These roots may be well developed, not entirely separate or as a single and large root, with two canals in its interior. The outline of the pulp chamber has an elliptical morphology, due to the mesio-distal flattening.<sup>4</sup> The number of roots and canals can vary as the buccal root may divide into two, evidencing mesio-vestibular and distobuccal roots and in this case, the premolar may be referred to as a “minimolar”.<sup>2</sup>

According to Bellizzi et al, when such alterations in root morphology occurs, the roots can be classified into three groups: Group 1- the three roots are merged or there are only two buccal roots, and the palatal root is semi-fused or free; Group 2 - buccal roots present separate, from middle or apical third and Group 3 - the three roots are separate from the cervical third.<sup>8</sup> In the above case reported, there was no certainty about the classification system, since the radiographic images allowed only for a subjective understanding on roots separation.

Endodontic treatment of maxillary premolars with this kind of morphology should be adjusted to a situation of locating all the existing root canals and making the outline change from elliptical to triangular, with the base toward the buccal aspect and the apex to the lingual aspect.<sup>8,9</sup> Likewise, in this case, due care had been taken regarding

the location of the canals by making the coronal opening adequate, which was more difficult due to great loss of coronal structure, particularly at the distal aspect of the tooth.

Regarding the instrumentation, a combination of hand and rotary system was employed where, the use of hand files was used for establishing apical stop, and ProTaper® system proved to be effective, improved and simplified technique, that allowed to perform the root canal treatment more effectively in a lesser time. Calcium hydroxide is the most appropriate intracanal medicament for endodontic purpose, being a substance with antimicrobial activity,<sup>3</sup> which justifies in the case presented.

Obturation of all the canals was done with cold lateral compaction technique using gutta percha and AH plus sealer. Since the remaining coronal tooth structure was insufficient to give retention and resistance form for the restoration, a prefabricated metal post was cemented with GIC in palatal canal. Prefabricated metal post was used because of its ease of use and preservation of tooth structure.<sup>10</sup> On the other hand, prefabricated posts chiefly rely on cement for retention. Reduced core retention of the post and the probability of rotation are the major disadvantages of this type of post.<sup>11</sup> The prosthetic rehabilitation in present case include full coverage metal ceramic crown for functional and aesthetic rehabilitation for protection of the remaining tooth.<sup>10</sup>

## CONCLUSION

Encounter of premolar with three roots and three canals is rare and it's important to have a good knowledge in dental anatomy while performing endodontic treatment. The biological purpose of root canal filling is to provide a favourable condition for the body to repair the tissue with no risk or relapse. In case a canal is missed out, cleaning and biomechanical preparation is hampered which hampers the overall treatment prognosis. Thus, careful study and analysis of the diagnostic radiographs along with magnification and well illuminated field during the course of endodontic treatment is required by the operating dentist so that such alterations are not missed and doesn't affect overall treatment prognosis.

**Conflict of Interest:** None

JNAPD

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