

CASE REPORT

Management of A Maxillary Premolar With Three Roots: A Case Report

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ABSTRACT

Introduction: In everyday endodontic practice, clinicians have to treat teeth with atypical configurations. Extra roots or additional root canals if not detected are a major reason for failure. This article describes the diagnosis and management of a second maxillary premolar with three canals and three separate roots, with methods for detection of aberrant anatomy and access opening refinements.

Case Report: A 27 year old male reported to the clinic with pain in the maxillary right premolar region. On examination it was found that the tooth had three roots with three root canals. According to Vertucci's classification this is a type VIII configuration. Modifications were done in the access opening procedure to get a straight line access to all the three canals. The cleaning, shaping and obturation of the canals was done accordingly.

Conclusion: Clinicians should be constantly on the lookout for 'occult' anatomy. Access cavity refinements may be required for stress-free entry to complex anatomy.

Key words: Anatomy, access opening, root canal treatment

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Conflict of Interest: None

INTRODUCTION

To attain success in Endodontics, three basic principles are essential, a good understanding of the biological principles, an accurate diagnosis and a good execution of treatment. In everyday endodontic practice, clinicians have to treat teeth with atypical configurations. Extra roots or additional root canals if not detected are a major reason for failure. To achieve these principles the clinician should be aware of the variations in the anatomy of a tooth.

The maxillary second premolar is reported to mostly have only one root and one canal in 75% of cases, and one root and two canals in 25% of cases.¹ Several other studies have demonstrated an incidence of three root canals between 0.3 and 2%.²⁻⁶

Bellizzi and Hartwell² (1985) found that that out of 630 premolars only 1.1% of teeth were with three canals, and did not report any with three roots. Velmurugan et al.⁵ (2005) have reported that only three had three roots and three canals, out of 220 maxillary second premolar teeth that were endodontically treated. In an Indian (Asian) population, single-rooted maxillary premolars are dominant and three-rooted forms are rare, reported to be 2.1% in the non-Asian population and 0.6% in the Asian population.⁷

As they resemble the adjacent maxillary molar in morphology maxillary second premolars with 3 roots are called "small molars or radicular".^{8,9}

According to Vertucci's classification this is a type VIII configuration (Figure-1). This case report describes the management of a maxillary second premolar with three roots and three canals.

Source of Support: Nil

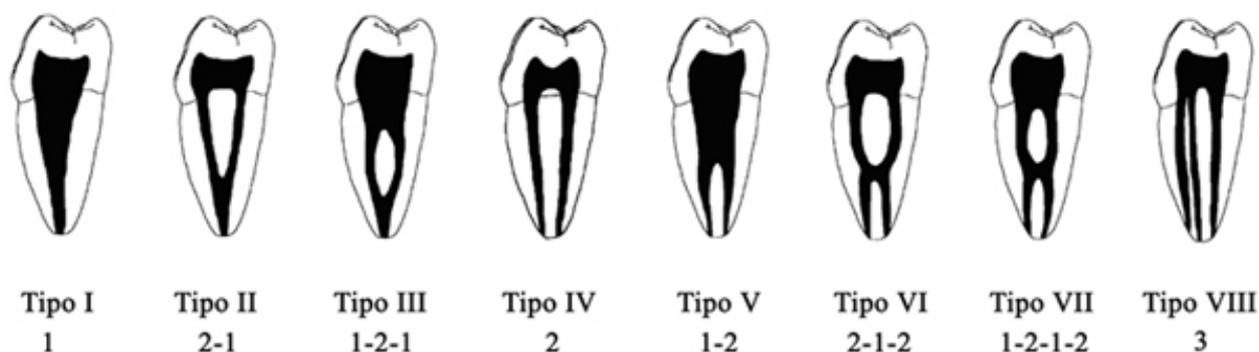


Figure:1-Vertucci's classification

CASE REPORT

The study was approved by the institute review board and a written informed consent was taken from the patient for publication and teaching purpose.

A 27 year old male patient reported to the clinic with a chief complaint of spontaneous pain in the maxillary right second premolar region since 1 week.

The pain was dull, continuous and mild in intensity. Intraorally there were deep distoproximal caries with pulp exposure with the maxillary right second premolar. The tooth was sensitive to electric pulp testing and gave a delayed response indicating irreversible pulp damage. There was no evidence of periapical radiolucency in association with the tooth. The tooth was symptomatic but not tender to percussion and there was no mobility.

A final diagnosis of chronic irreversible pulpitis with the right maxillary second premolar was made. On the pre operative radiograph, there was an abrupt loss of radiolucency in the pulp chamber and the mesio-distal width of the root was greater than the mesio-distal width of the crown. Three roots with three canals were seen with the premolar on the radiograph. The tooth was anaesthetized & isolated with rubber dam. The access cavity was prepared to a triangular outline and three separate root canal orifices were found on the same level of the pulp chamber floor: one mesiobuccal (MB), one distobuccal (DB) and one palatal (P). The pulp tissue was established 1mm short of the radiographic apex.

The canals were cleaned and shaped initially with hand files (Mani, Japan) upto no. 20 (2% taper) and then in a crown down technique using hand Protapers (DentsplyMallifer) upto a size of F2. Irrigation was done with 5.25% sodium hypochlorite and 17% EDTA gel was used as a lubricant.

An intracanal dressing of calcium hydroxide was given for one week. The canals were irrigated with 17 % EDTA to remove the smear layer and final rinsing was done with normal saline. Obturation was done with guttapercha points (6%) and AH plus sealer using the cold lateral condensation. An intracanal dressing of calcium hydroxide was given for one week. The canals were irrigated with 17 % EDTA to remove the smear layer and final rinsing was done with normal saline. Obturation was done with guttapercha points (6%) and AH plus sealer using the cold lateral condensation. According to the study of Sabalaet al¹⁰ (1994), the rarer the anomaly the higher the chances of its bilateral occurrence. We followed his proposition and took IOPAs of the opposite quadrant and the mandibular premolars as well. The IOPA's showed that his maxillary and mandibular premolars had multiple roots. The clinical appearance of the teeth did not reveal any aberrant anatomy.

DISCUSSION

The presence of an untreated canal, inadequate debridement and incomplete obturation of the root canal system are common reasons for failure.

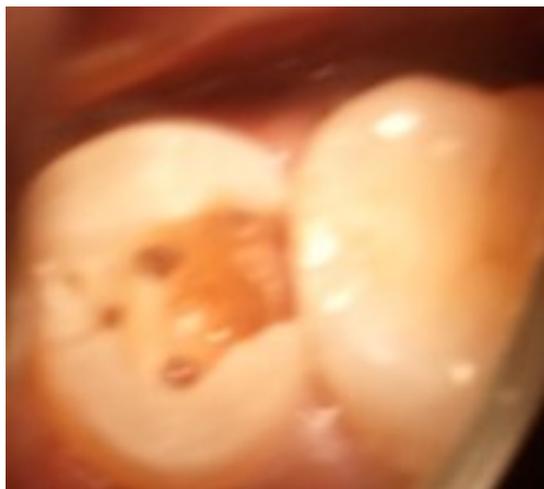


Figure:2- Access Opening

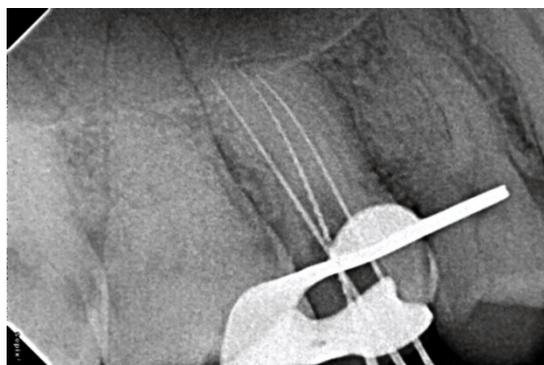


Figure:3- Working Length



Figure:4- Master Cone



Figure:5- Obturation



Figure:6- Radiograph of contra-lateral maxillary left second premolar region

Studies have shown that the pulp cavity is highly variable making each treatment unique. It is extremely important that clinicians use all the armamentaria at their disposal to locate and treat the entire root canal system.

Detection of aberrant anatomy can be done by:

In vivo Methods

- Loupes
- Operating Microscope
- Dyes
- Champagne Bubble Test
- Following the dentinal map
- Anatomy of the crown

In vitro Methods

These methods include

- Direct observation
- Microscopic observation
- Macroscopic sectioning
- Microscopic sectioning
- Dyes
- Filling and decalcification
- Filling and clearing
- Radiography
- Contrasting media (Hypaque)
- Cone beam Tomography.¹¹

Sieraskiet al¹² gave a general guideline for the identification of three rooted maxillary premolars using radiographs. He stated that, most likely, the tooth has three roots if the mesio-distal width of the mid-root image appears equal to or greater than the mesio-distal width of the crown image. In this case the buccal orifices were close to each other and can be hard to locate.¹³

Soares et al.¹³ have also advocated the modification of the access cavity for location and management of all three canals.

Javidi et al.¹⁴ have described a few cases on maxillary premolars with extra roots which had similar findings and the treatment protocol was also followed in a similar fashion.

Means of magnification (ocular loops, microscope) and additional lighting (fibre optic illumination) are recommended. A third canal should be suspected clinically when the pulp chamber does not appear to be aligned in its expected buccal-palatal relationship. Additionally, lines on the floor of the pulp chamber connecting the root canal orifices give some clues about locating the root canals.^{1,15}

Balleriet al.¹⁶ suggested that the preparation of a cut at the buccal-proximal angle from the entrance of the buccal canals, creates a helpful T-shaped access outline.

- Oval/Figure of 8 opening: restricts access
- Triangular/T shaped opening : better access

Calcium hydroxide was used as an intracanal dressing because it has a wide range of antimicrobial activity against common endodontic pathogens and was used to disinfect the canals.¹⁷ It is the most commonly used agent for treatment of the vital pulp. It also plays a major role as an inter-visit dressing in the disinfection of the root canal system.

Properly reaching all of the root canals, cleaning and shaping, followed by hermetic filling, are necessary for successful root canal treatment. Premolars with three root canals are rarely seen and reported. If aberrant anatomy is seen it should be documented and checked by taking at least three radiographs from different angulations

CONCLUSION

Aberrant anatomy is far more common in today's endodontic practice because of the advances in the field of magnification. Clinicians should be constantly on the lookout for 'occult' anatomy. Access cavity refinements may be required for stress-free entry to complex anatomy. This anatomy can be predictably managed following identification and negotiation.

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