



Endodontic Management of Maxillary 2nd Premolar with Three Roots and Three Canals: A Case Report

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ABSTRACT

Introduction: Maxillary premolars have a complex and variable anatomy and are the only tooth that shows eight configurations of the Vertucci classification. As they correspond to the adjacent maxillary molar in morphology, maxillary second premolars with 3 roots are called “small molars or radiculous”. Endodontic success in teeth with a number of canals above that normally found requires a correct diagnosis and careful clinical radiographic inspection.

Case description: This case report aims to describe the endodontic management of a maxillary second premolar with three roots and three canals. Canals were enlarged up to ProTaper F2 size by instrumenting 1 mm beyond the apical constriction. Irrigation was done with 3% sodium hypochlorite and 17% EDTA gel was used as a lubricant and obturation was done with guttapercha points and AH plus sealer using single cone technique

Conclusion: This case report presents the management of a patient who presented with the uncommon anatomy of three root-canaled maxillary second premolar. One of the cause for failure in endodontic treatment is incomplete obturation and unnoticed canals. Clinical thoroughness and early identification of aberrant tooth morphology assist in refraining possible mishaps.

Keywords:

Anatomy, maxillary premolar, radiographs, root canal preparation, access cavity.

Introduction:

Maxillary premolars have a complex and variable anatomy, with the maxillary second premolar being the one that presents the greatest difficulty. Maxillary second premolar is the sole tooth that shows all the configurations of the Vertucci classification.^[1] Successful endodontic treatment requires thorough knowledge of the dental anatomy and its variations.^[2]

This clinical case describes a maxillary second premolar with three separate root canals, two buccal and one palatal, with distinct foramens. The maxillary second premolar is reported to mostly have only one root and one canal. Studies report that maxillary second premolar with one root and one canal is seen in 75% of cases, while one root and two canals is seen in 25% of cases. Other studies have proved the presence of three root canals between 0.3 and 2%. As they correspond to the maxillary first molar in morphology, maxillary second premolars with 3 roots are thus known as “small molars or radiculous”.^[3]

This case report aims to describe the endodontic management of a maxillary second premolar with three roots and three canals.

CASE DESCRIPTION

A 28 year old male patient reported to the clinic with a chief complaint of spontaneous pain in the left upper back tooth region since 1 week. The pain was dull, continuous and mild in intensity. On intraoral examination, deep mesioproximal caries was seen in relation to maxillary

left second premolar. The tooth was sensitive to electric pulp testing and gave a delayed response indicating irreversible pulp damage. There was an evidence of periapical radiolucency in association with the tooth. The tooth was symptomatic and tender to percussion and there was no mobility.

A final diagnosis of chronic periapical abscess with the left maxillary second premolar was made. On the preoperative radiograph, there was an abrupt loss of radiolucency in the pulp chamber (Figure-1a). Three roots with three canals were seen with the premolar on the radiograph.

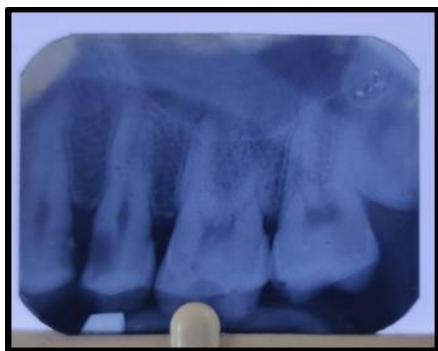


Figure 1a: pre-operative radiograph of maxillary left second premolar

Procedure :

The tooth was anaesthetized & isolated with rubber dam. The access cavity was prepared in a triangular outline form 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 root canal length was recorded by using Root ZX II (J. Morita, Tokyo, Japan) electronic apex locator and confirmed by taking a radiograph (Figure -1b).



Figure 1b: working length determination.

The canals were shaped and cleaned with hand instruments (Dentsply Maillefer, Ballaigues, Switzerland) and nickel-titanium rotary instruments (ProTaper Universal; Dentsply Tulsa). Canals were enlarged up to ProTaper F2 size by instrumenting 1 mm beyond the apical constriction. Irrigation was done with 3% 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. The canals were dried with sterile paper points following which a master cone xray was taken (Figure- 2a) and obturation was done with gutta percha points (Dentsply Maillefer) and AH plus sealer using single cone technique (Figure – 2b).



Figure 2a: Mastercone Radiograph

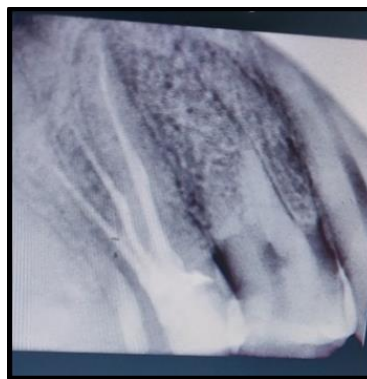


Figure 2b: Post-operative Radiograph following Obturation

DISCUSSION

The ubiquity of three roots in maxillary second premolars is very rare. In literature it is illustrated mainly through case reports.^[1] To date, single, two and three-rooted maxillary second premolars have been recognized, with the number of canals differing from one to three according to different grades of classifications. The occurrence of four canals in the maxillary second premolar has been reported once having 2 canals in the distal root, 1 in the mesial and 1 in the palatal root.^[4]

According to Leonardo, lack of success in endodontic treatment can be due to the failure in detecting, negotiating and instrumentation of all root canals.^[5] Premolars have been perceived to be the most strenuous tooth to be endodontically treated, owing to its strong possibility of having supernumerary root canals.^[6] Clinically, three-rooted, three-canal premolars show crowns with greater dimension and greater mesiodistal width when compared to premolars having a single roots.^[2]

Radiographically, it is possible to determine three canals that realign from their orifices, each one to its respective root.^[2] The best radiographic imaging is achieved by using a facial projection, which minimizes the risk of superimposition of the roots and canals of maxillary second premolars with three canals and three independent roots.^[2] Recent advancement in diagnostic radiographic techniques have provided the potential in the detection and interpretation of root canal anatomy. Cone beam computed tomography (CBCT) is able to provide three-dimensional imaging with a low radiation dose and reasonably high resolution, producing images similar to that of the modified canal staining and clearing techniques in identifying root canal anatomy.^[7]

In the case of premolars with three roots, it is advocated that the access opening be altered, slightly expanding it in a more mesiodistal direction to discover the second buccal canal thus completing the preparation of the cavity by giving it a triangular shape, similar to the access opening for an upper first molar, but smaller.^[1] Balleri et al reported that T shaped endodontic cavity is ideal in terms of cleaning and gaining more easier access to the pulp chamber and canals of the premolar tooth with three roots and canals.^[8]

Premolars with three root canals are seldom seen and reported. If aberrant anatomy is seen, it should be put on record and checked by taking at least three radiographs from different angulations.^[3] Furthermore, use of enhanced visualization by the means of DOM will help in the proper examination of the floor of the pulp chamber, localizing the canal orifices and detecting these variations which could not be easily seen due to the limited access opening.^[9] Endodontic success in teeth with a number of canals more than normally found requires an accurate diagnosis and careful clinical radiographic inspection. Morphological variations in pulpal anatomy must be taken into account before beginning treatment.^[10]

CONCLUSION

The root canal anatomy is complex, therefore a thorough understanding of the normal root canal anatomy and their variations followed by management of the same determines the success of the endodontic treatment.

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