

Case Report

Three rooted maxillary first premolar- a case report

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Abstract: Endodontic literature has described the standard anatomy of maxillary first premolar to have two roots and two canals. At the same time, there are many cases reports documenting numerous aberrations in its root canal morphology. This article showcases a documented case of an extracted three rooted premolar that was recovered during collections of samples for an *in vitro* study.

Keywords: premolar, root canal, endodontic treatment

INTRODUCTION

The visualization of the internal anatomy of teeth and a thorough knowledge of the root canal anatomy and its variations form the fundamental basis for a successful endodontic therapy [1]. In endodontic literature, the standard anatomy of maxillary first premolar has been described to have two roots (Buccal-B and Palatal-P) and two canals (B and P) [2]. Three rooted maxillary premolars are uncommon (0.5-6%) [3-6].

Three rooted maxillary first premolars have three anatomic variants; 1) three separate roots, 2) interfused buccal roots and 3) three interfused roots [7]. Maxillary first premolars with 3 separate roots frequently have one canal in each root. The anatomy of a maxillary premolar with three canals is similar to the adjacent maxillary molars and they are sometimes referred to as small molars or radicular premolars [8].

Numerous factors influence the variations found in the root canal morphology including ethnic background, gender, method of data collection, sample size and the mode of studying the root canal space [9]. Three-rooted premolars are more frequent in Caucasian populations and practically non-existent in Asian populations [10].

This article aims to describe the root and canal morphology of a three rooted maxillary first premolar that was recovered during collections of samples for an *in vitro* study.

TOOTH DESCRIPTION (Fig. 1)

This right maxillary first premolar has three roots; two buccal and one palatal. The dimensions of the tooth are as follows: length- 21.08 mm; mesio-distal width- 8.14 mm; bucco-lingual width-10.16 mm. The bifurcation of the buccal roots and the trifurcation are at a distance of 7.5 mm and 6 mm from cement-enamel junction (CEJ) respectively. An Intraoral periapical radiograph (IOPAR) in relation to this tooth revealed the outlines of three roots and three distinct canals.

Access cavity preparation (Fig. 2) was done to determine the number of root canals. The triangular access cavity of this premolar resembled that of a molar and three distinct orifices were located corresponding to three canals. Mesio-buccal (MB) and disto-buccal (DB) orifices were located in close proximity to each other and the palatal orifice was found to be located in line with the palatal cusp tip.

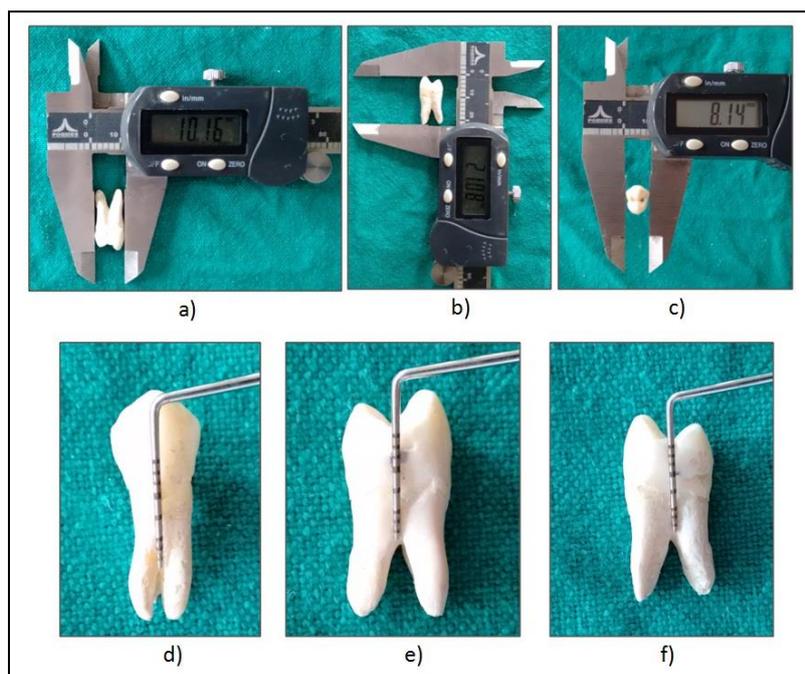


Fig.-1: a) to f): measuring the dimensions of the extracted three rooted maxillary first premolar



Fig-2: Access cavity preparation of the tooth shows three distinct orifices

DISCUSSION

The process of identifying and determining the root canal morphology is particularly challenging in endodontic treatment of a tooth with atypical canal configuration. The maxillary first premolar has a highly variable canal and root morphology. Probably even today, many dentists treat maxillary premolars presuming them to have two canals. For a successful root canal treatment, it is essential to identify, clean and shape the root canal properly before placing a hermetic filling. The presence of an untreated canal; inadequate debridement and incomplete obturation of the root canal system are common reasons for failure of endodontic treatment [11]. A root canal may be left untreated because the dentist fails to recognize its presence.

Visualization of three canals in a maxillary premolar on pre-operative radiographs can often be difficult. Although the pre-operative radiograph gives a two dimensional image of a three dimensional object, there are some guides that suggest the presence of a

third canal/root. Whenever there is an abrupt straightening or loss of radiolucent canal in the pulp cavity, a third canal should be suspected, either in the same root or in the other independent root [12]. Also, whenever the mesio-distal width of the mid-root area is equal to or greater than the mesio-distal width of the crown, the tooth most likely has three roots and multiple canals are common when a radiograph shows an eccentrically placed instrument in roots [13].

Root canal orifices are the number one guide in determining the outline form of the access cavity. In the maxillary first premolar, an ovoid outline form is recommended. This figure of 8 shaped access restricts the expectation of the clinician to one or two root canal orifices [14]. A third canal should be suspected clinically when pulp chamber does not appear to be aligned in its expected bucco-palatal relationship.

If the pulp chamber appears to deviate from normal configuration and seems to be either triangular

in shape or too large in a mesio-distal plane, more than one root canal should be suspected. In three rooted maxillary premolar, the buccal orifices are close to each other that are hard to locate. In treatment of three rooted maxillary first premolars, Balleri *et al.* suggested a T-shaped access outline [14]. This modification allows good access to the two buccal canals. When confronted with unusual tooth anatomy as three rooted maxillary premolars, good illumination and magnification can make treatment easier. With the aid of an operating microscope or loupe, it is possible to locate all the root canal orifices.

CONCLUSION

Endodontic success in teeth with the number of canals more than that normally found requires a correct diagnosis and careful exploration. Morphological variations in root canal anatomy must always be considered before beginning the treatment. The case presented shows that an extra root canal and root may occur in maxillary premolars. Although the frequency is rare, each case should be evaluated carefully both clinically as well as radiographically.

REFERENCES

1. Vertucci FJ; Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol*, 1984; 58:589-99.
2. Gandhi B, Majety KK, Gowdra RH; Root canal treatment of bilateral three-rooted maxillary first premolars. *J OrofacSci*, 2012; 4:56-9.
3. Hess W; Anatomy of the root canals of the teeth of the permanent dentition. Part 1. New York: William Wood, 1925; 3-49.
4. Pineda F, Kuttler Y; Mesiodistal and buccolingualroentgenographic investigation of 7,275 root canals. *Oral Surg Oral Med Oral Pathol*, 1972; 33:101-10.
5. Carns EJ, Skidmore AE; Configurations and deviations of root canals of maxillary first premolars. *Oral Surg Oral Med Oral Pathol*, 1973; 36:880-6.
6. Bellizzi R, Hartwell GR; Radiographic evaluation of root canal anatomy of in vivo endodontically treated maxillary premolars. *J Endod*, 1985; 11:37-9.
7. Mohammadi Z, Shalavi S, Jafarzadeh H; Extra roots and root canals in premolar and molar teeth: Review of an endodontic challenge. *J Contemp Dent Pract*, 2013; 14(5):980-86.
8. Miabaum WW; Endodontic treatment of a 'radiculous' maxillary first premolar: a case report. *Gen Dentistry*, 1989; 37:340-1.
9. Loh HS; Root morphology of the maxillary first premolar in Singaporeans. *Aust Dent J*, 1998; 43:399-402.
10. Walker RT; Root form and canal anatomy of maxillary first premolars in a southern Chinese population. *Endod Dent Traumatol*, 1987; 3:130-4.
11. Sulaiman AO, Dosumu OO, Amedari Mc K; Maxillary first premolar with three root canals: a case report. *Ann IbdPg Med*, 2013; 11(2):105-8.
12. Soares JA, Leonardo RT; Root canal treatment of three rooted maxillary first and second premolars- a case report. *IntEndod J*, 2003; 36:705-10.
13. Sieraski SM, Taylor GT, Kohn RA; Identification and endodontic management of three canalled maxillary premolars. *J Endod*, 1985; 15:29-32.
14. Balleri P, Gesi A, Ferrari M; Primer premolar superior comtresraices. *Endodontic Practice*, 1997; 3: 13-15.