

Endodontic Management of Maxillary First Premolars With Three Roots; A Report Of Two Cases.

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Citation

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Abstract

A thorough knowledge about the normal and abnormal variation of anatomy of the teeth and their detection is essential for clinical success. Maxillary first premolars show a considerable variation in root canal morphology but the presence of three roots is rare. However, it must be taken considered radiographically and clinically during endodontic treatment. This article describes the diagnosis and clinical management of two cases of maxillary first premolar with three separate roots and three root canals with special reference to radiographic interpretation and diagnosis.

INTRODUCTION

The degree of clinical success in endodontic therapy depends on the accuracy of biomechanical instrumentation and obturation of the root canal system. One of the main reasons for treatment failure in endodontics is the lack of thorough knowledge about the anatomy of root canals. Therefore the first step in achieving a successful endodontic outcome is an exact diagnosis of the root canal system and its anatomical variations. Maxillary first premolars show a considerable variation in root canal morphology but the presence of three roots is rare. This anatomic abnormality is an additional challenge, which influences all the stages of treatment including case assessment, access cavity design, canal orifice localization, and cleaning and shaping of the root canal system.

The presence of three roots in maxillary premolar varies from 0.5% to 6% (1-4) with one canal in each of the three roots (5). The root canal anatomy of three rooted maxillary premolars shows close resemblance to that of maxillary molars and therefore they have been termed as mini-molars or as being "ridiculous" (6, 7). The ethnic background of the patients with three rooted maxillary premolars in many of the studies was not identified. The studies identifying ethnic background have demonstrated distinct differences between Asian and Caucasian populations. Single rooted maxillary first premolars are the dominant form in Asian population (8, 9), and three rooted forms are rare (8, 9, 10).

Routine preoperative radiography gives a two dimensional

view of a three dimensional object but precise interpretation can reveal fine anatomic details that suggest the presence of extra roots or canals. An extra canal should be suspected, whenever there is an abrupt straightening or loss of radiolucent canal in the pulp cavity (11). In case of maxillary premolar whenever the mesio-distal width of the root image is equal to or greater than the mesio-distal width of the crown, the tooth most likely has three roots (12).

This article describes the diagnosis and endodontic management of three-rooted maxillary first premolars with special emphasis on radiographic interpretation and diagnosis.

CASE REPORT# 1

A 26- year- old male patient reported to the post-graduate clinic, Department of conservative dentistry and endodontics, Government Dental College and Hospital, Srinagar (India) with a chief complaint of pain in the upper left posterior region. On clinical examination tooth #24 was tender on percussion. The tooth had received temporary restoration by a local dentist after which the patient experienced severe pain in the involved tooth.

A preoperative-Digital radiograph (Schick technologies, NY, USA) revealed a temporary restoration approximating the pulp with an abrupt loss of radiolucency in the pulp canal and a mesio-distal root diameter greater than the mesio-distal width of the crown suspecting a possible tooth variation (Fig 1a).

Figure 1

pre-operative diagnostic radiograph



Endodontic treatment of the involved tooth was decided and informed consent was taken from the patient. The temporary restoration was removed and access cavity preparation was done under proper rubber dam isolation. One large buccal and one palatal canal orifice were located using an endodontic explorer at the first instant. The access cavity was then slightly modified and extension of the buccal orifice was carried out using a slow speed round bur (Dentsply Maillefer). By exploring the extended buccal orifice with an endodontic explorer using a DG16 explorer, the exact location of the mesio-buccal and disto-buccal canals was confirmed. The root canals were explored with k-flex file ISO15 (Dentsply Maillefer) and working length determination was performed with elements diagnostic apex locator (Sybronendo, USA,) (Fig1b) and confirmed radiographically (Schick technologies, NY, USA) (Fig1c).

Figure 2

, elements diagnostic apex locator used for working length determination.



Figure 3

, working length determination confirmatory radiograph



The root canals were shaped with ProTaper rotary instruments (Dentsply Maillefer). During canal preparation Glyde (Dentsply Maillefer) was used as a lubricant and the root canals were disinfected with 5.25% sodium hypochlorite (Prime Dental Product, Mumbai, India). The root canals were properly dried with absorbent paper points and obturated with gutta-percha and resin based sealer (AH plus, Dentsply De Trey, Konstanz, Germany) (Fig 1d, Fig 1e). The access cavity was then sealed with temporary restorative material. The patient was recalled for the permanent restoration.

Figure 4

, master cone selection radiograph



Figure 5

, post-operative obturation radiograph

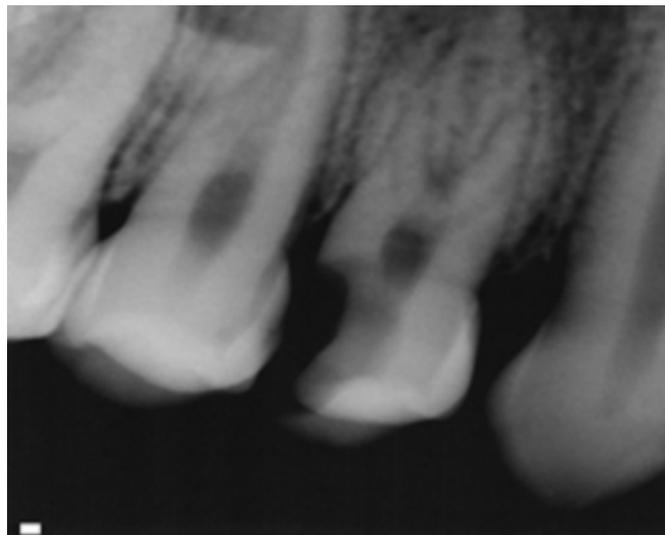


CASE REPORT# 2

A 16- year- old male patient visited the Department of conservative dentistry and endodontics, Government Dental College and Hospital, Srinagar (India) with a chief complaint of pain in the maxillary right first premolar. On clinical oral examination of the patient, maxillary right first premolar had a deep carious lesion. Digital radiograph (Schick technologies, NY, USA) of the involved tooth revealed the presence of three separate roots (Fig 2a). Buccal object rule (SLOB technique) confirmed the presence of the third additional root.

Figure 6

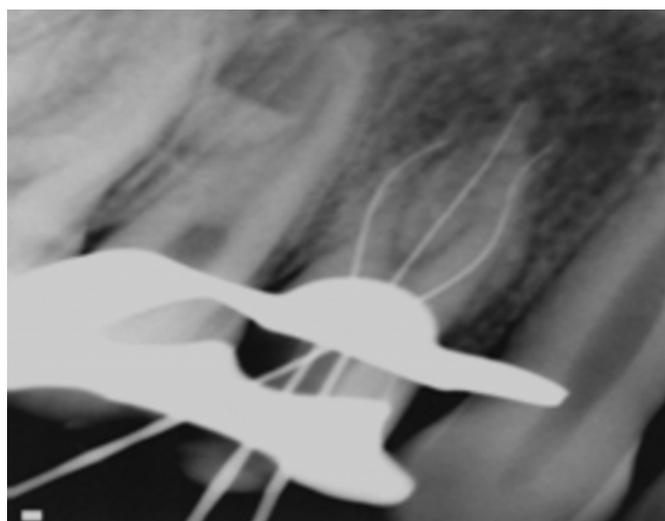
, pre-operative diagnostic radiograph



Informed consent was taken from the patient and endodontic treatment of the involved tooth was decided and access cavity preparation was done using access opening bur kit (Dentsply Malliefer) under rubber dam isolation. Three distinct canal orifices were located and negotiated using k-flex file ISO 15 (Dentsply Malliefer). Working length measurement was done using elements diagnostic apex locator (Sybronendo, USA) and it was confirmed by a digital radiograph (Schick technologies, NY, USA) (Fig2b).

Figure 7

, working length determination confirmatory radiograph



Root canal shaping was done using hand Protaper instruments (Dentsply Malliefer) using copious Glyde (Dentsply Malliefer) as a lubricant during the preparation. Canal disinfection was done using 5.25% sodium hypochlorite (Prime Dental Product, Mumbai, India). After

root canal cleaning and shaping, the canals were properly dried with absorbent paper points and obturated with Gutta percha and resin based sealer (AH plus, Dentsply De Trey, Konstanz, Germany) (Figs 2c, 2d). The access cavity was sealed with a temporary restorative material. The patient was recalled for the permanent restoration.

Figure 8

, master cone selection radiograph

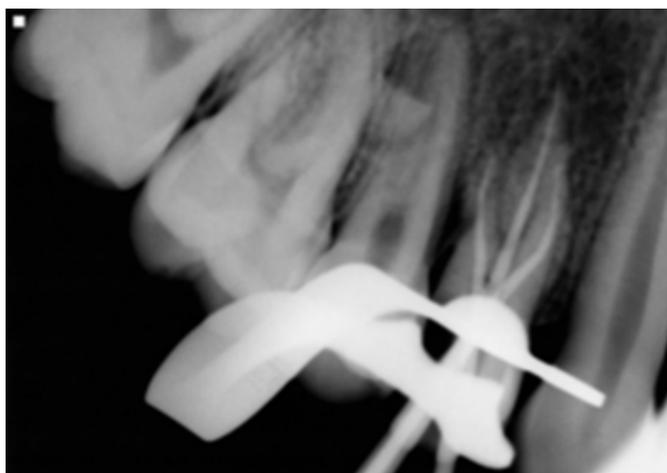
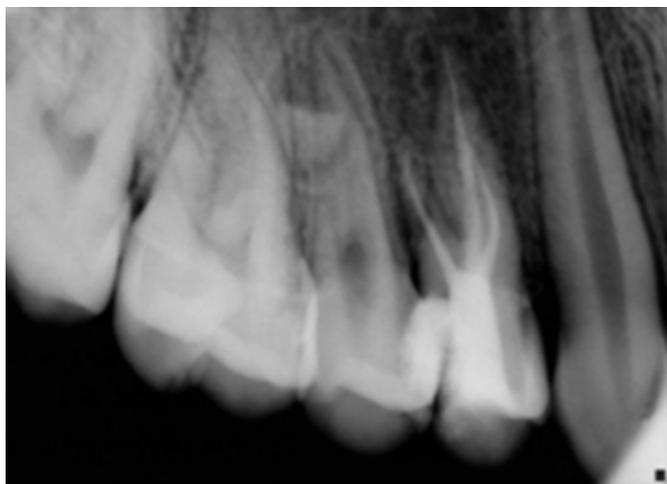


Figure 9

, post-operative obturation radiograph



DISCUSSION

The basic goal of root canal treatment is thorough mechanical and chemical cleansing of the entire pulp cavity and its complete obturation with an inert filling material. Endodontic therapy requires a thorough knowledge of root canal morphology to adequately shape and clean the canal system. Proper care and attention should be directed in identifying and negotiating extra roots and canals.

Maxillary premolars can exhibit several anatomic

configurations in different populations (13-19). But, in the literature only a few cases related to three rooted maxillary first premolar are reported (20-24).

Our article has described the clinical management of first premolars with three canals and three separate roots.

Detection of three-canal maxillary premolar can often be difficult on routine preoperative radiographs. The root canal configuration of three-rooted maxillary premolars resembles that of a miniature three-canal maxillary molar; the canals being classified as the mesio-buccal, disto-buccal and palatal canals. Three rooted configuration can be sometimes seen on preoperative radiographs. In our case, diagnostic periapical radiography revealed a three separate rooted maxillary first premolar. But, it was difficult to find canal accesses because the buccal orifices were too close to each other and therefore, it was very hard to locate them.

A three-canal maxillary premolar requires an access cavity modification into a “T” shape mesio-distally extending the buccal aspect of the usual outline form. This modification allows good access to each of the two buccal canals (22). A thorough knowledge of variations will assist the dentist in reaching conclusions when diagnosing and treating endodontic cases. The possibility of presence of multiple canals and additional roots in different cases should be carefully explored and treated.

References

1. Bellizi R, Hartwel G. Radiographic evaluation of root canal anatomy of in-vivo endodontically treated maxillary premolars. *J Endod* 1985;11:27-39.
2. Carns EJ, Skidmore AE. Configurations and deviations of root canals of maxillary first premolars. *Oral Surg Oral Med Oral Pathol* 1973;36:880-886.
3. Hess W. Anatomy of the root canals of the teeth of the permanent dentitions. Part I. William Wood, New York, 3-49.
4. Pineda F, Kutler Y. Mesiodistal and buccolingual roentgenographic investigation of 7,275 root canals. *Oral Surg Oral Med Oral Pathol* 1972; 33:101-110.
5. Vertucci FJ, Gegauff A. Root canal morphology of maxillary first premolar. *J Am Dent Assoc* 1979;99:194-198.
6. Maibaum WW. Endodontic treatment of “a “ridiculous” maxillary premolar. *Gen Dent* 1989;37:340-341.
7. Goon W. The “ridiculous” maxillary premolar: recognition diagnosis and case report of surgical intervention. *Northwest Dent* 1993;72:31-33.
8. Aoki K. [Morphological studies on the roots of maxillary premolars in Japanese]. *Shikwa Gakuho* 1990;90:181-199.
9. Loh HS. Root morphology of the maxillary first premolar in Singaporeans. *Aus 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;3:130-134.
11. Soares JA, Leonardo RT. Root canal treatment of three rooted maxillary first and second premolars- a case report.

Int Endod J 2003;36:705-710.

12. Sieraski SM, Taylor GN, Kohn RA. Identification and endodontic management of three canalled maxillary premolars. J Endod 1989;15:29-32.

13. Pecora JD, Saquy PC, Sousa Neto MD, Woelfel JB. Root form and canal anatomy of maxillary first premolars. Braz Dent J. 1992; 2: 87-94.

14. Chaparro AJ, Segura JJ, Guerrero E, Jimenez-Rubio A, Murillo C, Feito JJ. Number of roots and canals in maxillary first premolars: study of an Andalusian population. Endod Dent Traumatol. 1999;15: 65-7.

15. Vertucci FJ, Gegauff A. Root canal morphology of the maxillary first premolar. J Am Dent Assoc. 1979; 99: 194-8.

16. Caliskan MK, Pehlivan Y, Sepetcioglu F, Turkun M, Tuncer SS. Root canal morphology of human permanent teeth in a Turkish population. J Endod. 1995; 21: 200-4.

17. Walker RT. Root form and canal anatomy of maxillary first premolars in a southern Chinese population. Endod Dent Traumatol. 1987; 3: 130-4.

18. Kartal N, Ozcelik B, Cimilli H. Root canal morphology of maxillary premolars. J Endod. 1998; 24: 417-9.

19. Loh HS. Root morphology of the maxillary first premolar in Singaporeans. Aust Dent J. 1998; 43: 399-402.

20. Barry GN, Heyman RA, Fried IL. Endodontic treatment of a three-rooted maxillary first premolar. Case report. N Y State Dent J. 1975; 4: 75-7.

21. Belizzi R, Hartwell G. Evaluating the maxillary premolar with three canals for endodontic therapy. J Endod. 1981; 7:521-7.

22. Sieraski SM, Taylor GN, Kohn RA. Identification and endodontic management of three-canalled maxillary premolars. J Endod. 1989; 15: 29-32

23. Zaatari EI, al-Busairi MA, Behbahani MJ. Maxillary first premolars with three root canals: case report. Quintessence Int. 1990; 21: 1007-11.

24. Evans M. Combined endodontic and surgical treatment of a three-rooted maxillary first premolar. Aust Endod J 2004; 30: 53-5.

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