



Root Canal Treatment of Maxillary First Premolar with Three Root Canals: A Case Report

Negin Ghasemi

Assistant professor, Department of Endodontics, Dental Faculty, Tabriz University (Medical Sciences), Tabriz, Iran

Ayla Bahramian

Assistant professor, Department of Oral Medicine, Dental Faculty, Tabriz University (Medical Sciences), Tabriz, Iran

**Fatemeh Dabaghi
Tabriz**

Assistant professor, Department of Operative Dentistry, Dental Faculty, Tabriz University (Medical Sciences), Tabriz, Iran

ABSTRACT

Successful endodontic treatment depends on complete cleaning, shaping, and filling of the all existing canals in the tooth and thorough knowledge about normal anatomy and possible variations in root canal morphology is critical. In the studies describing tooth and root canal anatomies of maxillary first premolars, the presence of three root canals has rarely been reported. This case report presents the maxillary first premolar with three root canals.

KEYWORDS

Dental pulp abnormalities; maxillary first premolar; root canal therapy.

Introduction

The main goal of nonsurgical endodontic treatment is thorough cleaning and shaping of all root canal system and complete obturation of them. The clinician must have an understanding of the complexity of the root canal system and its possible variations in order to achieve a technically satisfactory outcome (1-2). Maxillary first premolars have a complex anatomy and are therefore considered challenging to treat and without a doubt, are among the most difficult teeth to be treated endodontically (3-5). This could be caused by many factors including the number of roots and canals, the direction and longitudinal depressions of the roots, the various pulp cavity configurations, and the difficulties in visualizing the apical limit by radiographs (5-6). Many studies have investigated the root and canal morphology of maxillary first premolar (3-10). The incidence of one root varies from 30% to 60%; two roots, 41.7 to 70%; and three roots, 0 to 6%. In addition, the occurrence of two canals in these teeth ranged from 73.3% to 92% in different morphology studies (9-12). The maxillary premolars with three root canals called small molars or ridiculous; which similar to maxillary molars and have mesiobuccal, distobuccal and palatal canals (2-3).

This case report presents the maxillary first premolar with three root canals.

Case report

A 31-year-old female presented to the Department of Endodontics, Tabriz Faculty of Dentistry, with a chief complaint of spontaneous toothache in her maxillary left first premolar. The pulpotomy was done in one week ago. The patient's medical history was unremarkable. After obtaining the informed consent from patient, the pulpal and periapical tests were done. Performed vitality tests did not show any response to cold, heat and electrical pulpal test. Palpation of the tooth did not reveal any tenderness. The tooth was not mobile and periodontal probing around the tooth was within normal limits. The pretreatment diagnosis for pulpal condition was previously initiated therapy and for periapical within normal limit.

The root structure seemed normal on radiograph and the tooth had rotation (Figure 1a). It should be mentioned that the right maxillary first premolar was extracted two years ago. Local anesthesia was administered with 2% lidocaine and

1:80000 epinephrine (Daroupakhsh, Tehran, Iran) and a rubber dam was placed. After removal of temporary restorative material, two orifices were found in the buccal aspect and one in the palatal (Figure 1b). No other orifice was found even by exploration at $\times 4.5$ magnification of prismatic loupes (Zeiss Eyemag Pro S; Carl Zeiss SpA, Aresa, Italy) and under dental operating microscope (DOM) (Seiler Revelation, St Louis, MO). This morphology was confirmed by radiographic examination. The canals' lengths were determined by a Root-ZX apex locator (Morita, Tokyo, Japan) and confirmed with a periapical radiograph using K-files #20 for buccal and 25 for palatal canals (Figure 1c).

The canals were then further prepared with RaCe rotary files (FKG; Dentaire, La-Chaux-de-Fonds, Switzerland) with 0.04 and 0.06 tapers up to 1 mm short of the radiographic apex up to #35 with 0.06 taper using the crown-down technique. During root canal preparation, irrigation was performed using normal saline, 2.5% sodium hypochlorite solution. The canals were dried with absorbent paper points (Dentsply, Maillefer) and obturated using cold lateral compaction of gutta-percha (Dentsply, Maillefer) and AH26 resin sealer (Maillefer, Dentsply, Konstanz, Germany). A final radiograph was taken to evaluate obturation quality; then the access cavity was then sealed with a temporary restorative material. The patient was referred to the Department of Operative Dentistry for restorative treatment (Figure 1d).

Discussion

Thorough knowledge of roots and root canal morphology is the foundation for successful root canal therapy. Maxillary first premolars have a complex anatomy and are therefore considered challenging to treat. The challenges in root canal treatment are directly related to the complexity of the root canal morphology (6). High quality preoperative radiographs and their careful examination are essential for the detection of additional root canals (4-5). It is very important for the clinician to explore the internal morphology and using magnification and fiberoptic illumination and operating microscope (5). Maxillary first premolars usually have two canals (3-12). A third canal should be suspected clinically when the pulp chamber does not appear to be aligned in its expected buccopalatal relationship that is obvious in this case report. If the pulp chamber appears to deviate from normal configuration and seem to be either

triangular in shape or too large in mesiodistal plane, more than one root canal should be suspected (3-4). The critical step in finding the additional buccal canal was tactile examination of all major buccal walls with a small, precurved K-file tip; and as mentioned before, magnification is very helpful tool (2). In three rooted maxillary premolars, outline of the access cavity is T-shaped (4).



Fig 1a. Initial Radiography.



Fig 1b. Three orifices in the floor of the pulp chamber.



fig 1c. Radiographic examination with files revealed three root canals.



Fig 1d. Obturated root canals.

References

1. Vertucci FJ, Gegauff A. Root canal morphology of the maxillary first premolar. *J Am Dent Assoc.* 1979;99:194-8.
2. Dadresanfar B, Khalilak Z, Shahmirzadi S. Endodontic treatment of a maxillary first premolar with type IV buccal root canal: A case report. *IEJ.* 2009;4:35-6.
3. Shalavi S, Mohammadi Z, Abdolrazzaghi M. Root canal treatment of maxillary and mandibular three-rooted premolars: case reports. *IEJ.* 2012;7:161-4.
4. Sert S, Bayirli GS. Evaluation of the Root Canal Configurations of the Mandibular and Maxillary Permanent Teeth by Gender in the Turkish Population. *J Endod* 2004;30:391-8.
5. Awawdeh L, Abdullah H, Al-Qudah A. Root form and canal morphology of jordanian maxillary first premolars. *J Endod.* 2008;34:956-61.
6. Li J, Li L, Pan Y. Anatomic study of the buccal root with furcation groove and associated root canal shape in maxillary first premolars by using micro-computed tomography. *J Endod.* 2013;39:265-8.
7. 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.
8. Carns EJ, Skidmore AE. Configurations and deviations of root canals of maxillary first premolars. *Oral Surg Oral Med Oral Pathol.* 1973;36:880-6.
9. Loh HS. Root morphology of the maxillary first premolar in Singaporeans. *Aust Dent J.* 1998;43:399-402.
10. Green D. Double canals in single roots. *Oral Surg Oral Med Oral Pathol.* 1973;35:689-96.
11. 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.
12. 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. *J Endod Dent Traumatol.* 1999;15:65-7.