

ENDODONTIC TREATMENT OF MAXILLARY FIRST PREMOLAR WITH THREE ROOT CANALS - A CASE REPORT

Amin Davoudi,¹ Ali Akhavan²

1. Dentistry student, Dental Students Research Center, School of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran.

2. Assistant professor of endodontic, Dental Materials Research Center and Department of Endodontic, School of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran.

Abstract

The maxillary first premolar may become a challenge when three roots are existed and more attention is required during endodontic procedure. This clinical paper reports the case of a maxillary first premolar with three roots and three root canals highlighting its procedure endodontic treatment.

After initial radiography and preparing access cavity, the presence of three roots canals was detected with #10 K-file. The working length was measured and step-back technique was administered for cleaning and shaping. Final irrigation accomplished by using photodynamic technique and the canals obturated based on lateral condensation technique.

It is necessary for professionals to consider the diagnostic radiograph and anticipate possible variation carefully to avoid endodontic therapies with missed canals even in rare cases.

Key words: Anatomy, Maxillary first premolar, Ridiculous, Root canals.

Introduction

Anatomic variations impose challenges to clinicians to achieve a successful root canal treatment.

Undetected extra roots and canals would eliminate the success rates of endodontic therapy.¹ Radiographs and clinical examinations should be ordered for better localization of undetected roots or canals.²

Several studies focused on anatomical variations of maxillary premolars. It is stated that the root canal morphology of maxillary first premolars is highly variable. Three-rooted maxillary premolars are similar to maxillary molars, and are sometimes called “small molars” or “ridiculous”.^{3,4}

The incidence of maxillary premolars with three root canals varies from 0.5% to 6% and the three roots generally have separated canals.⁵⁻⁷

A survey on 246 extracted maxillary first premolars revealed that only three of them (1.2%) had three roots canals⁸

Hence, clinicians must be aware about the likelihood of extra roots and canals when managing a root canal treatment.

Some recent investigations have been dedicated to new disinfectant materials and techniques specially by using technology and new devices.^{9, 10} The use of photodynamic therapy (PDT) for final decontamination of root canals has demonstrate hopeful results and no adverse effect has been established until now.^{10, 11}

The purpose of this clinical report is to describe a rare case of a maxillary first premolar with three roots which was treated with relying on a new approach of disinfection technique.

Case report

A healthy 40 year old man referred to the Department of Endodontic, Faculty of Dentistry, Isfahan University of

Medical Sciences. During profiling, a previous endodontic treatment on the right first premolar maxillary tooth was indicated in the dental history of patient and medium quality of obturation was found in that three-rooted first maxillary premolar. (Figure 1)



Figure 1: The three-rooted first maxillary premolar in the right side which was obturated previously.

However, his chief complaint was about spontaneous pain in the other side (left upper first premolar) at the moment. Deep carious lesion was observed in the distal site of the tooth which was confirmed by periapical radiograph (Figure 2), further.



Figure 2: Diagnostic radiograph of the left maxillary first premolar. Deep carious lesion was observed in the distal site.

Objective tests revealed sensitivity to cold and electronic pulp testing, which reflected irreversible pulpitis. So, one-visit endodontic treatment was scheduled for the tooth and 1.8 ml Lidocain (Daroopakhsh, Tehran, Iran) local anesthetic infiltration was administered in mucobuccal fold. The tooth was isolated with rubber dam, all caries were removed and an access cavity was completed by using high speed fissure burs (Teeskavan, Tehran, Iran) and handpiece (NSK, Tokyo, Japan). After removing the coronal pulp, the possibility of a third canal was observed and all three canals were explored with K file (Dentsply Maillefer, Ballaigues, Switzerland) size #10. The working length was measured and assessed with a radiograph (Figure 3).

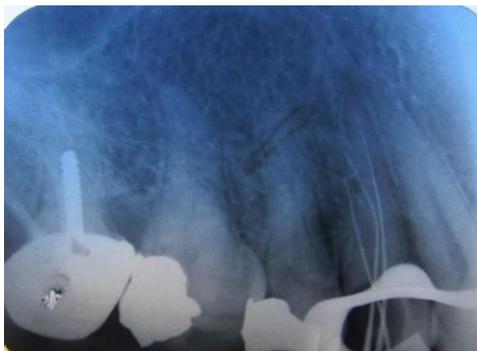


Figure 3: Assessing the working length and observing the three canals separation.

Step-back technique was administered and the root canals were cleaned manually up to size # 30 K file for distobuccal and palatal canals and size of #25 for mesiobuccal canal. The shaping was continued until the size of #55 K file. The canals were irrigated by 5.25% NaOCl (Probem, Catanduva, Brazil) during cleaning and shaping. Master apical cone (MAC) with size of #30 was considered for distobuccal and palatal canals and size of #25 for mesiobuccal canal. Final irrigation was accomplished by photodynamic therapy (Fotosan 360, CMS Dental, Copenhagen, Denmark) with attached Endo tip and low concentration for 1 minute of activation. The canals were obturated by laterally condensed gutta-percha (Diadent Group International Inc., Vancouver, Canada) and AH Plus (Dentsply Maillefer, Ballaigues, Switzerland) root canal sealer (Figure 4).

Discussion

The first maxillary premolar features two conical roots in buccal and palatal with one canal in each one. However, the amount of roots and canals can vary since the buccal root may divide into two mesiobuccal and distobuccal roots.¹²

According to Bellizzi R and Hartwell G, change in the root morphology can be classified into three groups. Two buccal roots with and semifused or free palatal root (A); two buccal roots which separate from middle or apical third (B); three roots which are separate from the cervical third.¹³ This case could be classified as the second group in which the buccal canals separated from each other in middle third (Figure 3). Regarding the instrumentation technique, the

use of conventional hand files is established for tactile sense of apical stop.¹⁴

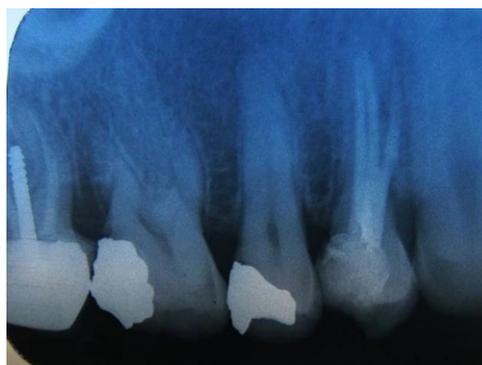


Figure 4: The final radiograph of the left maxillary first premolar with three separate root canals after endodontic treatment.

Use of photodynamic therapy as the final irrigation has gain acceptance among clinicians because of its high degree of selectivity for killing microorganisms.¹⁵ In present case, the use of photodynamic therapy seems to be effective and non-invasive.

There is hope for photodynamic therapy to become a routine disinfectant in dental procedures.

Conclusion

Changes in shape and number of root canals may occur even in rare cases like the premolar with three roots and three canals. Thus the clinicians are required to focus more to the diagnostic radiographs during endodontic therapies to avoid obturations missed canals.

References

1. Holderrieth S, Gernhardt CR. Maxillary molars with morphologic variations of the palatal root canals: a report of four cases. *J Endod* 2009;35(7):1060-5.
2. Alapati S, Zaatar EI, Shyama M, Al-Zuhair N. Maxillary canine with two root canals. *Med Princ Pract* 2006;15:74-6.
3. Goon WW. The "radiculous" maxillary premolar: recognition, diagnosis, and case report of surgical intervention. *Northwest Dent* 1993;72(2):31-3.
4. George GK, Varghese AM, Devadathan A. Root canal treatment of a maxillary second premolar with two palatal roots: A case report. *J Conserv Dent* 2014;17(3):290-2.
5. Carns EJ, Skidmore AE. Configurations and deviations of root canals of maxillary first premolars. *Oral Surg Oral Med Oral Patho* 1973;36(6):880-6.
6. Vertucci FJ, Gegauff A. Root canal morphology of the maxillary first premolar. *J Am Dent Assoc* 1979;99(2):194-8.
7. Pineda F, Kuttler Y. Mesiodistal and buccolingual roentgenographic investigation of 7,275 root canals. *Oral Surg Oral Med Oral Patho* 1972;33(1):101-10.

8. Atieh MA. Root and canal morphology of maxillary first premolars in a Saudi population. *J Contemp Dent Pract* 2008;9(1):46-53.
9. Cheng X, Guan S, Lu H, Zhao C, Chen X, Li N *et al.* Evaluation of the bactericidal effect of Nd:YAG, Er:YAG, Er,Cr:YSGG laser radiation, and antimicrobial photodynamic therapy (aPDT) in experimentally infected root canals. *Lasers Surg Med.* 2012;44(10):824-31.
10. Ng R, Singh F, Papamanou DA, Song X, Patel C, Holewa C *et al.* Endodontic photodynamic therapy ex vivo. *J Endod* 2011;37(2):217-22.
11. Garcez AS, Nunez SC, Hamblin MR, Suzuki H, Ribeiro MS. Photodynamic therapy associated with conventional endodontic treatment in patients with antibiotic-resistant microflora: a preliminary report. *J Endod* 2010;36(9):1463-6.
12. Mattuella LG, Mazzocato G, Vier FV, So MV. Root canals and apical foramina of the buccal root of maxillary first premolars with longitudinal sulcus. *Braz Dent J* 2005;16(1):23-9.
13. Bellizzi R, Hartwell G. Evaluating the maxillary premolar with three canals for endodontic therapy. *J Endod* 1981;7(11):521-7.
14. Genc O, Alacam T, Kayaoglu G. Evaluation of three instrumentation techniques at the precision of apical stop and apical sealing of obturation. *J Appl Oral Sci.* 2011;19(4):350-4.
15. Garcez AS, Nunez SC, Hamblin MR, Ribeiro MS. Antimicrobial effects of photodynamic therapy on patients with necrotic pulps and periapical lesion. *J Endod* 2008;34(2):138-42.

Corresponding Address

Ali Akhavan
 School of Dentistry, Isfahan University of Medical
 Sciences, Isfahan, Iran
 Email: amindvi@yahoo.com