

Maxillary First Molar with Unusual Root Canal System: A Case Report¹

FARKLI KÖK KANAL SİSTEMİNE SAHİP MAKSİLLER BİRİNCİ MOLAR: BİR OLGU SUNUMU

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Summary

Purpose: This case report describes an unusual root canal configuration of maxillary first molar tooth.

Case Report: Studies on canal configuration have demonstrated a substantial variation in the number of roots and root canals in different teeth. Maxillary first molars may have three roots and generally present with three or four root canals. This case report describes the presence of two roots, including one root canal in each root, in the first molar tooth and also type I configuration in the buccal root.

Conclusion: Knowledge of possible variations in internal anatomy of human teeth is important for successful endodontic treatment. Preoperative radiographs in different directions are necessary for the success of endodontic therapy.

Key Words: Root canal anatomy, maxillary first molar, root canal treatment

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Özet

Amaç: Bu olgu raporu maksiller birinci molar dişin nadir görülen kök kanal konfigürasyonunu göstermektedir.

Olgu Sunumu: Kanal konfigürasyon çalışmaları farklı dişlerde kök ve kök kanal sayısında önemli bir varyasyon olduğunu göstermiştir. Maksiller birinci molarlar genellikle üç kök ile üç veya dört kök kanalı içerebilir. Bu olgu raporu maksiller birinci molar dişteki iki kök ve iki kök kanalının varlığını ve ayrıca bukkal kökteki tip I konfigürasyonun varlığını göstermektedir.

Sonuç: İnsan dişlerinin iç anatomisindeki varyasyonların bilinmesi başarılı bir endodontik tedavi için önemlidir. Farklı açılardan alınan preoperatif radyograflar endodontik tedavinin başarısı için gereklidir.

Anahtar Kelimeler: Kök kanal anatomisi, maksiller birinci molar, kök kanal tedavisi

Success in endodontic therapy depends on the removal of the inflamed pulp tissue or necrotic debris within root canal systems. Therefore, a thorough knowledge about root canal morphology and its potential for variations related to race may be important for endodontic therapy. If a canal is not detected, it cannot be cleaned and filled and this is a potential cause of failure of endodontic therapy (1).

In the past, the morphology of the permanent maxillary molars has been reviewed extensively. Most of the literature concentrated on the morphology of the mesiobuccal root and particularly on its mesiopalatal canal. Maxillary first molar teeth most commonly have three or four canals (a canal in palatal or in distobuccal root and one or two in the mesiobuccal root). The incidence of a

mesiopalatal canal has been reported between 18% and 96.1% (2,3).

In addition to these studies, the literature cites many anomalies associated with permanent maxillary molars. Variations included one (4), four (5) and five (6) roots and unusual morphology of root canal systems within individual roots. Case reports with four (7), five (8) or six (9) root canals or with a c-shaped configuration (10) were also presented. Other Cases have also been presented showing two or three root canals in the palatal root of the maxillary first molar or even two separate palatal roots (8,11).

The present case report describes a case of a maxillary first molar with a canal configuration not yet reported in the literature. This tooth had only two roots (one buccal and one palatal) and a type I configuration in the buccal root.



Figure 1. Preoperative radiograph of the maxillary right first molar.



Figure 2. Root length determination radiograph.

Case Report

A 25-year-old female patient was admitted to Endodontics Clinic of Selçuk University, Faculty of Dentistry with signs of irreversible acute pulpitis. The pain was spontaneous and related to temperature on the right side of the face. The patient's medical history was noncontributory. A preoperative radiograph was obtained (Figure 1). After extensive clinical and radiographic examination, nonsurgical endodontic therapy of maxillary right first molar was decided. The patient was anesthetized with 2% lidocaine with 1:100.000 epinephrine. Rubber dam was placed, and a conventional endodontic access opening was prepared.

The coronal pulp tissue was removed and the pulp chamber was irrigated with 5.25% sodium hypochlorite. Only two root canal orifices were detected. One was in buccal root and the other was in palatal root. However, the buccal orifice had a large shape that occupied a large area of the pulp floor. The canals were explored and the working length was determined with an electronic apex locator (Root ZX, J. Morita Corp., Japan). The determined working length was confirmed with radiographs. The radiographs with two different angulations showed that the instrument in the buccal root canal was well centered (Figures 2 and 3). Therefore it was thought that the buccal root had only one root canal.

K-type files were used to clean and shape the canal system. Gates Glidden burs #2 and #3 were



Figure 3. Another root length determination radiograph.

used to flare the coronal portion of the canals. Frequent irrigation with 5.25% sodium hypochlorite was also carried out during the procedures. All canals were stepped back in 1-mm increments for 3 file sizes larger than the master apical file. The tooth was dried with paper points, and calcium hydroxide was placed into the root canals. Then the pulp chamber was sealed with a temporary restorative filling material (Cavit G, 3M ESPE, Germany).

At the next appointment, the root canals were irrigated with 5.25% sodium hypochlorite and dried with paper points. Gutta-percha (Diadent, Korea) with a tug-back sensation was selected for obturation and a control radiograph was taken. The canals were obturated using AH plus root canal

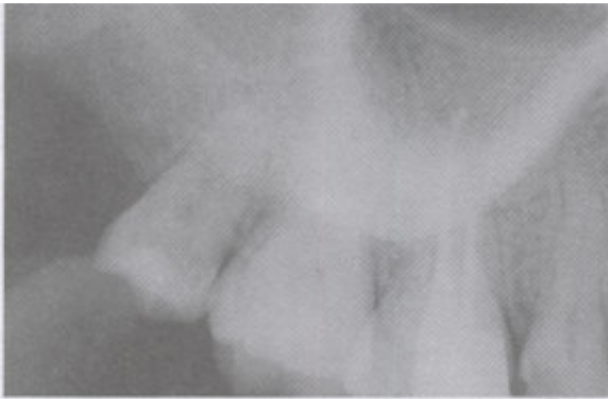


Figure 4. Postoperative radiograph.



Figure 5. Control radiograph after one year.

sealer (Dentsply, De Trey, Germany) and laterally condensed gutta-percha technique. The tooth was restored with composite resin (AP-X, Kuraray, Japan) and dentin bonding system (SE Bond, Kuraray, Japan) after all a postoperative radiograph was taken (Figure 4). The periodontal treatment of the patient, including scaling and oral hygiene instruction, was applied at the same appointment.

A new appointment was given to the patient for other teeth but the patient did not come. One year later the same patient was referred again for endodontic therapy, for the lower teeth. Recall examination and radiograph of the previously treated tooth confirmed that the treatment has been successful (Figure 5). The tooth was asymptomatic and the radiographic examination revealed normal periapical tissue. But maxillary second premolar and third molar teeth had been extracted by the patient when she was out of the city.

It was considered that the canal morphology was bilateral; unfortunately the left maxillary first molar tooth was extracted previously. When the radiograph obtained from the patient's former dentist, two roots were detected with bad root canal filling (Figure 6).

Discussion

An awareness of root canal morphology and careful interpretation of preoperative radiographs are necessary for the success of endodontic therapy. However radiographs are two dimensional



Figure 6. Radiograph of the maxillary left first molar which was extracted previously.

images of a three-dimensional object. The clinician must be aware of this limitation during radiographic interpretation (12).

From a clinical standpoint, radiographic or other images provide clinicians with the most appropriate method to detect variations in both root and canal anatomy. Only by correct examination and interpretation of these images help the clinician to detect such variations and make him to be aware of them before and during endodontic procedures (13).

When a preoperative radiograph reveals atypical tooth shape with unusual contour, further radiographs should be taken with a different angulation to confirm any unusual anatomical features (14).

In this case the initial radiograph suggested only two roots (one buccal and palatal). Fava (13) was hypothesized that when a radiograph showed only one buccal root, it was possible that the tooth had indeed only one buccal root or that the two buccal roots had fused.

Unlike mandibular second molars, a root canal system with C shape root canal system may occasionally occur. Such a configuration for a maxillary first molar tooth has been reported in a limited number of cases (10,15,16). A fusion of the distobuccal and palatal root in maxillary first molar tooth was reported in their study. In this case there were no signs of C shaped root canal system.

Maxillary first molar teeth have greater percentage of separated roots than maxillary second molar teeth. Maxillary second molar teeth have higher incidence of fusion in their buccal or all roots. Sabala et al (17) reported that the most common aberration of maxillary molar teeth involved the fusion of 2.2% of the facial roots of second molars.

Cases of fused buccal roots have been described in clinical cases (17,18) and in an *in vitro* study (19). Pecora et al (19) evaluated 140 first molar teeth and reported that fusion was observed 7.9% in buccal roots, 5% in lingual and distobuccal roots and 0.7% in all of the roots. But Sabala et al (17) reported that fused buccal roots can be seen only in 0.4% cases.

Weine (1) showed four types of canal configuration in one root. Single canal from the pulp chamber to apical foramen (Type I), two root canals that join short of the apex ending in one foramen (Type II), two separate canals ending two separate foramina (Type III), or one root canal that bifurcates inside the root ending in two foramina (Type IV) (1).

Type II and type IV configurations were described in a maxillary first molar with fused buccal roots respectively by Malagnino et al (18) and Fava (13). Up to now, no clinical reports have been described about two-rooted maxillary first molar in which the buccal root present a type I configuration. In this case, it was reported that there are only

two roots (one buccal and one palatal) and a type I configuration in the buccal root. The canal was in the center of the root according to the radiographs from different directions.

Sabala et al (17) discovered that aberrations occurred under 1% of the cases and that 90% of such aberrations were bilateral. In this case when the patient's bilateral tooth (which was extracted previously) evaluated radiographically, two roots were seen.

As conclusion, knowledge of possible variations in internal anatomy of human teeth and pre-operative radiographs in different directions are important for successful endodontic treatment.

REFERENCES

1. Weine FS: Endodontic Therapy. 5th ed. St. Louis, Mosby-Year Book, Inc, 1996, p.242
2. Hartwell G, Belizzi R: Clinical investigation of in vivo endodontically treated mandibular and maxillary molars. J Endodon 8: 555, 1982
3. Kulild JC, Peters DD: Incidence and configuration of canal systems in the mesiobuccal root of maxillary first and second molars. J Endodon 16: 311, 1990
4. Carlsen O, Alexandersen V, Heitmann T, Jakobsen P: Root canals in one-rooted maxillary second molars. Scand J Dent Res 100: 249, 1992
5. Christie WH, Peikoff MD, Fogel HM: Maxillary molars with two palatal roots: A retrospective clinical study. J Endodon 17: 80, 1991
6. Fahid A, Taintor JF: Maxillary second molar with three buccal roots. J Endodon 14: 181, 1988
7. Benenati FW: Maxillary second molar with two palatal canals and a palatogingival groove. J Endodon 11: 308, 1985
8. Wong M: Maxillary first molar with three palatal canals. J Endodon 17: 298, 1991
9. Bond JL, Hartwell G, Portell FR: Maxillary first molar with six canals. J Endodon 14: 258, 1988
10. Dankner E, Friedman S, Stabholz A: Bilateral C shaped configuration in maxillary first molars. J Endodon 16: 601, 1990
11. Baratto-Filho F, Fariniuh LF, Ferreira EL, Pecora JD, Cruz-Filho AM, Sousa-Neto MD: Clinical and macroscopic study of maxillary molars with two palatal roots. Int Endod J 35: 796, 2002
12. Ingle JI, Walton RE, Lambert GL, Lambert C, Taintor JF, Zidell JD, et al: Preparation for endodontic therapy. In: Ingle JI, ed. Endodontics. 3rd ed. Philadelphia: Lea & Febiger, 1985, p. 54
13. Fava LRG: Root canal treatment in an unusual maxillary first molar: A case report. Int Endod J 34: 649, 2001

14. Fava LRG, Dummer PMH: Periapical radiographic techniques during diagnosis and treatment. *Int Endod J* 30: 250, 1997
15. Newton CW, McDonald S: C-Shaped canal configuration in a maxillary first molar. *J Endodon* 10: 397, 1984
16. De Moor RJG: C-Shaped root canal configuration in maxillary first molars. *Int Endod J* 35: 200, 2002
17. Sabala CL, Benenati FW, Neas BR: Bilateral root or root canal aberrations in a dental school patient population. *J Endodon* 20: 38, 1994
18. Malagnino V, Galottini L, Passariello P: Some unusual clinical cases on root anatomy of the permanent maxillary molars. *J Endodon* 23: 127, 1997
19. Pecora JD, Woefel JB, Souza Neto MD: Morphologic study of the maxillary molars. Part I: External anatomy. *Braz Dent J* 2: 45, 1991

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