IEJ
Iranian Endodontic Journal

Endodontic Management of a Two-Rooted Maxillary Central Incisor Using Cone-Beam Computed Tomography: A Case Report

Zahra Jafari [a], **Ali Kazemi** [a], **Amin Shiri Ashtiani** [a*]

[a] *Department of Endodontic, School of Dentistry, Shahed University, Tehran, Iran*

Article Type: Case Report

Received: 14 Aug 2022
Revised: 06 Sep 2022
Accepted: 19 Sep 2022
Doi: *10.22037/iej.v17i4.38466*

**Corresponding author*: Amin Shiri Ashtiani, School of Dentistry, Shahed University, No39, Italy Street, Tehran, Iran

E-mail: amin.shiri@shahed.ac.ir

Practitioners need to know the normal and complex anatomy of the root canal system of individual teeth. Maxillary central incisors almost in all cases have one root and one root canal system. This case report describes a non-surgical endodontic treatment of a double-rooted maxillary central incisor using cone-beam computed tomography (CBCT). A fourteen-year-old male with spontaneous pain of the maxillary left incisor showed the presence of an extra root on the periapical radiograph. CBCT was used to assess the root canal details that lead to finding a narrow root in the mesial of the main root. Also, a periapical bone defect was detected. Nonsurgical treatment of tooth performed. At the 3-month follow-up, the tooth was functional and the lesion was healed. Therefore, practitioners should consider the presence of extra roots and canals during root canal treatment. CBCT imaging helps in detecting the exact location of the extra root.

Keywords: Central Maxillary Incisor; Cone-Beam Computed Tomography; Root Canal Therapy; Tooth Anatomy

Introduction

For a successful endodontic treatment, it is essential for clinicians to have a thorough knowledge of root canal system [1-4]. According to the literature, almost all of the maxillary central incisors have one root and one root canal system; and only a few reports are published about presence of two independent roots [5-9]. Usually the presence of extra roots or canals in maxillary central incisors are associated with some tooth anomalies such as fusion [10], germination [7], dens invagination [11], or craniofacial abnormalities like lip and palatal cleft [12], so this anatomic variations in teeth with normal crown are uncommon [8].

Conventional intraoral periapical views are used as diagnostic imaging; however, they provide two dimensional views of three dimensional objects. It is especially important in teeth with unusual root canal anatomy [13-15]. Cone-beam computed tomography (CBCT) is an effective imaging technique for evaluation of root canal system in teeth with potential complex anatomy [14].

This article aims to report a case of two-rooted maxillary central incisor that managed by CBCT scanning as an adjunct imaging technique and nonsurgical endodontic treatment.

Case Report

A 14 year-old male referred to the Endodontic department of Shahed University, Tehran, Iran. The patient presented with spontaneous pain in left maxillary central incisor. There was no contributable medical history.

Pulp sensibility tests and radiographic examination revealed tooth #9 was necrotic with chronic apical periodontitis. The tooth had normal clinical crown and a composite restoration was detected. No developmental abnormalities could be identified. The initial periapical radiograph showed that, there was an extra root (Figure 1A). For a better survey, preoperative CBCT scan with a small field of view was performed. The CBCT scan was made using Scanora 3Dx (Soredex, Finland) with0.5 mm slice interval. Axial, sagittal and coronal sections of CBCT revealed that there was an extra root at midroot level located

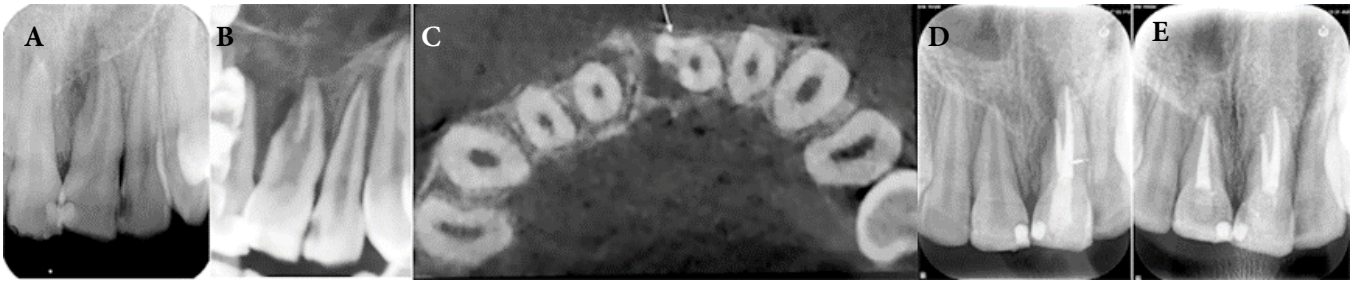

Figure 1. *A*) Preoperative radiograph; CBCT scan of tooth #9 *B*) Axial section; *C*) Coronal section; *D*) Postoperative radiograph *E*) 3-month follow-up

mesially. The supernumerary root was short, narrow and had a tight canal in comparison with the main canal (Figures 1B and 1C).

Informed consent was taken from the patient. Local anesthesia administrated, the tooth isolated with a rubber dam and the access cavity was prepared with high-speed round diamond bur No 13. One root canal orifice was located at the coronal root level. Two canals were negotiated.

The working length was determined by an electronic apex locator (Root ZX; Morita, Tokyo, Japan) and radiographically confirmed. Chemomechanical preparation of the canal including a glide path up to a size #20 stainless steel hand K-file (Mani, Tochigi, Japan) followed by Denco Super Files (Shenzhen Denco Medical Co, China) rotary files up to a size 30/0.04. Irrigant solution was 2.5 % sodium hypochlorite (Golrang, Iran) for both canals. Due to purulent discharge of extra root canal, a creamy dressing of aqueous calcium hydroxide was placed in both canals and access cavity was sealed with a temporary restoration material (Caltosol, AriaDent, Iran).

Seven days after the initial visit, the tooth was isolated; the calcium hydroxide removed by saline irrigation and root canal obturation was performed using warm vertical compaction of gutta-percha points and AH-26 sealer (Figure 1D). At the next session, root canal treatment of tooth #8 was performed and both maxillary central incisors restored with a composite restoration.

At a 3-month follow-up, the tooth was functional and asymptomatic. A periapical radiograph revealed complete healing of the periradicular radiolucency (Figure 1E).

Discussion

Adequate cleaning and shaping of root canal system is necessary for a successful root canal therapy. For achieving this goal, practitioner should be familiar with normal root canal anatomy and also consider presence of extra root canals

Based on published data, maxillary central incisors are teeth with the least anatomic variations and have one root and one root canal in almost all studies [2]. In the current case report, a double rooted maxillary central incisor was detected. Few case reports published about presence of two canals in one root [16], and two distinct roots in maxillary central incisors are rare [1, 17].

In the present case report, two canals were observed in a maxillary central incisor with a normal crown. This finding is consistent with the reports of Lambruschini [18] and Genovese [19] who reported normal crown and extra canals in maxillary central incisors. However most of the maxillary central incisors with additional canals or roots were found in teeth which have abnormal crowns [7, 10, 11].

Advanced imaging techniques are necessary for assessment of unusual tooth anatomy [14]. Limited field of view CBCT is the imaging tool of choice for surveying of teeth suspected complex root canal anatomy [15]. In this case report, we used limited field of view CBCT system to assess the details of root canal anatomy. It is in accordance with the case reports published Levin [5] and Chaniotis [20] who have utilized this imaging technique for precise evaluation of uncommon internal anatomy of maxillary central incisors.

Conclusion

In this case, additional canals in maxillary central incisor suspected in periapical radiography and two separate roots. CBCT scanning detected two separate roots and two root canals and also provided 3D analysis of root canal anatomy. Nonsurgical root canal treatment performed in two sessions and periapical radiolucency disappeared in tree month follow-up. This emphasizes the consideration of extra roots and root canals by dentists and necessity of using advanced imaging techniques in complex cases.

Conflict of Interest: 'None declared'.

References

1. Sponchiado EC, Jr., Ismail HA, Braga MR, de Carvalho FK, Simoes CA. Maxillary central incisor with two root canals: a case report. J Endod. 2006;32(10):1002-4.
2. Aznar Portoles C, Moinzadeh AT, Shemesh H. A Central incisor with 4 independent root canals: a case report. J Endod. 2015;41(11):1903-6.
3. Ahmed HM, Hashem AA. Accessory roots and root canals in human anterior teeth: a review and clinical considerations. Int Endod J. 2016;49(8):724-36.
4. Calvert G. Maxillary central incisor with type V canal morphology: case report and literature review. J Endod. 2014;40(10):1684-7.
5. Levin A, Shemesh A, Katzenell V, Gottlieb A, Ben Itzhak J, Solomonov M. Use of cone-beam computed tomography during retreatment of a 2-rooted maxillary central incisor: case report of a complex diagnosis and treatment. J Endod. 2015;41(12):2064-7.
6. Kang M, Kim E. Unusual morphology of permanent tooth related to traumatic injury: a case report. J Endod. 2014;40(10):1698-701.
7. Mahendra L, Govindarajan S, Jayanandan M, Shamsudeen SM, Kumar N, Madasamy R. Complete bilateral gemination of maxillary incisors with separate root canals. Case Rep Dent. 2014;2014:425343.
8. Matta MS. Two Rooted maxillary lateral incisor: a case report. Iran Endod J. 2012;7(4):4.
9. Gonzalez-Plata RR, Gonzalez-Plata EW. Conventional and surgical treatment of a two-rooted maxillary central incisor. J Endod. 2003;29(6):422-4.
10. Persic Bukmir R, Braut A, Brekalo Prso I. Conservative endodontic management of a fused tooth: A case report. Gerodontology. 2017;34(3):398-400.
11. Zoya A, Ali S, Alam S, Tewari RK, Mishra SK, Kumar A, Andrabi SM. Double dens invaginatus with multiple canals in a maxillary central incisor: retreatment and managing complications. J Endod. 2015;41(11):1927-32.
12. George Táccio Miranda Candeiro FLPV, Hermano Camelo Paiva, Celso Luiz Caldeira, Elaine Faga Iglecias, Giulio Gavini. Endodontic retreatment of a maxillary central incisor with two root canals in a patient with cleft lip and palate. Iran Endod J. 2019;14(3):5.
13. Chogle S, Zuaitar M, Sarkis R, Saadoun M, Mecham A, Zhao Y. The recommendation of cone-beam computed tomography and its effect on endodontic diagnosis and treatment planning. J Endod. 2020;46(2):162-8.
14. La SH, Jung DH, Kim EC, Min KS. Identification of independent middle mesial canal in mandibular first molar using cone-beam computed tomography imaging. J Endod. 2010;36(3):542-5.
15. Radiology AAoEAAoOaM. Use of cone-beam computed tomography in endodontics joint position statement of the american association of endodontists and the american academy of oral and maxillofacial radiology. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2011;111(2):4.
16. Anantanarayanan Krishnamurti NV, Suresh Nandini. Management of single-rooted maxillary central incisor with two canals: A case report. Iran Endod J. 2012;7(1):4.
17. Yavuz MS, Keles A, Ozgoz M, Ahmetoglu F. Comprehensive treatment of the infected maxillary lateral incisor with an accessory root. J Endod. 2008;34(9):1134-7.
18. Lambruschini GM, Camps J. A two-rooted maxillary central incisor with a normal clinical crown. J Endod. 1993;19(2):95-6.
19. Rao Genovese F, Marsico EM. Maxillary central incisor with two roots: a case report. J Endod. 2003;29(3):220-1.
20. Chaniotis A, Filippatos CG. The use of a novel approach for the instrumentation of a cone-beam computed tomography-discernible lateral canal in an unusual maxillary incisor: case report. J Endod. 2017;43(6):1023-7.

Please cite this paper as: Jafari Z, Kazemi A, Shiri Ashtiani A. Endodontic Management of a Two-Rooted Maxillary Central Incisor Using Cone-Beam Computed Tomography: A Case Report. Iran Endod J. 2022;17(4): 220-2. *Doi: 10.22037/iej.v17i4.38466.*