

Bilateral presence of two root canals in maxillary central incisors: A rare case study

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Abstract

Success in root canal treatment is achieved after thorough cleaning and shaping followed by complete obturation of the canal system. Therefore, endodontic therapy requires specific and complete knowledge of the internal and external dental anatomy, and its variations in presentation. The internal anatomy of the maxillary central incisor is well-known and usually presents one root canal system. This case report describes an endodontic treatment of traumatized both maxillary central incisors with two canal systems. Knowledge of dental anatomy is fundamental for proper endodontic practice. When root canal treatment is performed, the clinician should be aware that both external and internal anatomy may be abnormal.

Keywords: Bilateral presence, maxillary central incisor, two canals

Introduction

The complete biomechanical instrumentation and obturation of the root canal system are mandatory to achieve endodontic success. Thus, a broad knowledge of both the external and internal anatomy of teeth is of great importance for adequate endodontic treatment. Many anatomical studies have declared that maxillary incisors are always comprised of a single root, while variations in the number of lateral canals and/or position of apical foramen are reported.^[1] However, recently, maxillary central incisors have been reported with 1, 2, and occasionally 3 root canals. Therefore, it is important that dentists consider the existence of anatomical variations of root canal systems, and that these variations can also be found in the maxillary central incisors.

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The present case study describes an endodontic treatment of traumatized both maxillary central incisors with two canal systems and without morphological anomaly of the crown.

Case Report

A 35-year-old female patient was reported to our department with complains of pain in the upper front region of the jaw for the past 1 week. On elaborating the history trauma occurs 2 months before in upper front teeth. On examination, tender on percussion noted in tooth no. 11 and 21. Tooth no. 11 was fractured and tooth no. 21 was intact [Figure 1]. Electrical pulp test revealed delayed positive response in relation to 11 and 21. Intraoral periapical (IOPA) X-ray reveals no periapical changes in relation to 11 and 21. Furthermore, the presence of two canals was evident in all maxillary incisors [Figure 2]. Probably, our case lies under Type II canal according to both Weine and Vertucci type of classification. After the pulp vitality tests and radiographic examination, the teeth were diagnosed with Ellis Class II fracture with Apical periodontitis in 11 and Apical periodontitis in 21. Proposed treatment was endodontic treatment of 11 and 21 followed by restoration with crown. After the initial radiographic examination.

Clinical Procedure

Under local anesthesia tooth 11 and 21 was treated individually. First tooth no. 11 was treated followed by tooth no. 21 after 1 week. The tooth was isolated with a rubber dam and disinfected. The access preparation was performed with high-speed round diamond burs No. 1015 (KG-Sorensen, Barueri, SP, Brazil), under continuous irrigation with water spray. Mesial canal which is a master canal was negotiated with 15 size file (Mani files, Japan). Since the IOPA X-ray reveals the presence of second canals distally, access cavity was extended slightly distally and distal canal orifice was scouted with no. 8 size K file. The root canals were irrigated

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Quick Response Code:	Website: www.contempclindent.org
	DOI: 10.4103/0976-237X.132354

with 1% sodium hypochlorite solution. The intraoral camera picture shows the presence of two orifices mesiodistally in both central incisors [Figure 3].

After this procedure, working length was taken [Figure 4]. In tooth no. 11, working length established 24 mm in mesial canal and 19 mm in distal canal where it joins the mesial canal. In tooth no. 21, the working length established was 24 mm in mesial canal and 15 mm in distal canal where it joins the mesial canal.

Then cleaning and shaping was done by using protaper system (Dentsply), up to file number F5 for mesial canal system, and F4 for the distal canal system. Master cone fit was checked with the IOPA X-rays [Figure 5].

The right and left permanent maxillary central incisor was obturated by using F5 and F4 Gutta-percha (Dentsply) in mesial and distal canals respectively. The post-operative X-ray was taken to confirm the obturation quality [Figure 6] and access cavities were sealed with temporary material (MD-temp, Meta Biomed). One week later temporary material was replaced by light cure composite (Tetric N ceram, Ivoclar Vivadent).

Finally, both central incisors were restored with Porcelain fused to metal crowns [Figure 7]. The patient was observed

for 3 months through clinical and radiographic examination and the tooth remained asymptomatic.

Discussion

Maxillary incisors are commonly single-rooted with one canal.^[1] The description of multiple canals in these teeth is limited to case reports of anomalies known as fusion, gemination or dens invaginatus. When a maxillary incisor presents two roots or two or three root canals, conditions such as fusion, gemination, dens in dente, palatogingival or distolingual groove and some variation in the normal development of Hertwig's epithelial root sheath must be considered.^[2] Some case reports illustrated a rare case of two roots in maxillary central incisor with two roots in a normal clinical crown.^[3]

In the present case, both clinical examination and pretreatment radiograph showed no evidence of enamel or dentinal invagination, thus making dens in dente or dens invagination are unlikely causative factors. Another developmental



Figure 1: Preoperative clinical picture

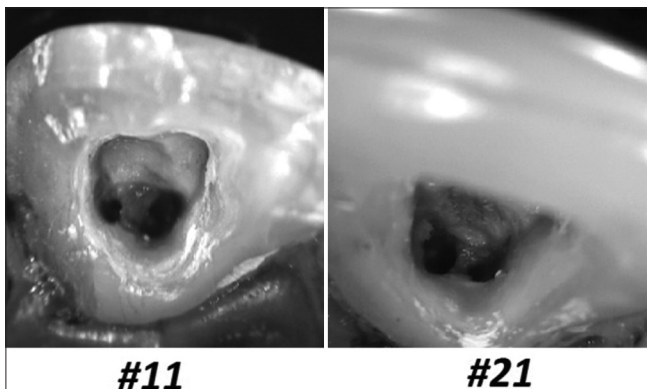


Figure 3: Intraoral camera pictures showing two orifices in both 11 and 21



Figure 2: Preoperative radiograph

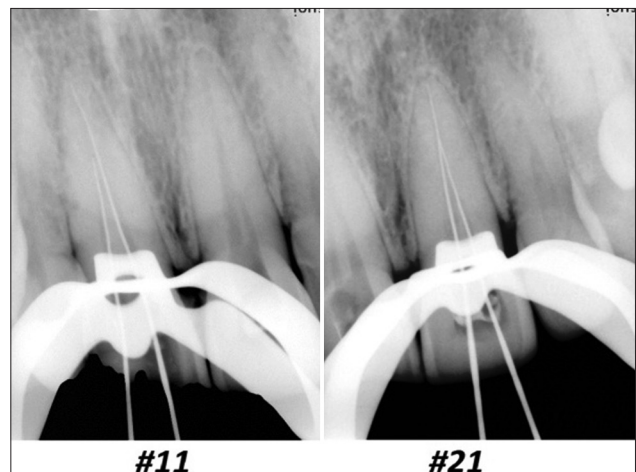


Figure 4: Working length X-rays of 11 and 21

anomaly, which may be appeared radiographically similar to this case, is palatogingival or distolingual groove, but clinical examination ruled it out.^[4]

Another case report illustrates a rare case of maxillary central incisor with two root canals, without morphological anomaly of the crown.^[5] The present report illustrates a rare case of maxillary central incisor with two root canals, also without morphological anomaly of the crown.

A correct diagnosis and evaluation should be made before treating the teeth with unusual anatomy. Radiographic examination with varying angles should be undertaken, when faced with a suspicious image. In the present clinical report, it was possible to visualize the canals through the evaluation of the pre-operative X-ray. The access cavity was extended mesiodistally to improve the visibility and the access for the endodontic instrumentation that was carried out with rotating instruments, considering the canal curvature.^[5]

Although the maxillary central incisor has one canal, clinicians need to be aware of unexpected root canal morphology when performing root canal therapy. Surgical Loupes, Endodontic endoscopes, dental operating microscopes are some of

the commercially available instruments that can help the clinicians to accomplish these goals.^[6]

Presence of two canals

In our case on careful pre-operative evaluation, IOPA X-ray shows presence of two canals in all upper incisors. In central incisors, it looks obvious from the pre-operative X-ray where two canals were located mesiodistally (mesial canal being the master canal), whereas in an intraoperative X-ray [Figure 8], it shows clearly that lateral incisor has two canals mesiodistally where distal canal being the master canal. This is a rare occurrence, which was reported only in one article previously.^[6]

Review of articles related to multiple canals in maxillary central incisor

An electronic systematic survey is made using PubMed internet website in attempt to find articles that were published from 1970 to 2010 regarding maxillary incisor and its unusual morphology. The standard search key term used was maxillary central incisor in combination

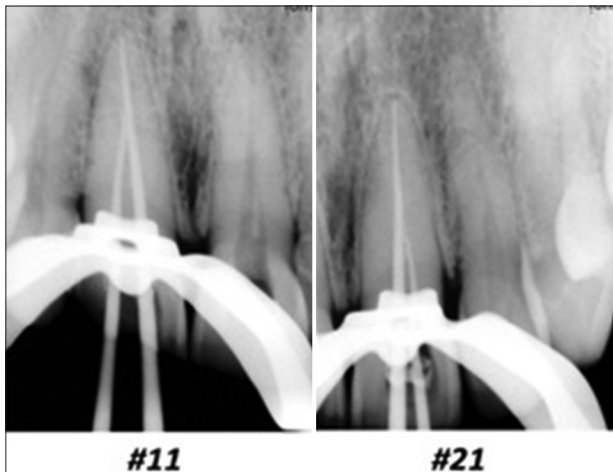


Figure 5: Master cone fit of 11 and 21



Figure 7: Postoperative Clinical picture



Figure 6: After Obturation of 11 and 21

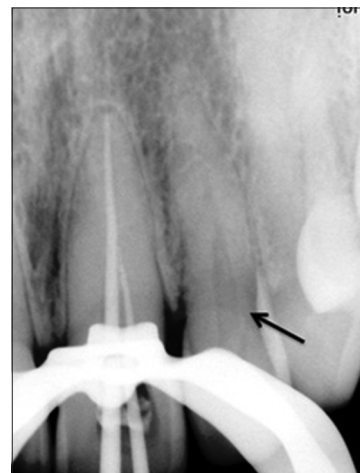


Figure 8: Intraoperative radiograph showing two canals in maxillary lateral incisor also

Table 1: Articles published so far with anatomic variations in maxillary central incisor from 1970 to 2010

Corresponding articles	Articles found with different anatomic variations	Total number of articles found
Oral Surg Oral Med Oral Pathol 1970;29:222	Two roots	13 articles with two roots
Oral Surg Oral Med Oral Pathol 1977;43:649	Two roots	
Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1980;50:99	Two roots	
J Endod 1984;10:105-6	Two roots	
J Endod 1990;16:454-5	Two roots	
J Endod 1993;19:95-6	Two roots	
J Endod 2003;29:220-1	Two roots	
J Endod 2003;29:422-4	Two roots	
Int Endod J 2003;36:380-6	Two roots	
J Dent Tehran 2005;2	Two roots	
Dent Traumatol 2008;24:e34-7	Two roots	
J Endod 2009;35:1445-7	Two roots	
Shanghai Kou Qiang Yi Xue 2010;19:671-2	Two roots	
J Endod 1989;15:161-3	2 canals	
J Endod 1991;17:469-71	2 canals	
Endod Dent Traumatol 1993;9:260-2	2 canals	
J Dent Assoc S Afr 1995;50:132-3	2 canals	
J Oral Rehabil 2001;28:797-8	2 canals	
J Endod 2002;28:480-1	2 canals	
J Endod 2006;32:1002-4	2 canals	
Int J Morphol 2009;27:827-30	2 canals	One article with three canals
J Endod 2009;35:1445-7	Three canals	
J Endod 1994;20:560-7	Four canals	
J Oral Sci 2007;49:245-7	Three canals in all incisors	One article with three canals in all maxillary incisors

Our case report had two root canals in all maxillary incisors (two maxillary central and two maxillary lateral incisors)

with two canals, three canals, multiple canals, or unusual morphology.

The list of articles published from 1970 to 2010 is enumerated in Table 1.

The total number of all articles found with unusual morphology in maxillary central incisor was expressed in terms of percentage among the variants. The result was as follows:

- Of 24 articles found
- 54% of articles published with two roots in maxillary central incisor
- 33% of articles published with two canals in maxillary central incisor
- One article present with three root canals in maxillary central incisor
- One article with 4 root canals due to dens invaginatus
- One article with three canals in all maxillary incisors.

Our case report had two root canals in all maxillary incisors of which two central incisors were endodontically treated.

Conclusion

Careful preoperative evaluation and diagnosis are essential for endodontics. The clinician should be careful that even the most routine of cases might deviate from the usual and should be always attentive to detect anatomic anomalies.

Clinical Significance

The description of multiple canals in maxillary central incisor is limited to case reports of anomalies known as fusion, gemination or dens invaginatus. Our case report illustrates a rare case of having two root canals in both maxillary central incisors, without morphological anomaly of the crown. Furthermore, our case report had two root canals in all maxillary incisors (two maxillary central and two maxillary lateral incisors).

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How to cite this article: Kavitha M, Gokul K, Ramaprabha B, Lakshmi A. Bilateral presence of two root canals in maxillary central incisors: A rare case study. *Contemp Clin Dent* 2014;5:282-6.

Source of Support: Nil. **Conflict of Interest:** None declared.