

# Nonsurgical re-treatment of a twin-rooted maxillary lateral incisor

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## Abstract

An accurate diagnosis of the anatomy of the root canal system is a prerequisite for successful endodontic treatment. Morphological variations or additional roots/root canal should always be expected. These variations should be strongly considered before starting any endodontic treatment using various diagnostic aids for better outcome therapy. Nonsurgical endodontic re-treatment of a painful twin-rooted maxillary lateral incisor tooth of a 40-year-old female was carried out due to improper diagnosis of the extra root. The clinical examination and radiographic analysis confirmed the diagnosis of previously treated/necrotic pulp and symptomatic apical periodontitis. The patient remained asymptomatic at 6-month follow-up both clinically and radiographically. The case report emphasized on the need for clinicians to be extra careful while treating such teeth and use of cone-beam computed tomography for their diagnosis and management.

**Keywords:** Cone-beam computed tomography, extraroot, maxillary incisors, morphological variations, nonsurgical retreatment

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## INTRODUCTION

Thorough mechanical and chemical cleansing of the entire pulp cavity and its complete obturation is considered the main objective of the endodontic therapy.<sup>[1,2]</sup> A tooth having canal with graceful tapering and a single apical foramen is more of an exception rather than a rule. Investigators have shown the presence of multiple foramina, deltas, accessory canals, etc., in most of the teeth.<sup>[3,4]</sup> Maxillary lateral incisors have a high incidence of pulpal anatomical variations, most common of which are the palatogingival groove,<sup>[5]</sup> dens invaginatus,<sup>[6-9]</sup> dens evaginatus,<sup>[6]</sup> fusion,<sup>[10]</sup> and gemination.<sup>[11,12]</sup>

It is important for the clinicians to consider possible anatomical variations in the number of root canals and/or roots because any failure to recognize the actual root canal configuration may result in failed treatment.<sup>[12]</sup> Maxillary incisor teeth have been reported to have a single root in almost 100% of the cases,<sup>[13]</sup> but it can have two canals,<sup>[5,14,15]</sup> three canals,<sup>[7]</sup> four canals<sup>[8]</sup> and even five canals.<sup>[9]</sup> This case reports the successful endodontic re-treatment of twin-rooted maxillary lateral incisor which was diagnosed with conventional radiography and cone-beam computed tomography (CBCT).

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## CASE REPORT

A 40-year-old healthy female patient reported with the chief complaint of pain in the right maxillary lateral incisor (#12) for 20 days. The pain was intermittent and dull in nature initially but increased in severity from the past 1 week. Dental history revealed root canal treatment done by a private practitioner 2 years back. Intraoral examination showed that #12 was discolored [Figure 1a] and painful to percussion. The periodontal examination (CP 12 periodontal probe, Hu-Friedy, Chicago, IL, USA) showed the presence of a periodontal pocket with a probing depth of 4 mm. Pulp vitality test revealed nonvitality #12.

Radiographic examination of #12 depicted unusual morphology with two separate roots, i.e., mesial and distal. The radiograph also revealed poorly obturated mesial root and a missed distal root, both associated with periapical radiolucency [Figure 1b]. The final diagnosis was made on the basis of both clinical and radiographic examinations. The involved tooth had previously treated/necrotic pulp and symptomatic apical periodontitis.

After final discussion with the patient, informed consent was obtained for nonsurgical endodontic therapy. After administration of 2 ml local anesthesia with 2% lignocaine and 1:100000 epinephrine (Xicaine, ICPA Health Products Ltd, Gujarat, India), the tooth was isolated using rubber dam (Hygienic, Coltène Whaledent Inc., Cuyahoga Falls, USA) [Figure 1c]. Restorative material was removed from the access cavity, followed by the removal of previous root filling using Protaper retreatment files (Dentsply, Maillefer, Ballaigues, Switzerland) [Figure 1d]. However, the orifice of the accessory root canal was not negotiated.

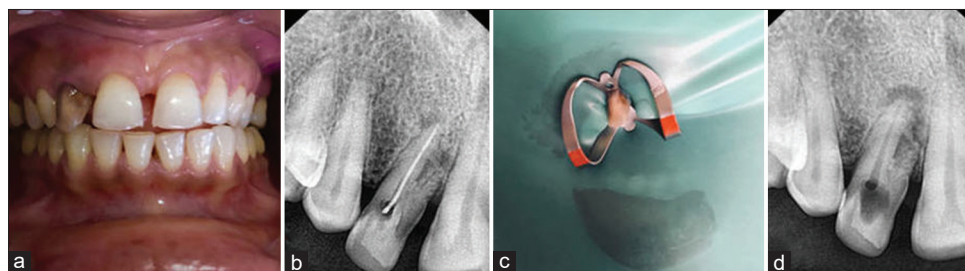
The patient was advised to have CBCT scan for better visualization of morphological variation and access the location of the orifice.

During the second appointment, the patient reported with CBCT scan which revealed an untreated root which was placed mesiopalatally, fused to the main root at the

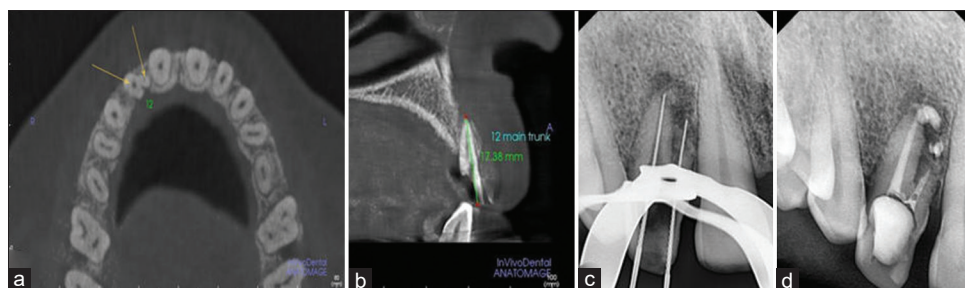
cervical level [Figure 2a and b]. The accessory root canal was negotiated with sharp endodontic explorer (DG 16, Hu-Friedy, Chicago, IL, USA) under magnification using dental loupes 3.0x (Zumax Medical, Suzhou, China). The working length was determined by electronic apex locator (Root ZX, J Morita, Tokyo, Japan) and verified radiographically [Figure 2c]. Canal preparation was done with hand k-files (Dentsply, Maillefer, Ballaigues, Switzerland) and protaper rotary Ni-Ti instruments (Dentsply, Maillefer, Ballaigues, Switzerland) along with copious irrigation using 5.25% sodium hypochlorite. An intracanal medicament of calcium hydroxide paste (Iodotin, TehnoDent, Belgorod, Severny, Russia) was placed up to the working length [Figure 2d]. The tooth was sealed with the temporary restoration (Cavit, 3M ESPE, Seefeld, Germany), and the patient was recalled after 2 weeks.

In the recall appointment, the patient was found to be asymptomatic; the tooth appeared in normal condition with no tenderness to percussion. Temporary restoration was removed, and canals were cleaned. An apical mineral trioxide aggregate (MTA ProRoot, Dentsply, Tulsa, Switzerland) plug was placed in both canals, followed by placement of moistened cotton and temporary restoration (Cavit, 3M ESPE, Seefeld, Germany). Next day, after the removal of temporary filling and cotton pellet, root canals were obturated with gutta percha (Meta Biomed Co., Chungcheongbuk-do, Korea) and AH Plus sealer (Dentsply, Maillefer, Ballaigues, Switzerland) using cold lateral compaction technique. The tooth was sealed with composite restoration (Charisma, Heraeus Kulzer, GmbH, Hanau, Germany), and a postoperative radiograph was taken [Figure 3a].

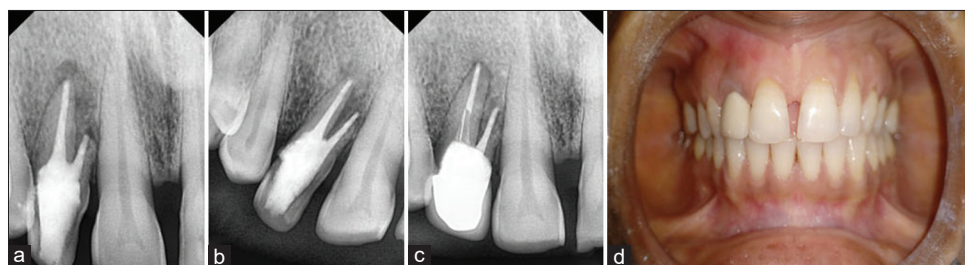
The 6-month follow-up examination of the patient revealed no clinical abnormalities, and the tooth was completely asymptomatic with no tenderness. Satisfactory healing was appreciated radiographically with the resolution of periapical lesion and moderate bone formation [Figure 3b]. During this visit, fiber post cementation (Para Post, Coltène Whaledent Inc., Cuyahoga Falls, USA) and core buildup



**Figure 1:** (a) Preoperative picture showing discolored tooth #12, (b) Preoperative radiograph showing an adequate root canal treatment #12 and presence of two separate roots, mesial and distal, (c) Isolation of tooth #12 under rubber dam, (d) Removal of old obturation material from the distal root



**Figure 2:** (a) Cone-beam computed tomography sagittal view showing two distinct roots (arrows) in tooth #12, the extra root is located somewhat mesiopalatally, (b) cone-beam computed tomography axial view showing approximate root length of the main root and accessory root of tooth #12, (c) Working length radiograph, (d) Radiograph showing intracanal calcium hydroxide dressing



**Figure 3:** (a) Radiograph taken immediately after obturation of both roots in tooth #12, (b) 6-month follow-up radiograph showing resolution of periapical radiolucency in tooth #12, (c) radiograph taken after fiber post and core done in tooth #12, (d) postoperative picture after placement of PFM crown

was done using dual-cure composite (Grandio Core, Voco, Cuxhaven GmbH, Germany) [Figure 3c], followed by placement of full-coverage porcelain fused to metal. (PFM) crown [Figure 3d].

## DISCUSSION

Thorough debridement of the canals and the hermetic seal is the key for the success of any endodontic treatment. Additional missed root canals that are not cleaned or incomplete root canal therapy might provide a nidus for bacterial growth, persistent irritation, compromising the long-term success, and lead to root canal treatment failure.<sup>[16,17]</sup> When there is the presence of two roots or two root canals in a maxillary incisor, it is important to consider conditions such as fusion,<sup>[10]</sup> gemination,<sup>[11,12]</sup> dens in dente,<sup>[6-9]</sup> and palatogingival or distolingual groove.<sup>[5]</sup> In this case, clinical examination as well as the pretreatment radiographs revealed a crown of normal size and shape when compared with the contralateral side with no evidence of enamel or dentinal invagination and palatogingival or distolingual groove. Although it is very rare to have more than one root in maxillary incisors, the presence of two separate root canals is also reported by Vertucci in 2% of the maxillary incisors.<sup>[18]</sup> In the present case report, endodontic treatment failure occurred because of a lack of knowledge of the two roots as mostly maxillary lateral incisor is associated with a single root. Due to an unknown etiology behind this variation, a

disturbance in the development of Hertwig's epithelial root sheath and consequent formation of a horizontal flap is considered.<sup>[19]</sup> The various diagnostic aids in the location of root canal orifices include obtaining multiple preoperative radiographs, an examination of the pulp chamber floor using sharp endodontic explorer, performing champagne bubble test, visualization of bleeding points, and troughing grooves with ultrasonic tips.<sup>[20]</sup> As an additional diagnostic tool, CBCT can be used in cases with complex root canal anatomy. This advanced radiographic technique is very helpful to explore the internal and external morphological variations.

In the present case, CBCT was used to know the exact location of the root canal orifice of the extra root in order to avoid excessive cutting of tooth structure, as the tooth was already compromised due to previous endodontic treatment. Three-dimensional imaging techniques such as CBCT can be useful in diagnosing teeth with unusual root canal morphology.<sup>[15]</sup> The missed canal was negotiated carefully using the information of CBCT scan and the magnification. The extra root canal orifice was located by extending the access cavity slightly toward mesiopalatal direction. Intracanal calcium hydroxide dressing was given for 2 weeks because of its known bactericidal effects, its ability to create favorable condition for periapical repair, and stimulate hard-tissue formation.<sup>[21]</sup> MTA plug was created to get perfect apical seal as some amount of apical root resorption was evident in the preoperative radiograph.



MTA provides an excellent apical seal as it expands on setting, also it has a potential for tissue regeneration and mineralization.<sup>[22]</sup> The tooth was later restored using fiber postcore and crown as it was having compromised crown structure.

## CONCLUSION

This case report explains the importance of preoperative assessment of the number of roots and canal configuration with different angulated radiographic and needs of CBCT in special circumstances. All of these are considered to be the prerequisite for successful endodontic treatment.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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