

Maxillary Central Incisor with Four Root Canals: A Rare Case Report.

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Abstract: Knowledge of dental anatomy and its variations is a pre-requisite for successful endodontic treatment. Abnormal variations in canal morphology may present a challenge to the practitioner. The occurrence of 4 canals in the maxillary central incisor is a rare finding. The presented study was a case of a maxillary central incisor with single root and 4 root canals. The case was demonstrated using radiographs and cone beam computed tomography (CBCT) scans.

Key words: Cone-beam computed tomography, dental anatomy, dental microscope, maxillary central incisor, tooth morphology

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I. Introduction

Complete debridement of root canal system followed by obturation in order to prevent the ingress of micro-organisms, is one of the important objectives of endodontic treatment [1].

Aberrant internal and external anatomy of teeth can pose a problem in achieving this objective. Therefore, it is important for clinicians to have thorough knowledge of anatomic variations in root canals and ways to clinically manage them to avoid any complications in the treatment[2].

The maxillary central incisors commonly exhibit single root with single root canal system. Vertucci reported 2 distinct root canals in 3% of maxillary central incisors [3]. Cases of dens invaginatus[4,5] and fusion or gemination, have reported variations in root canal system[6].

Present study is a clinical report which describes endodontic treatment of maxillary central incisors with single root and 4 root canals, demonstrated using radiographs and computed tomography scans.

II. Case Report

A 19-year-old female patient was referred to the Department of conservative Dentistry and Endodontics with a chief complaint of discoloration with the right maxillary central incisor.

Clinical examination revealed a discolored right maxillary central incisor, that was in normal alignment with the adjacent teeth (Figure 1). The occlusion of the patient revealed a class III incisor relation with 1mm negative overbite. There was no tenderness to percussion or palpation, no noted swelling and no sinus tract was seen. Periodontal examination revealed mobility, probing depth and gingival tone within the normal limits. Radiographic examination, revealed a central incisor with anomalous root and root canal anatomy (Figure 3,A). Presence of a single root with four canals was evident, 3 mesial and 1 distal. Cone beam computed tomography images of the patient were made to confirm the number of canals (Figure 2).

Pulp sensibility tests were negative and the tooth was diagnosed with pulp necrosis and normal periradicular tissue.

An informed consent was taken from the patient prior to the procedure. The tooth was isolated with a rubber dam and disinfected. Access cavity preparation was carried out with high-speed round diamond burs (Mani Inc. Japan) under continuous irrigation with water spray. 4 canals could be identified under the dental microscope (Moller-Wedel International, Germany). The working length was determined using an electronic apex locator (Root ZX; Morita, Tokyo, Japan) and confirmed radiographically (Figure 3,B). The root canals were irrigated with 2.5% sodium hypochlorite solution. Chemomechanical preparation was carried out with the help of Protaper Universal Rotary file system using Crown-Down technique. The distal canal was calcified and liquid EDTA (Largal Ultra Septodont Healthcare India Pvt Ltd) was used as an adjunct to negotiate the calcification. The canals were enlarged up to a file size # F2. At this point 2 of the mesial canals fused together.

Calcium hydroxide (Ultradent, South Jordan, UT) dressing was placed, the access cavity was sealed with a temporary filling material (Cavit; 3 M, St Paul, MN) and the patient was recalled after seven days (Figure 3,C).

After seven days the calcium hydroxide was rinsed off from the canal with 2.5% sodium hypochlorite, the canal was dried using paper points (Sure Dent Corporation, Korea) The tooth was obturated by using the single cone technique with AH Plus sealer (Dentsply, Rio de Janeiro, RJ, Brazil).

The access cavity was restored with the help of a composite resin material (Z250; 3 M), and postoperative radiographs were taken from varying angulations. Figure 3 (D) shows the final X-ray after root canal therapy.



Fig 1: Clinical Photograph showing normal crown anatomy.

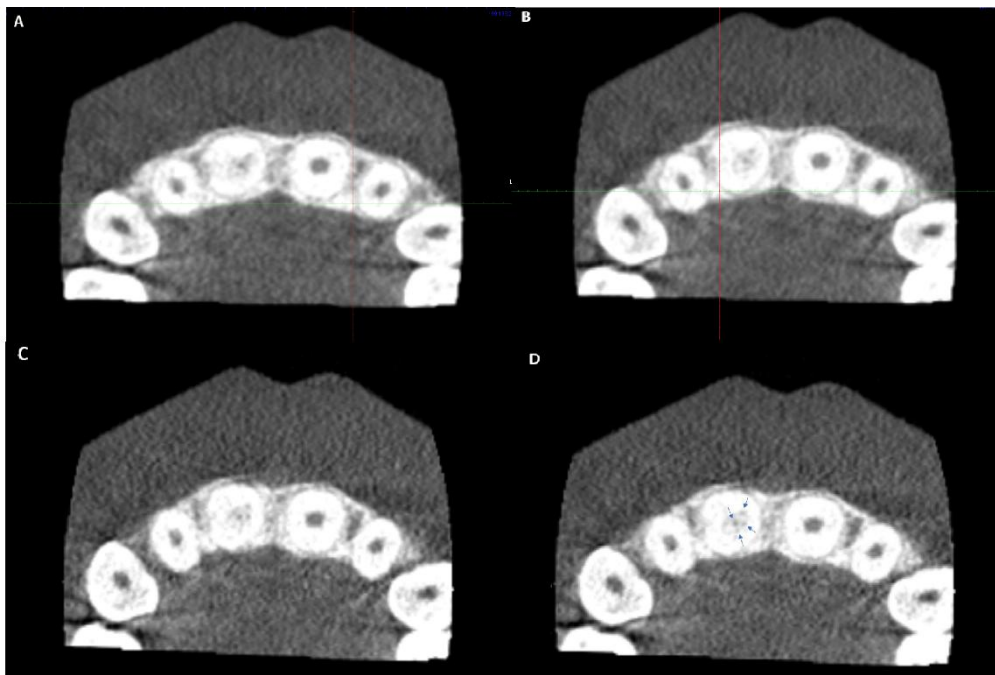


Fig 2: Cone-beam computed tomography image.



Fig 3: (A) Pre-operative radiograph, (B) Working length radiograph, (C) Placement of Calcium Hydroxide in the canals, (D) Post-operative radiograph following obturation.

III. Discussion

The present report illustrates a rare case of a maxillary central incisor showing the presence of a single root with 4 canals, without any morphological anomaly seen in the crown of the tooth. It is important for the practitioners to take into consideration anatomical variations in number and architecture of the root canal systems because literature states that, there are no limits for the morphological variability of the root canal [7]. However, it is rare to find more than one canal in maxillary central and lateral incisors.

According to a survey, it was reported that 3% of maxillary lateral incisors may have two canals [8]. The reported cases of multiple canals in these teeth are limited to those of dens invaginatus, fusion or gemination [9-13]. Hososmiet al. [14] presented a case with maxillary central incisor with 3 canals. Mangani et al. has described endodontic treatment of a maxillary central incisor which had dens invagination and four canals [13]. Gomes et al. presented a case of a maxillary central incisor having four canals [15]. Leonardo has stated that the cause of endodontic failure is due to an inability to detect, locate, negotiate, and instrument all root canals [16].

Accurate pre-operative radiographs should be taken using a parallel cone technique and the use of a dental microscope is essential. However, curvatures present in the canals may not be easily detectable by conventional radiography. Similarly, in the present case, additional diagnostic aids such as CBCT scans helped to identify and confirm the number of canals. The dental microscope also proved to be a useful adjunct as it helped in examination of the pulp chamber, including the walls and the floor and to detect additional root canals during access opening that might not be found easily.

IV. Conclusion

It is important to maintain vigilance during every stage of the endodontic procedure due to cases that may present variations in pulpal anatomy. The nonuse of different diagnostic resources as well as lack of knowledge about variations in canal configurations, may result in remnants of necrotic tissue and toxic products being left behind during endodontic procedures.

It is therefore important for each case to be inspected carefully clinically, and radiographically, prior to beginning of endodontic procedure.

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