

## CASE REPORT

# Maxillary Central Incisor with Two Root Canals

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## ABSTRACT

The success of endodontic treatment requires adequate knowledge of dental anatomy and its variations. These variations can occur in any tooth including maxillary central incisors. The aim of the study was to report the endodontic management of maxillary central incisor with two canals demonstrated radiographically. Careful evaluation of two or more radiographs, exposed at different angulations of the X-ray cone, is mandatory. This case report describes the clinical significance and the endodontic treatment of the maxillary central incisor with two root canals. The conclusions of the case report were that the success of endodontic treatment requires thorough knowledge of tooth morphology, its variations, and also the skills on the part of the operator.

**Keywords:** Anatomy, Pulp vitality, Radiographs.

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## INTRODUCTION

One of the most important objectives of endodontic treatment is to prevent or treat apical periodontitis by removing bacterial colonies and necrotic material from the root canal system.<sup>1</sup> However, the failure of endodontic treatment can be attributed to many reason, such as diagnostic error, persistence of infection, error in debridement and shaping of the root canal system, instrument fractures, poor restorations, and undetected extra roots or canals.<sup>2</sup> Thus, a thorough knowledge of both the external and internal anatomy of teeth is very important for adequate

endodontic treatment.<sup>3</sup> Numerous studies describing the internal anatomy of the teeth reported that the maxillary central incisor has one root and one canal in 100% of cases,<sup>4</sup> but recently, a few cases of two-rooted maxillary central incisor, two root canals in a single root, and variation in the anatomy of a tooth with coronal macrodontia have been reported in the literature.<sup>1,3,5,6</sup>

It is, therefore, of utmost importance that dentists be aware of the existence of anatomical variations in the root canal system. The incidence of an additional canal in the maxillary central incisor is 0.6%.<sup>7</sup> This case report describes the clinical significance and the endodontic treatment of the maxillary central incisor with two root canals.

## CASE REPORT

A 35-year-old male patient reported to the Department of Conservative Dentistry with the chief complaint of discoloration of the upper front teeth. He gave a history of trauma to the upper front teeth a year ago. Clinical examination revealed that there was discoloration present with respect to the maxillary right central incisor. The tooth was tender on percussion. Pulp vitality test using an electric pulp tester (Parkell, Farmingdale, New York, USA) showed no response suggestive of pulp necrosis. Radiographic examination revealed periapical changes, obliteration of canal space, and periodontal ligament widening, and in the next radiograph taken at a different angulation, a faint radiolucent line was also observed in the central incisor in addition to the main canal on the radiograph. Therefore, the presence of an extra canal was suspected (Fig. 1). Based on the clinical and radiographic findings, the diagnosis of pulpal necrosis was made, and the patient was advised to undergo root canal treatment. After obtaining the patient's consent, root canal treatment was initiated. The tooth access opening was started, and access was gained to the pulp chamber with high-speed round diamond bur. The main canal was located, and the access was modified to locate the additional canal. The canals were negotiated with a no. 10 K file. Coronal shaping was carried out using Gates Glidden drills #2, #3 (Dentsply, Ballaigues, Switzerland) by crown down technique, along with copious irrigation with 2.5% sodium hypochlorite solution. The canals were explored, and working length was calculated using an electronic apex locator (Root ZX; J Morita, Tokyo, Japan) as well as using the radiographic method (Fig. 2). The chemomechanical preparation was carried

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Fig. 1: Preoperative radiograph



Fig. 2: Working length radiograph



Fig. 3: Master cone radiograph



Fig. 4: Postobturation radiograph

out by the crown down technique using rotary protaper instruments (Dentsply, Ballaigues, Switzerland) under continuous irrigation with 2.5% sodium hypochlorite, 17% ethylenediaminetetraacetic acid (Prime Dental Products Pvt. Ltd, India), and saline. Both the canals were cleaned and shaped with nickel–titanium rotary protaper instruments, and a master cone radiograph was taken (Fig. 3). The canals were dried with paper points, and the root canals were obturated by lateral condensation using a resin-based endodontic sealer (AH plus™; Dentsply) and postobturation radiograph was taken (Fig. 4).

## DISCUSSION

As per descriptions given in most of the endodontic and dental anatomy texts, human maxillary central incisors usually have single root and single canal.<sup>4,8-10</sup> Only a few cases reported additional canals in the maxillary central incisor.<sup>3</sup> An accurate diagnosis before proceeding for the treatment is essential in these cases. Therefore, radiographic examination with at least two different angles had to be taken.

Vertucci<sup>11</sup> reported that a considerable number of failures could be assigned to the anatomical variations, such as the presence of unusual root canals. Variations in the anatomy of the root canal may be associated with coronal aberrations, such as talon cusp fusion, or germination, dens invaginatus, even with a clinically normal crown.

In the present case, it was possible to visualize the canals by taking two radiographs at different angles. This is, however, dependent on the amount of separation between the canals and is reported to lie between 20° and 40°.<sup>12</sup> The access was modified to improve visibility, and endodontic instrumentation was carried out with rotary NiTi instruments, considering the canal curvature. Carrying out coronal flaring before proceeding to the apical regions of the root canal system removed majority of bacteria and also prevented their inoculation into the periapical tissues.<sup>13</sup>

## CONCLUSION

One of the main objectives of endodontic treatment is the elimination of infections from the root canal system and prevention of its reinfection. A clear understanding

of root canal morphology of human dentition along with precise radiographic technique (preferably advanced radiographic technique, if available) is a prerequisite for conventional endodontic procedures. Therefore, the success of endodontic treatment requires a thorough knowledge of tooth morphology, its variations, and also the skills on the part of the operator.

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