



A CASE SERIES OF UNUSUAL ROOT CANAL MORPHOLOGY

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ABSTRACT

Aim: The thorough knowledge of tooth morphology and its variations is essential for successful endodontic treatment.

Case report: This article reports an unusual root canal configuration that was detected in a maxillary central incisor with two root canals, mandibular canine with two canals and mandibular canine with two roots and root canals.

Conclusions: These case reports increase the awareness of clinicians on variations in the root canal anatomy so that complete disinfection and obturation of the root canal system is possible.

KEYWORDS: dental anatomy, root canal, maxillary central incisor, mandibular canine

INTRODUCTION

Identification of anatomic variations in the root canal system is a major challenge in the endodontic treatment. Successful endodontic treatment requires exploration of variations in root canal anatomy, complete disinfection and obturation. Thus, it is necessary for the clinician to have a thorough knowledge of not only the dental anatomy but also its variations.

Usually one root and one root canal is present in maxillary central incisor. Some case reports described

maxillary anterior teeth with two canals in one or two separated roots. The incidence of two canals in maxillary central incisor is extremely rare with 0.6-1%¹. In mandibular anterior teeth the incidence of two or three root canals has been reported as low as 1% and as high as 43%. Mandibular canines are reported in most cases with one root and one root canal.²

The following case reports describes the successful endodontic treatment of rare morphological variations as maxillary central incisors with two canals, mandibular canine with two canals and mandibular canine with

two roots and two root canals.

CASE REPORT

CASE #1

A 28 year old male patient was referred to the postgraduate department of conservative dentistry and endodontics with complaint of pain in upper front jaw region since one week. There was a history of road traffic accident two months back. There was no history of significant medical illness. On clinical examination both the maxillary central incisors were fractured (Figure 1)

and electric pulp testing (Digitest) showed delayed positive response.

Figure 1. Central incisor fractured.



The preoperative radiographs (Figure 2) with different angulations revealed the presence of extracanal in relation to 21 with signs of external resorption. On the basis of clinical and radiographic examination it was diagnosed as Ellis class II fracture with apical periodontitis in relation to 11 and 21. Endodontic treatment was planned for both incisors. After giving local anaesthesia, access cavity was prepared under rubber dam isolation and main canal was located. Modification in access cavity was made to locate the extra canal.

Figure 2. Preoperative radiograph.



The working length was determined (Figure 3) and chemomechanical preparation done by step back technique using K file (Mani) system up to 50 master apical file. Three percent Sodium hypochlorite (Vip) and 17 % ethylene diamine tetraacetic acid (Endoprep RC) was used for root canal irrigation and sodium hypochlorite was used as the final irrigant. The obturation of 21 was done with mineral trioxide aggregate (MTA Angelus) and that of 11 was done with gutta-perchaby lateral condensation method (Figure 4). The patient was observed for three months and tooth remained asymptomatic.

Figure 3. The working length.



Figure 4. Lateral condensation method.



CASE #2

A 23 year old female patient was referred to our post graduate department with complaint of pain in relation to lower left front tooth region. There was no relevant medical history. Radiographic examination revealed coronal radiolucency involving pulp and also the presence of an extra canal branching from the main canal in relation to 33 (Figure 5).

Figure 5. Coronal radiolucency involving pulp and the presence of an extra canal.



After giving local anaesthesia, access cavity was prepared under rubber dam isolation and exploration of additional canal was done after locating the main canal. The working length was determined by placing no. 20 H file (Mani) in the main canal and no. 20 K file (Mani) in the additional canal (Figure 6). It was found that both canals joined in the apical third of the root. The canals were cleaned and shaped and master apical file was protaper F3 rotary file (Dentsply). Three percent sodium hypochlorite (Vip) and 17 % ethylene diamine tetraacetic acid (Endoprep RC) was used for root canal disinfection. The canals were dried and obturated with

protaper gutta-percha (Diadent) using AH PLUS sealer (Dentsply) (Figure 7). The patient was recalled after one week and post endodontic restoration was done. The one month follow up showed asymptomatic tooth.

Figure 6. The working length.



Figure 7. Final radiograph.

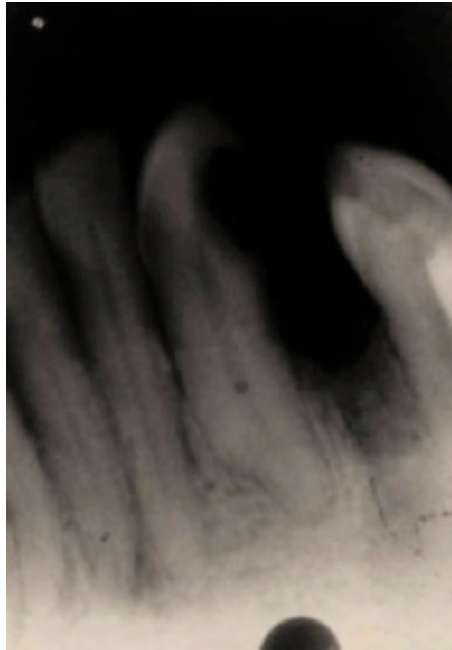


CASE #3

A 38 year old female patient was referred from department of prosthodontics for endodontic treatment of mandibular left canine before the prosthetic rehabilitation of missing

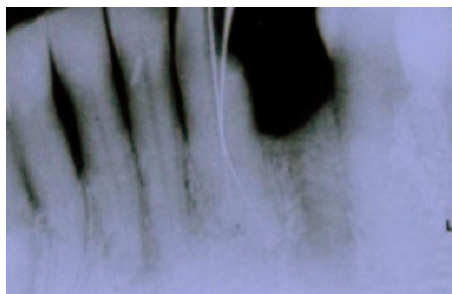
mandibular left first premolar. On clinical examination deep dental caries with pulp exposure was found and preoperative radiograph revealed coronal radiolucency involving pulp and presence of two roots (Figure 8).

Figure 8. Coronal radiolucency involving pulp and presence of two roots.



Any unusual medical histories were not revealed. The diagnosis was chronic apical periodontitis in relation to 33. After local anaesthesia administration, access cavity was prepared under rubber dam isolation and working length was determined (Figure 9).

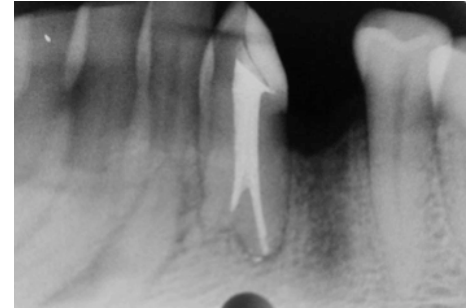
Figure 9. The working length.



Cleaning and shaping was done using protaper rotary files (Dentsply) and protaper F2 was the master apical file.

Three percent sodium hypochlorite (Vip) and 17 % EDTA (Endoprep RC) was used as root canal irrigants. The tooth was obturated with protaper gutta-percha using AH PLUS sealer (Dentsply) (Figure 10). After post endodontic restoration patient was referred back to department of prosthodontics.

Figure 10. Final radiograph.



DISCUSSION

The unusual root canal morphology in most of the cases is associated with developmental anomalies as fusion, gemination, dens in dente, palatogingival groove and variations in normal development of Hertwig's epithelial root sheath³. A rare case report of maxillary central incisor with two roots in a normal clinical crown have been illustrated in literature¹³. Here the cases are not associated with any developmental anomalies. Reid et al.¹⁴ reported 2 cases of maxillary permanent incisors with 2 root canals in a single root¹⁴. Another case report illustrates a rare case of maxillary central incisor with three root canals, without morphological anomaly of the crown¹⁵.

Even though maxillary central incisor has one canal, clinicians should expect varied root canal morphology when performing root canal therapy. Since the first case presented with external root resorption, MTA obturation was done. External root resorption is a pathologic condition caused by several

etiological factors. In the presence of bacteria and their by products, the inflammatory response is exacerbated inside the root canal system⁴. The resorption process may continue and will lead to rapid tooth loss.⁵

Mineral trioxide aggregate (MTA) can be considered as a reliable material due to its biocompatibility and good sealing property. It enhances the regeneration of periradicular tissues such as periodontal ligament bone and cementum^{6,7}. Various alternatives to gutta-percha are used nowadays to provide greater coronal and apical seal and thus protection from bacterial contamination⁸. Development of new bioactive material such as MTA makes possible other therapeutic approaches including the obturation of root canal space in complex cases of pathologic root resorption⁵.

Single root with two canals in mandibular canines was observed by many authors. However, the presence of two roots in mandibular canines is rarely observed. Green⁹ observed two canals in a single root in 13 out of 100 mandibular canines examined. The occurrence of mandibular canine with two roots and two canals was described by Quellet¹⁰ in only 5% of all analyzed teeth. Laurichesse et al.¹¹ described the second root of mandibular canines in only 1% of cases. D'Arcangelo et al.¹² reported two cases of root canal treatment of mandibular canines with two roots.

The initial radiograph is extremely important because it allows for the identification of multiple roots, root canals and anatomical variations. Radiographs in different angulations reveal the aberrations in root canal anatomy. Hence additional radiographs should be taken for confirmation of varied canal anatomy.

CONCLUSIONS

These case reports increase the awareness of clinicians on variations in the root canal morphology of anterior teeth. Clinicians should be aware of anatomical variations in the teeth they are managing, and should consider the possibility of varied canal systems. Even though the most common anatomy of mandibular canine is with single root and root canal, clinicians should expect a chance of second root canal in teeth with either one or two roots. These case reports also enhance the importance of careful preoperative evaluation.

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