Mandibular First Molar with Vertucci Type I Canal Configuration diagnosed with the Help of Cone Beam Computed Tomography: A Rare Case Report

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ABSTRACT

The knowledge of root canal morphology and the existing anatomical variations is essential for successful endodontic therapy. This report presents an extraordinary case of unusual tooth morphology involving the mandibular first molar with a single root and a single canal in a patient. Endodontic treatment of the affected tooth 36 was performed. Cone beam computed tomography (CBCT) images confirmed our diagnostic and therapeutic measures after endodontic management of the teeth. This morphologic variation has been reported once in the literature. The availability of three-dimensional images further provided the opportunity for the precise description of the anatomy of mandibular first molar with single roots and single canals.

Keywords: Morphology, Diagnostic, Therapeutic, Single canal, CBCT, Vertucci.

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INTRODUCTION

The success of root canal therapy depends on the locations of all the canals, thorough debridement and proper sealing. Together with diagnosis and knowledge of common root canal morphology and its variation is a basic requirement for endodontic success. Unusual anatomical and morphologic variations such as the existence of additional supernumerary roots and root canals are remarkable features that have been described in several studies in maxillary and mandibular molars.

The mandibular first molar is one of the commonly encountered teeth for endodontic treatment. Mandibular 1st molar usually have 2 roots (mesial and distal) with 2 canals in mesial and 1 in distal. But rarely, it can have fused roots and fused canals. This case report has a mandibular first molar with single root and single canal. Only 0.3% Asian population has one root (de Souza et al). So, single root canal (Vertucci type I) is rarest.

The root canal configuration was assessed and recorded according to the classification of Vertucci et al (Fig. 1) (1984) as follows:

Type I: A root canal extending from the pulp chamber to the apex.

Type II: Separate root canals leaving the pulp chamber and joining short of the apex to form one canal.

Type III: One root canal leaving the pulp chamber before dividing into two canals within the root and then merging to exit as one canal.

Type IV: Two separate root canals extending from the pulp chamber to the apex.

Type V: One root canal leaving the pulp chamber and dividing short of the apex into two separate and distinct root canals with separate apical foramina.

Type VI: Two separate root canals leaving the pulp chamber, merging in the body of the root, and again dividing short of the root apex to exit as two separate and distinct canals.

Type VII: One root canal leaving the pulp chamber, dividing and rejoining within the body of the root canal and finally re-dividing into two distinct canals short of the apex.

Type VIII: Three separate and distinct root canals extending from the pulp chamber to the apex.

Conventional intraoral periapical radiographs have been declared as the most common and important diagnostic tool for the assessment of the root and root canal morphology in clinical practice. However, they are not completely reliable because of their inherent limitations such as the lack of three-dimensional imaging.
The application of cone beam computed tomography (CBCT) for the preoperative assessment of unusual root canal morphology has been highlighted, aiding the correct endodontic management of complicated and challenging cases. The configuration of root canal diagnosed with CBCT is helpful for successful endodontic treatment.

**CASE REPORT**

A general dentist referred a 27-year-old male to the Department of Endodontics, Government Dental College, Jaipur. The dentist had started endodontic treatment in tooth number 36. The patient had a continuous complain of pain and sensitivity in that tooth. Clinical examination (Fig. 2) revealed his lower left first molar having temporary restoration and the tooth responded positively on percussion. A preoperative intraoral periapical radiograph (Fig. 3) demonstrated pulp exposure in relation to lower left back tooth region with no radiolucent lesion present at apex of root of mandibular first molar. Radiograph also revealed single root with single canal present in the tooth. Further confirmation of the single root with single root canal was done with CBCT (Fig. 4) of the tooth.

The right inferior alveolar nerve was anesthetized using 2% Lignocaine with 1:80,000 adrenaline (Lignox, Indoco Remedies Ltd, India). The tooth was isolated using a rubber dam and an endodontic access cavity was established (Fig. 5). Clinical examination revealed single large canal in the center of the tooth. The canal were explored with a #15 K-file (Mani, Inc; Tochigi, Japan). Cleaning and shaping (Figs 6 and 7) was performed using a step back preparation. Under abundant irrigation with 3% sodium hypochlorite solution and EDTA (Glyde, Maillefer, Dentsply, Ballaigues, Switzerland). The root canals were dried with paper points (Maillefer, Dentsply, Ballaigues, Switzerland) and obturated with cold laterally condensed gutta-percha (Maillefer, Dentsply, Ballaigues, Switzerland) and zinc oxide eugenol sealer (Fig. 8) (Dental products of India Ltd).

**DISCUSSION**

A thorough knowledge of root canal morphology and the configuration of the teeth plays an important role in the success of endodontic therapy. In this case report, the endodontic treatment of a mandibular first molar with a single root and a single canal is also reported. Despite the comprehensive literature review that was performed by our research group, we find only one study. This is the second study describing the incidence and the endodontic management of a mandibular first molar with a single root and a single canal.

Cone beam computed tomography was developed in 1988 to produce geometrically accurate 3 dimensional scans of the maxillofacial skeleton at a considerably lower radiation dose than conventional CT. The image quality...
Fig. 4: Cone beam computed tomography images of the patient confirming the diagnosis of single canal in the left first molar.

Fig. 5: Access cavity of the first molar with single root canal orifice.

Fig. 6: Working length radiograph.

Fig. 7: Master cone radiograph.

Fig. 8: Postoperative radiograph (after obturation).
of CBCT scans is superior to helical CT for the assessment of cancellous bone, periodontal ligament, lamina dura, enamel, dentin and pulp.\textsuperscript{17}

In our case report, the CBCT assisted in the confirmation of initial diagnosis of single root with single canal and helped in accomplishing the treatment successfully.

**CONCLUSION**

This report presents an extraordinary case of an unusual tooth morphology involving the mandibular first molar with a single root and root canal in a patient. The necessity of the precise knowledge of root canal morphology and its variation is a must for successful endodontic treatment. CBCT examination is an excellent diagnostic tool when information from conventional imaging systems does not yield an adequate amount of data to allow appropriate management of an endodontic problem.

**REFERENCES**