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CASE REPORT

Maxillary Second Molar with Two Fused Roots and a Single Canal Confined with CBCT: A Rare Case Report

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ABSTRACT:

Root canal treatment of maxillary molars presenting with complex root canal configurations can be diagnostically challenging. The present case describes the endodontic management of a maxillary second molar with two fused roots and a single canal. The clinical detection of the single canal was made using a peri-apical radiograph & confirmed using cone beam computed tomography scanning. The aim of this publication was to present a case report about the management of maxillary second molar with two fused roots and a single canal confined with CBCT.

Key words: Fused Roots, maxillary second molar.

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INTRODUCTION

The success of nonsurgical root canal treatment is dependent on a thorough knowledge of the external root and internal root canal morphology and to locate all root canals and properly clean, shape, and obturate the root canal space in three dimensions.¹ Stress occur if clinician cannot locate the root canal, it cannot be properly cleaned, shaped, filled and sealed. Insufficient knowledge of the anatomy of the teeth is one of the main reasons for failure of root canal therapy.² Root canal morphology has been classified using different ways by several investigators in the literature.³

Maxillary second molar usually has three root canals of which two are on the buccal side and correspond with its roots, and palatal canal which also corresponds with this root. Cases of maxillary second molar with two palatal roots, four roots, three buccal roots and five roots have been previously reported in literature. Variations have also

been reported in the form of fewer or lesser number of canals.⁴

Conventional radiographs are routinely used to assess root canal anatomy, but these radiographs are only a two dimensional image of a three dimensional object resulting in superimposition of images. Recently developed diagnostic aids like cone beam computed tomography (CBCT) for the assessment of unusual root canal morphology aids in the correct endodontic management of complex and challenging cases.⁵ The CBCT scanning has been used to study tooth anatomy since 1990, it is a diagnostic modality that provides high-quality, high-resolution, and accurate three-dimensional visualization.⁶

The purpose of the present article is to report the endodontic management of a maxillary second molar with a two fused roots i.e. buccal & palatal root and a single canal confirmed with the aid of CBCT examination & conventional intraoral peri-apical radiographs.

CASE REPORT

A 18 year old male patient came to the Department of Conservative Dentistry and Endodontics, K.D. Dental College & hospital, Mathura, Uttar Pradesh, India, with the chief complaint of spontaneous pain in right upper back region of the mouth since 1-2 months.

History revealed intermittent pain in the same region with hot & cold stimuli & on mastication for the past 1 month. The patient’s medical history was noncontributory. A clinical examination revealed a carious maxillary right second molar, and was tender to percussion. The tooth was not mobile and periodontal probing around the tooth was within physiological limits. Vitality testing was carried out with heated gutta-percha stick and cold test by endofrost (coltene) caused an intense lingering pain, whereas electronic pulp stimulation (parkel electronics division, farmingdale) caused a premature response.

A preoperative intraoral peri-apical radiograph revealed a coronal mesio occlusal radiolucency approaching the pulp space [Figure 1]. The periapical region of the radiograph revealed the widening of periodontal ligament space. From the clinical and radiographic findings, a diagnosis of symptomatic irreversible pulpitis was made and endodontic treatment was suggested to the patient.

The tooth was anesthetized with 1.8 mL, 2% lignocaine containing 1:200,000 epinephrines (lignox 2%, Indocoremedies ltd, India) followed by rubber dam isolation. On access opening, a single wide canal was located at the center of the pulpal floor.

The working length was determined with the help of an apex locator (Root ZX; Morita, Tokyo, Japan) and later confirmed using an IOPA radiograph. [Figure 2]. To confirm this unusual morphology, it was decided to perform CBCT imaging of the tooth. An informed consent was obtained from the patient, and a multislice CBCT scan of the maxilla was performed at 3D imaging center, Agra, India. The involved tooth was focused, and the morphology was obtained in transverse, axial, and sagittal sections of 0.5mm thickness. CBCT scan slices also confirmed a fused buccal & palatal roots and a single canal with single portal of exit i.e. Vertucci type 1 [Figure 3a, 3b, 3c]

Cleaning and shaping was done using step back technique with ISO hand files till ISO 60no.K file M- access (dentsply maillefer, Switzerland). Irrigation was performed using normal saline, 3% sodium hypochlorite solution, with 17% ethylene-diamine-tetra-acetic acid being used as the final irrigant & master cone radiograph was taken to confirm the biomechanical preparation [figure 4]. The canal was dried with absorbent paper point (dentsply maillefer, Switzerland), and obturation was performed using sectional & thermoplasticized obturation technique. Sectional obturation was done by 60/0.02% guttapercha (dentsply maillefer, Switzerland). Middle & coronal third of root canal was obturated by thermoplasticized guttapercha (calamus dual system by dentsply Sirona, USA). Post endodontic restoration was done by type 2 glass ionomer

cement (Gc Gold Label 2 Glass Ionomer, japan) A postoperative radiograph was taken [figure 5]. Porcelain fused metal Crown was placed after 1 month. Follow up was done after six months [Figure 6].



Figure: 1



Figure: 2

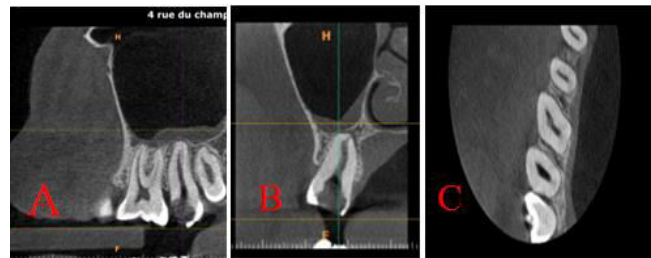


Figure 3(A): Sagittal View, Figure 3(B): Transverse View, Figure 3(C): Axial View Confirming Two Fused Roots with a Single Canal



Figure: 4



Figure: 5



Figure: 6

DISCUSSION

Morphologic variations such as the existence of maxillary second molars with fused roots and a single system occur less frequently. A literature search revealed the incidence to be 0.5-3.1%^{7,8} in the various *in vivo* studies, but **Carlsen et al.** in an *in vitro* study from Denmark population reported the incidence of 30.4%.⁹ Recently, study of root and canal morphology of maxillary second molars in an Indian population revealed 0.9% of teeth with single roots but none with single root canal.¹⁰

Common iatrogenic access opening errors generally occurs while searching for missed canals. These errors include perforations and excessive tooth removal. Such iatrogenic errors can be minimized if the clinician has the knowledge of the general location and dimensions of the pulp chamber. Clinician should be aware of the variations in root canal anatomy. The varying morphology of the root canals is normally ascertained with radiographs of different angulations or careful examination of the floor of the pulp chamber. This gives us a clue to the type of canal configuration present. This case report is one such case wherein we suspected missed canal initially but ended finding only one single canal (Vertucci type 1)

Usually canal variations in such cases occur bilaterally. Fava et al. reported the bilateral existence of 4 second molars with single roots and single canals in a patient using radiographs, but no endodontic treatment was performed¹¹. Ioannidis et al. reported the existence of 7 maxillary and mandibular molars with single roots and single canals using

CBCT¹² but in our case contra-lateral side second molar revealed 2 roots.

CBCT produces geometrically accurate 3-dimensional scans of the maxillofacial skeleton at a considerably lower radiation dose than conventional CT.¹³ CBCT technology aids in the diagnosis of endodontic pathosis, assessing root and alveolar fractures, analysis of resorptive lesions, identification of pathosis of non-endodontic origin, and pre-surgical assessment before root end surgery¹⁴. In our case, the axial planes at the coronal third [Figure 5a] displayed a single, wide but gradually decreasing, oval shaped canal with a large buccolingual diameter and a small mesiodistal diameter in the middle [Figure 5b] and the apical third [Figure 5c]. The coronal sections and the sagittal sections exhibited a two fused roots with a single canal.

CONCLUSION

The present case report emphasis on the importance of thorough knowledge of root canal morphology & the endodontic management of a maxillary second molar with a two fused roots with a single canal (Vertucci type 1) confined with the help of CBCT.

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