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Case Report

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Endodontic management of rare morphological variation in root anatomy of Mandibular first molar and Maxillary second molar: A case report

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Abstract

Thorough knowledge of root canal system is of utmost importance for a successful endodontic therapy and its prognosis. Supernumerary roots are often present, but for many reasons they are missed while negotiation, which is an important factor leading to a failed endodontic treatment. Hence, clinical examination of pulpal floor and location of canal orifices at unusual position suggests a morphological variation in the roots of the tooth. Taking intraoral radiographs from different angulations can give tentative diagnosis of an extra root. However, diagnostic tool like Cone- beam computed tomography (CBCT) can give accurate diagnosis and provide details of root canal anatomy. Clinician's knowledge and skills play an important factor in detection of these supernumerary roots and success of an endodontic therapy. This article reports endodontic management of Mandibular first molar and Maxillary second molar with unusual root canal anatomy. The morphological variations were confirmed with the help of CBCT and successful endodontic therapy was carried out.

Keywords: Radix Entomolaris, Three rooted Mandibular First molar, Four rooted Maxillary second molar, Cone beam Computed tomography.

INTRODUCTION

Variations in crown and root morphology are acknowledgeable characteristics of multi-rooted teeth. Thorough knowledge of root canal system is essential for success of endodontic therapy [1]. Prevalence of supernumerary root in multi-rooted teeth is a rare phenomenon. These supernumerary roots often go unnegotiated which is a reason for failed root canal therapy. The radicular anatomy of Maxillary second molar generally comprises of separate three roots and three canals. Presence of four separate roots and four separate canals in Maxillary second molar (MSM) is very rare and has prevalence rate of less than 1% [2]. Similarly, mandibular first molar commonly comprises of two roots and three canals [3]. Three roots variation in mandibular first molar have a prevalence rate of 5% [4]. These variations can be detected when intraoral radiographs are taken from different angulations. Diagnostic tool such as Cone beam computed tomography (CBCT) plays a major role in diagnosis of supernumerary roots [5]. This article describes two cases of endodontic management of rare morphological variation in root anatomy of Mandibular first molar and Maxillary second molar.

CASE REPORT 1

A female patient reported in dental OPD of BARC & Hospital with complaint of flattening of teeth with sensitivity and pain. On clinical examination, patient dentition showed generalized attrition of teeth with reduced vertical dimension. Patient was planned for full mouth rehabilitation alongwith endodontic therapy for full dentition. She was scheduled for root canal treatment of carious right mandibular first molar (Figure 1a) under local anaesthesia (Lignospan 2%, Septodont). Access opening and de-roofing of the pulp chamber was done using round end tapered fissured diamond bur. With the help of endodontic explorer, pulpal floor was explored and orifices were located. The distolingual orifice was found to be located at an eccentric position (Figure 1b). To interpret the proper radicular anatomy, intraoral radiographs were taken with different angulations and found that radix entomolaris is present in the tooth which was later confirmed

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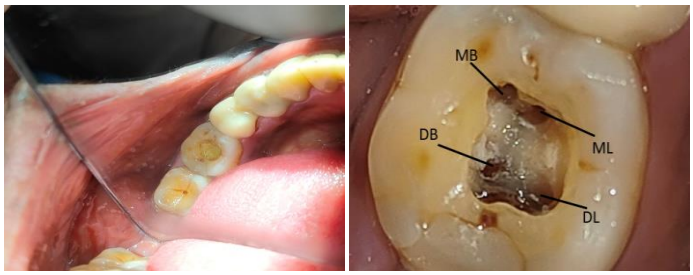
using CBCT (Veraviewpocs 3D R100, J Morita). The canals were negotiated using 10 no k-file (Figure 1c) and working length was measured using apex locator. For shaping of canals, Heroshaper endodotic system (Micro-Mega) was used and finishing was done with 4% red Heroshaper file. For irrigation and disinfection of canals 5.25% sodium hypochlorite with EDTA (Canal +, Septodont) and 2% Chlrohexidine (Hexidine) solution was used alternating with normal saline. The canals were dried and sealed with 4% red gutta percha using Adseal (Meta Biomed) as sealer by lateral cold condensation method (Figure 1d). The post obturation restoration was done with composite resin.



a: Carious Right Mandibular

b: Root Canal Orifices

c: Root Canals Negotiated

d: Obturation of Root Canals

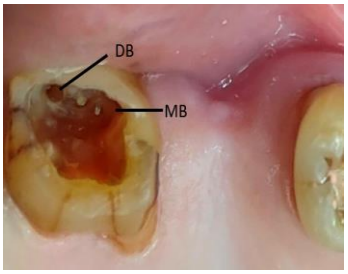
Figure 1: Images and Radiographs Right Mandibular First Molar

CASE REPORT 2

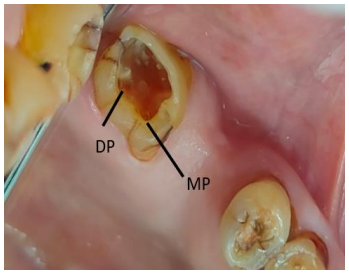
A male patient reported in dental OPD with chief complaint of missing upper left first molar. Patient had history of chronic tobacco chewing and his dentition showed generalized attrition. The implant placement has been deferred due to presence of heavy occlusal forces. Hence, it was planned to replace missing tooth with fixed prosthesis using left maxillary second premolar and left maxillary second molar as abutments. The maxillary second molar had a large composite restoration with mild tenderness (Figure 2a). Root canal treatment was planned for both the abutments. Local anaesthesia (Lignospan 2%, Septodont) was administered and access cavity was prepared. Pulp chamber was deroofed using round end tapered fissure diamond bur. Four orifices were found and the opening of orifices showed unusal location (Figure 2b and 2c). An intraoral radiograph was taken with 10 no file (Figure 2 d) and it was found out that there are four canals. CBCT (Veraviewpocs 3D R100, J Morita) was taken to confirm the diagnosis. CBCT show an extra palatal root.

After taking the working length radio-graphically, cleaning and shaping of the canals was accomplished using Heroshaper endodontic system (Micro-Mega) and final preparation was done using 4 % red Heroshaper file. The canals were irrigated with 5.25 % sodium hypochlorite, 2 % Chlorhexdine and normal saline. The canals were dried with absorbent paper followed by lateral cold compaction with 4 % red gutta percha using Adseal (Meta Biomed) sealer (Figure 2e). Finally the access cavity was restored with composite resin.

a: Large Composite Restoration in Maxillary Second Molar

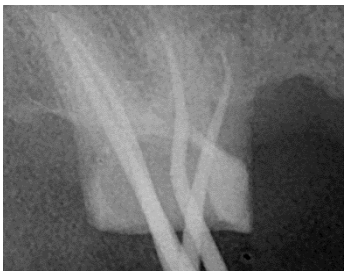


b: Mesiobuccal and Distobuccal Orifices



c: Mesiopalatal and Distopalatal Orifices

d: Root Canals Negotiated



e: Obturation of Root Canals

Figure 2: Images and Radiographs Left Maxillary Second Molar

DISCUSSION

Variation in root canal anatomy possesses a great challenge for dentist in diagnosing and management of tooth. Clinician must have detailed knowledge of root canal anatomy for successful endodontic therapy.

Prevalence of supernumerary roots in Mandibular molar and Maxillary second molar

Mandibular molars

Supernumerary roots often known as Radix Entomolaris in mandibular molars were first reported by Carabelli. Supernumerary roots in mandibular molars are most commonly found in mandibular first molar and least commonly in mandibular second molar. The occurrence of Radix Entomolaris in mandibular molar also shows relation to certain ethnic group. The maximum frequency (30%) is found in Mongloid trait and minimum frequency of (3%) is found in African population. Indian population has a prevalence rate of 5% [6].

Radix entomolaris is generally located distolingually and its coronal portion is partially attached to distal root. The length of Radix Entomolaris (RE) is usually found to be smaller than distobuccal and mesial counterparts. Carlsen and Alexander has given classification on the basis of location of cervical part of RE. Type A, B, C and AC [7].

Type A and Type B refer to distal location of cervical part and type C refer to mesial location of cervical part of RE. Type AC refers to cervical part in the middle of distal and mesial root component. (Figure 3) [8].

De Moor et al. classified RE on the basis of the curvature of the root or the root canal [9].

Type 1: with a straight root or root canal.

Type 2: with a curved coronal third and straight middle and apical third

Type 3: with an initial curve in the coronal third and a second curve beginning in the middle or apical third with buccal orientation.

Maxillary second molar

Maxillary second molar usually have 3 roots; mesial, distal and palatal with one canal each respectively. However, there are many reported variations in root morphology that include four-rooted MSMs with either two palatal roots containing single canals [10], two distobuccal single-canal roots or two separate Mesiobuccal roots [11], presence of five roots and root canals (double Palatal and double distobuccal roots) [12].

Peikoff et al has classified the maxillary second molar into 6 variants suggested as follows,

(1) occurrence of three roots with separate three canals (56.9%);

(2) occurrence of three separate roots along with four canals in which two are in the mesiobuccal root (22.7 %);

(3) occurrence of three roots and canals in which the mesiobuccal and distobuccal canals joins to form a common buccal (9%);

(4) occurrence of two independent roots with single canal in each of the roots (6.9%);

(5) occurrence of one root and only one canal in it (3.1%) ;

(6) occurrence of four roots and four separate canals in which two roots are palatal (1.4%) [13,14].

According to Christie et al, the prevalence of two palatal roots and two palatal canals was highest in maxillary second molar [15]. Christie classified four rooted maxillary second molar into 3 basic types. (Figure 4) [16].

Type I presented as to two widely splayed palatal roots that are long and complex.

Type II showed four short parallel roots.

Type III showed a web of root dentin engaging the mesiobuccal, mesiopalatal and distopalatalroot canal.

Type IV was added by Baratto-Filho with a fused mesiobuccal and mesiopalatal root [17].

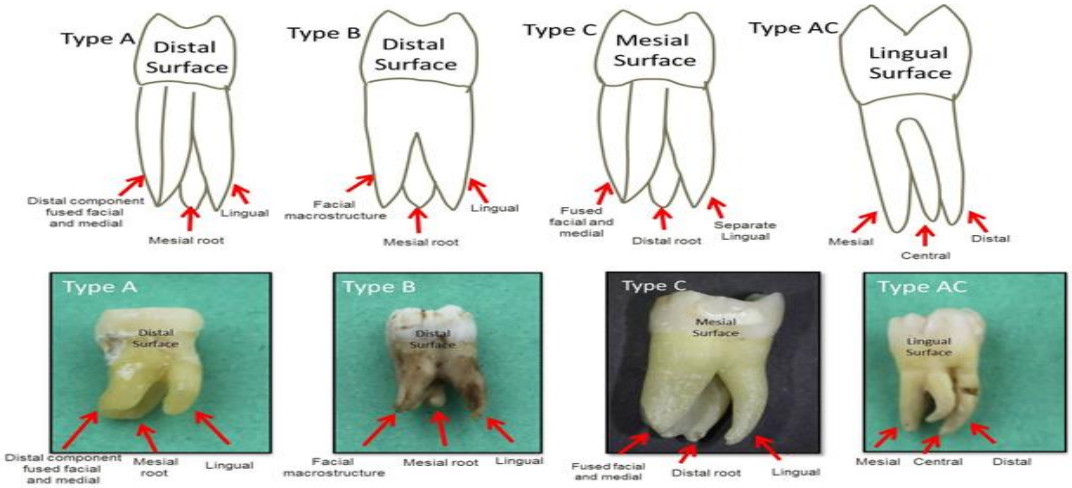


Figure 3: Schematic and pictorial representation of types of Radix entomolaris (RE)

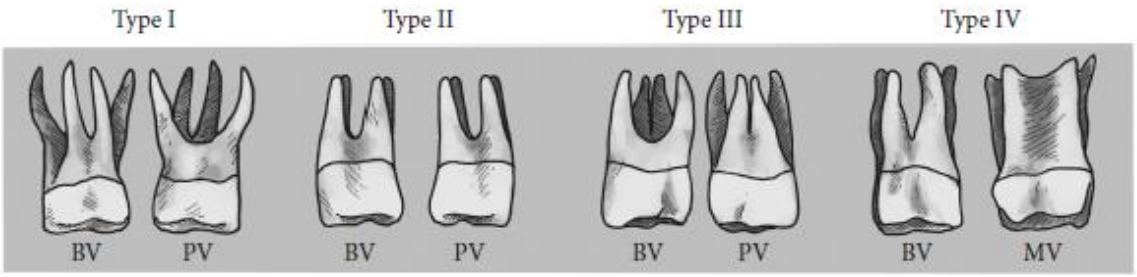


Figure 4: Schematic drawing of radicular classifications of four-rooted maxillary molars modified from [12–16]. Christie classified four rooted maxillary molars in Type I to Type III based on the radicular shape and the degree of root separation. Type IV was added by Baratto-Filho with a fused mesiobuccal and mesiopalatal root

Clinical significance

Supernumerary roots when left unnegotiated can lead to failure of endodontic treatment. Intraoral radiography is two dimensional representation of root anatomy and these roots get misdiagnosed due to superimposition of other roots. Radiographs taken from multiple angulations help in diagnosis of these supernumerary roots. In case of unclear internal anatomy and outline of canal orifices, Cone-beam computed tomography (CBCT) is a valuable tool for definitive diagnosis of these extra roots. Magnification aids like loupes and endodontic microscope also enhance the treatment outcome [18].

CONCLUSION

Supernumerary root in multi-rooted teeth is a rare phenomenon. Proper interpretation of the root canal anatomy radigraphically and orifice location on the pulpal floor is of utmost importance in diagnosis and management of these variations. Intraoral radiography and Cone-beam computed tomography are essential diagnostic tools for such variations, thus enhancing the treatment outcome and prognosis.

Conflicts of Interest

The author reports no conflicts of interest.

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