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Maxillary First Molar with Two Roots and Two Canals - A Case Report

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## Abstract

Knowledge regarding the anatomic morphology of maxillary molars is absolutely essential for the success of endodontic treatment. The morphology of the permanent maxillary first molar has been reviewed extensively; however, the two-rooted maxillary first molar with two canals has rarely been reported in studies. This case report documents the diagnosis & endodontic management of a permanent maxillary left first molar with two roots and two canals detected using magnifying loupes and intraoral periapical-radiographic images. Such variations can facilitate a better understanding of the complex root canal anatomy during root canal treatment of maxillary molar to prevent iatrogenic errors in endodontic therapy. **Keywords:** Maxillary First Molar, Cone-beam Computed Tomography, Magnifying loupes.

## Introduction

Internal root morphology of a tooth is often complex and greatly influences endodontic treatment<sup>1</sup>. In fact, successful endodontic treatment depends on proper cleaning, shaping and filling of the root canal system. A thorough knowledge of root canal morphology and good anticipation of their possible morphological variations may help to prevent iatrogenic errors in endodontic therapy<sup>2</sup>. It is generally accepted that maxillary first molar usually exhibits three roots and three or four canals. The literature shows the wide range of variations with respect to frequency of occurrence of number of roots, number of canals in each root and incidence of fusion of roots<sup>3</sup>. Other variations for maxillary first

molars include one, four& five roots and unusual morphology of root canal systems within individual roots<sup>4</sup>. Cases with a C-shaped canal configuration, seven and eight root canals have also been reported earlier<sup>5, 6</sup>. Smadi and Khraisat reported that the maxillary first molar has some of the highest failure rates in endodontic treatment. The failure often is due to the presence of extra canal in the Mesiobuccal root that clinician fails to detect, debride and obturate<sup>7</sup>.

Various cases of maxillary first molar have been found with a greater number of roots and root canals, but only very few cases have been documented with two roots and two canals. Case reports of maxillary first molar with unusual canal anatomy of maxillary first molar having one buccal root and one palatal root are summarized in Table -1<sup>8, 9, 10, 11</sup>

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Table 1: Case reports showing	unusual anatomy	of maxillary t	first molar having	one buccal	root and c	one palatal	root along
with details of their canal syste	em <sup>8,9,10,11</sup>						

Year	Authors	Root configuration	Number of canals	Canal configuration Buccal Palatal	
1997	Malagninoet	2 roots (1 buccal and 1	2 in buccal root 1 in	Type Il	Type I
	al.	palatal)	palatal root		
2001	Favaet al.	2 roots (1 buccal and 1	2 in buccal root 1 in	Type IV	Type I
		palatal)	palatal root		
2009	Ma Let al.	2 roots (1 buccal and 1	1 in buccal root 1 in	Type I	Type I
		palatal)	palatal root		
2006	Yelmez et al.	2 roots (1 buccal and 1	3 in buccal root 1 in	C-shaped canal (trifurcated	Type I
		palatal)	palatal root	in the apical one-third)	
2013	Rahimi and	2 roots (1 buccal and 1	1 in buccal root 1 in	Type I	Type I
	ghasemi	palatal)	palatal root		
2013	Shakouie et	2 roots (1 buccal and 1	1 in buccal root 1 in	Type I	Type I
	al.	palatal)	palatal root		
2014	Pak seat S et	2 roots (1 buccal and 1	02 in buccal root	Fusion of MB and DB roots	Type I
	al.	palatal)	01 in palatal root	forming a C shaped canal Type I	
				MB2 canal	
2015	Sharma et al.	2 roots (1 buccal and 1	1 in buccal root 2 in	Type I	Type I
		palatal)	palatal root		
2018	Saores R et	2 roots (1 buccal and 1	1 buccal and 1 palatal	Type I	Type I
	al.	palatal)			
2018	Bansal P et	2 roots (1 buccal and 1	1 in buccal root 1 in	Туре І	Type I
	al.	palatal)	palatal root		
2019	Jie Liu et al.	2 roots (1 buccal and 1	1 in buccal root 1 in	Type I	Type I
		palatal)	palatal root		
2022	Present case	2 roots (one mesial one	1 in mesial root 1 in	Туре І	Type I
		distal)	distal root		

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This case report describes endodontic therapy of a permanent maxillary first molar with 2 separate roots and root canals, diagnosed and confirmed with the help of radio visiography and magnifying loupes.

# **Case Report**

A 35-year-old female patient reported to the department with chief complaint of pain in left maxillary posterior region for past several days. She gave a history of intermittent pain which was increased in intensity in the last three days and not relieved by medication. Medical history was non-contributory.

On clinical examination left maxillary first molar (#26) found to be disto-proximal carious and left maxillary second premolar (#25) had full coverage of restoration. None of the teeth showed any presence of pain on palpation or tenderness on percussion. The preoperative radiograph #26 showed disto-proximal radiolucency in the coronal portion approaching the pulp space with no widening of the periodontal ligament space and normal periapical tissue. There seemed to be present only two roots in left first molar. (fig.1) Electric pulp testing was indicative of irreversible pulp damage in left first molar teeth. The clinical findings, radiographic findings and vitality tests led to a diagnosis of chronic irreversible pulpitis was made with maxillary left first molar necessitating endodontic therapy.

The tooth was anesthetized using 2% lidocaine (Themis Medicare Limited, Uttarakhand, India) with epinephrine 1:80,000 and isolation (Optra rubber dam, Ivoclar Viva dent, USA) was done, all carious tissue was excavated and an adequate conventional coronal access was made.

Through observation of the internal anatomy of tooth with magnification (2.5x loupes, Carl Zeiss, Germany) the two canal orifices (one was present mesially and second present distally) were present which was identified and negotiated using DG-16 explorer (GDC India). The conventional ovoid access was made in the mesio-distal direction with the help of slow-speed safe-end bur (MANI, Japan) following Krasner and rankow's law of access opening to improve access to both the canals.

After scouting the canals with no.10 and no.15 K-files (Mani Japan), coronal flaring with Neo Endo Sx (Orikam Gurugram, Haryana, India) was done. Working lengths were determined by means of an apex locator (Root ZX, J. Morita Mfg. Corp, Kyoto, Japan) and confirmed with a radio visiography (Sopro Imaging, France). The canals were initially instrumented to a size no.15 K-file (Mani Japan), under copious irrigation with 3% sodium hypo chlorite (Neelkanth, Jodhpur, India). Biomechanical preparation was performed using the crown-down technique with Neo Endo Rotary NiTi files (Orikam Gurugram, Haryana, India).

Irrigation was performed after each instrumentation with 3% 17% sodium hypochlorite solution and ethylenediamine tetra-acetic acid (Prime dental product, Thane, India) and subsequently flushed with sterile saline (Axa Parenteral Ltd India). The canals were dried using paper points (Dentsply, Maillefer) and a calcium hydroxide (RCCAL; Prime dental product, Thane, India) dressing was given. At the next visit after three days, the tooth was asymptomatic and obturated using cold, laterally condensed gutta-percha (Dentsply, Maillefer) and seal apex sealer (Sybron Endo, West Collins orange CA, USA).



Fig 1: Clinical photograph.



Fig 2: Access opening



Fig 3: Preoperative.



Fig 4: Working length.



Fig 5: Master cone



Fig 6: Obturation

#### Discussion

A successful endodontic treatment requires a thorough understanding of root canal anatomy and morphology. Burns RC (2002) described the maxillary first molar as "possibly the most treated, least understood, posterior tooth"<sup>12</sup>. The root canal anatomy of the maxillary first molar is that of three roots with three canals with an incidence as high as 97.6% to  $100\%^8$ . Anatomical aberration in maxillary first molars is corroborated in the literature therefore a thorough understanding of the variations occurring in the root canal system is an absolute necessity in achieving endodontic success <sup>3</sup>.

The commonest variation in the permanent maxillary first molars is the presence of a second Mesiobuccal canal with an incidence ranging 18% to 96.1%<sup>5</sup>. The presence of fused and less number of roots or canals is infrequent rather than the presence of extra canal. Cleghorn BM et al. (2006) found that existence of two roots and two canals is quite uncharacteristic of a maxillary first molar and the incidence of occurrence is 3.8% for two rooted teeth<sup>13</sup>.

According to Martins JN et al. (2013) fusion of roots may take place between Mesiobuccal and distobuccal roots, Mesiobuccal and palatal roots or distobuccal and palatal roots. They divided fusion of roots into three types: fusion of the distobuccal (DB) root with the palatal (P) root (Type A), fusion of the Mesiobuccal (MB) root and the distobuccal root (Type B), and fusion of two palatal roots (Type C) they are present mostly in buccolingually<sup>14</sup>. In the present case the roots are seen in mesio-distally with Vertucci's Type 1 canal configuration.

Preoperative intraoral periapical radiographs are essential before initiating endodontic treatment to identify variations from the normal. In certain cases, use of multiple preoperative radiographs or an additional radiograph from a 20° mesial or distal projection may be helpful in detecting unusual root canal morphology<sup>15</sup>. Kottooret al. (2011) and Neelkanth an et al. (2010) have suggested the use of CBCT for the purpose of determining the root canal morphology in cases with aberrations<sup>5, 16</sup>.

In the present case, the presence of only two roots and two canals was confirmed with intraoral radiograph and with the help of 3.2x magnification loupes. The canals were easily located by making an ovoid access outline similar to upper first premolar but in mesio-distal direction following the pulp chamber floor anatomy and application of basic concepts. No further attempt was made to search for any other canal, which could cause iatrogenic errors.

For success of the endodontic treatment, we should knowledge of have thorough root canal morphology. Many morphologic variations present in maxillary first molars. Such variation can be found by intraoral periapical radiographs and its magnification proper interpretation, and preoperative CBCT imaging. However, in present case CBCT image could not be obtained due to the patient's financial constraints hence, we ascertained the morphology with the IOPA radiographs and magnification loupes.

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#### Conclusion

The present case report discusses the endodontic management of an unusual case of a maxillary first molar with two roots. Anatomic variations can occur in any tooth and maxillary first molar is no exception. Although the incidence of presence of two roots and two canals is very less, it is important to take these variations into consideration during root canal treatment of maxillary molar to prevent iatrogenic errors and to ensure success.

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