

## Endodontic treatment of maxillary molar with 6 canals: a case report

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### Abstract

The clinician must have to be familiar with the morphology of the roots of all teeth, and the associated intricate root canal anatomy, to achieve proper access to the canals, effective debridement and obturation for successful endodontic treatment. This case report intensifies the complexity of maxillary molar morphologic variation and represents successful endodontic treatment of maxillary first molar with 3 roots and 6 canals having 2 separate palatal canals which is rarely discussed in literature.

**Key Words:** Maxillary first molar, Extra canals, Endodontic treatment, 6-canals.

### Introduction

Maxillary first molar is the most treated tooth with the complex anatomy that has long been an unceratin mystery. The primary goal of endodontic therapy is identification, proper cleaning and shaping and three-dimensional obturation of the entire root canal system<sup>1</sup>. Undetected extra roots and extra canals can lead to endodontic failures.<sup>2</sup>

Generally maxillary molars are described to have 3 roots and 3 canals, 1 canal having each root. Literature shows wide variations in numbers and morphology of canals in each root. The mesiobuccal root of the maxillary first molar contains a double root canal system more often and the incidence of second mesiobuccal canal (MB2) has been reported to be between 18.6% and 96.1%.<sup>3,4</sup> The incidence of second distobuccal canal (DB2) has been reported to be between 1.6% and 9.5%.<sup>5,6</sup> The incidence of two root canals in the palatal root has been found to be 0.2% to 7.0%.<sup>3,5</sup> This case report presents successful endodontic treatment of maxillary left first molar with a presence of 2 canals in each root.

### Case Presentation

An 18-years-old male presented to the Operative Dentistry Department, Shaheed Zulfiqar Ali Bhutto Medical University, PIMS Islamabad with the chief complaint of spontaneous toothache in his left posterior maxilla for 2 days. The pain intensifies on sleeping. History shows intermittent pain in the same tooth by hot and cold stimuli for past 2 months. Patients medical history was not significant. Clinical examination revealed mesio-occlusal carious upper left first molar (#26) with pain on percussion. The tooth was not mobile and periodontal probing was within physiological moments. Vitality testing of the involved tooth with heated gutta-percha (Dentsply Maillefer, Ballaigues, Switzerland) and pulpoflourane (Septodont, France) elicited an intense pain that remained for more than a minute. Adjacent teeth responded normally on this test.

A preoperative radiograph revealed mesial caries involving pulp horn and periodontal ligament widening in relation to the mesiobuccal root. Radiograph didn't reveal any unusual morphology. A diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made after clinical and radiographic examination and endodontic treatment was suggested to the patient.

After administering Local anesthesia (1.8ml of 2% lignocaine with 1:100,000 epinephrine) isolation with rubber dam was achieved. Caries were removed and endodontic access cavity was made. Clinical examination reveals 3 root canals mesiobuccal (MB), distobuccal (DB) and palatal (P). After probing with a DG 16 endodontic explorer (Hu-friedy, Chicago, IL) 2 small hemorrhagic pin points were visible in a groove from MB to P direction and DB to P direction, MB2 and DB2 canals were found and negotiated with #8 file (MANI, Dentsply). After taking working lengths by radiographic method (IOPA) root canals were prepared using protaper nickle-titanium rotary files (Dentsply Maillefer) with a crown down technique. Buccal canals were prepared upto protaper number F1 and palatal upto F2. Irrigation was performed using normal saline, 5% sodium hypochlorite solution, and 17% EDTA. The canals were dried with absorbent points (Dentsply Maillefer) and non-setting calcium hydroxide (METAPEX) was placed as an intracanal medicament, tooth was sealed with Cavit (Cavit W, 3M ESPE, Germany) as a temporary dressing. One week later, all canals were dried with absorbent points (Dentsply Maillefer), and while performing obturation another palatal canal was located mesial to the first one access preparation was made pentagonal from triangular, MP canal was negotiated, confirmed by radiograph and prepared upto F2. So, 6 canals were visible (MB, MB2, DB, DB2, MP & DP) Obturation was performed using gutta-percha (Dentsply Maillefer) and root canal sealer (Endomethasone N, Septodont) Fig. 1 The tooth was

restored with Dental Amalgam and PFM crown was advised to the patient.

**Table 1: Literature review of maxillary first molar with anatomical variations**

Arturo Martinez-Berna (1983) (2 cases) <sup>10</sup>	6 canals with 3 mesiobuccal, 2 distobuccal and 1 palatal
Lior Holtzman (1997) (2 cases) <sup>11</sup>	5 canals with 2 mesiobuccal, 1 distobuccal and 2 palatal
Michael Hulsmann (1997) <sup>12</sup>	4 canals with 2 distobuccal, 1 mesiobuccal and 1 palatal
Peter M. Di Fiore (1999) <sup>13</sup>	4 roots - distobuccal, distopalatal, mesiobuccal and mesiopalatal
L. R. G. Fava (2001) <sup>14</sup>	2 roots - buccal and palatal, with Weine's type IV configuration in the buccal root
R. J. G. De Moor (2002) (4 cases) <sup>15</sup>	C-shaped canal configuration
F. Baratto-Filho et al. (2002) <sup>16</sup>	2 palatal roots, each with separate canal i.e., 2 palatal canals and 1 mesiobuccal and distobuccal canal
F. Maggiore, Y. T. Jou & S. Kim (2002) <sup>17</sup>	6 canals with 2 mesiobuccal, 3 palatal and 1 distobuccal
Barbizam JV, Ribeiro RG, Filho MT (2004) (2 cases) <sup>18</sup>	4 roots and an extracted molar with 5 roots
Ferguson DB, Kjar KS, Hartwell GR.(2005) (1 case) <sup>19</sup>	Three canals in the mesiobuccal root
N Adanir (2007) (1 case) <sup>20</sup>	Four roots and six canals. Mesiobuccal and mesiopalatal, distobuccal and distopalatal and palatal
Poorni S, Kumar A, Indira R. (2008) (3 cases) <sup>21</sup>	2 canals in the palatal root showing Vertucci's Type II configuration
Cobankara FK, Terlemez A, Orucoglu H. (2008) (1 case) <sup>22</sup>	Single root and single canal
Aggarwal V, Singla M, Logani A, Shah N(2009) (1 case) <sup>23</sup>	Two palatal canals separate orifices and separate foramen
de Almeida-Gomes F, Maniglia-Ferreira C, Carvalho de Sousa B, Alves dos Santos R (2009) (1 case) <sup>24</sup>	Six root canals
Kottoor J, Velmurugan N, Sudha R, Hemamalathi S. (2010) (1 case) <sup>25</sup>	Seven root canals
Kottor et al (2010) (1 case) <sup>26</sup>	Eight root canals



**Fig. 1: Post-obturation radiograph**

## Discussion

Several studies shows complexity in frequency and number of root canals along with the complexity in morphology of the pulp chamber as well as root canal

morphology. Thorough understanding of these anatomical variations is necessary for understanding the principles and problems of shaping and cleaning, for determining the apical limits and dimensions of canal preparations, and for performing successful endodontic treatment.<sup>7,8,9</sup>

The literature demonstrates extensive anatomical variations (Table 1) in the number of roots and canal morphology of maxillary first molars and the most clinical search was generated on mesiobuccal root.<sup>27,28</sup>

This case presents unusual anatomy of maxillary first molar with 6 canals i.e. 2 mesiobuccal canals (MB1 & MB2) 2 distobuccal canals (DB1 & DB2) and 2 palatal canals (MP & DP). IOPA radiograph reveals buccal canals presented with vertucci<sup>29</sup> type II canal pattern (i.e., two canal orifices with single exit) and palatal canals presented with vertucci type IV canal pattern (i.e., two canal orifices with two separate exists)<sup>29</sup>. It was also correlated clinically by the proximity of canal orifices to

each other which is indicative of whether the canals joined or remain separated as defined by Vertucci.<sup>30</sup>

For successful endodontic treatment, it is necessary to use different aids like using angulated x-rays, efficient explorers, wider crown accesses, adequate lighting and, more advance techniques like use of dental operating microscopes and CBCT whenever possible.<sup>31,32</sup>

### Conclusion

This case report highlights the importance of gaining proper knowledge and thorough clinical & radiographic examination regarding anatomical variations of all teeth especially maxillary posteriors in order to achieve successful root canal therapy

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