



**ORIGINAL RESEARCH PAPER**

**Endodontics**

**MANAGEMENT OF FIVE CANALED MANDIBULAR FIRST MOLAR WITH RARE EXTRA MIDDLE MESIAL CANAL – THREE CASE REPORTS**

**KEY WORDS:** five canals, mandibular molar, middle mesial canal

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**ABSTRACT** The endodontic management of mandibular first molar with unusual root canal anatomy can be very challenging for the practitioner. The review of literature demonstrates the presence of five canals in mandibular first molar is 1 – 15%. This article presents the technique and instruments used for successfully managing three cases of mandibular first molar with three mesial canals and two distal canals.

**Introduction**

The success of the root canal therapy depends upon multiple factors. Locating all the canals and debriding the necrotic tissue followed by cleaning and shaping of the canal is one of the most important procedures. Typically a permanent mandibular molar presents with two mesial canals and one distal canal. But with the increased knowledge and latest techniques, the probability of finding the third canal in mesial root of permanent mandibular first molar has increased and it may go upto 15%.<sup>[1,2]</sup>

Pomeranz et al<sup>[3]</sup> has classified middle mesial canal into three categories: fin, confluent and independent canal. According to this independent canal has different orifice and different foramen. The others two categories represent with different orifice but with confluence with other canal.

This paper presents the endodontic management of the five canalled mandibular first molar with middle mesial canal of the patients presented in college of dentistry, jizan university, Saudi arabia.

**Case report 1:**

A 15 year old Saudi female was referred to specialty clinic from the intern’s clinic with continuous pain in the tooth 46 after the start of the root canal treatment. After giving the local anesthesia, the temporary restoration was removed and thorough inspection of the pulp chamber was done. The orifice of four canals mesiobuccal, mesiolingual, distobuccal and distolingual were clear on the pulp chamber. With further inspection and small round bur, the additional orifice between the mesiobuccal canal and mesiolingual canal was located before applying the rubber dam as the patient was very apprehensive. The pulp was extirpated with # 10 k-file and copious irrigation was done with sodium hypochlorite (Figure 1a). The access cavity was sealed with temporary restoration. Patient was rescheduled for next appointment. In the next appointment the tooth was asymptomatic. Local anesthesia was given and rubber dam was applied followed by initial negotiation with rotary path file #013 and #016 (Dentsply, Tulsa dental, Switzerland). Thorough cleaning and shaping of all the five canals were done with protaper next rotary Ni-Ti file system (mailefer, Dentsply). All the mesial canals were prepared till protaper next X2 and the distal canals till protaper next X3. Copious irrigation was done with 5.25 % sodium hypochlorite alternating with EDTA. The canals were dried with the corresponding protaper next paper points. Master cone radiograph was taken (Figure 1b). The obturation was done using resin sealer MM – seal (Micromega, France) and corresponding protaper next gutta percha. The access was sealed with permanent restoration and post obturation radiograph was taken. The radiograph showed confluent middle mesial canal with the mesiobuccal canal (Figure 1c).



**Figure 1a – working length IOPA**



**Figure 1b – master cone IOPA**



**Figure 1c – Post obturation IOPA**

**Case report 2:**

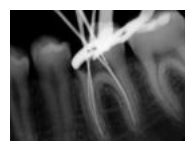
A 19 year old male reported with the acute pain in 36 (Figure - 2a). The pain was sharp, continuous and increases on lying down in the night. His medical history was noncontributory. There was no tenderness on percussion. The tooth was not mobile and surrounding periodontal ligament was healthy. Local anesthesia with epinephrine was administered as mandibular nerve block. Rubber dam was applied. Access opening was done and canal orifices were explored. On careful exploration three mesial orifices that are mesiobuccal, mesiolingual and middle mesial were found (Figure – 2b). On the distal side there was one orifice but on progressing into the canal the root canal was divided in two canals. The orifices of the canals were enlarged using the protaper universal SX. The canals patency was checked with #10 k file in the mesial canals and #15 k file in the distal canals. After that working length determination was done with 15 k file (Figure – 2c). The canals were prepared with protaper next rotary NiTi file system (mailefer, Dentsply). All the mesial canals were prepared till X2 and the two distal canals were prepared till X3. Copious irrigation with 3% sodium hypochlorite was performed with alternating use of EDTA. The canals were dried with corresponding protaper next paper points. After complete drying the canals were obturated (Figure – 2d) using corresponding protaper next gutta percha and MM-seal resin based sealer (Micromega, France). Lateral condensation with the 2% # 25 gutta percha accessory cones was done in the distal canals because of the large space. The middle mesial canal was found to be confluent with mesiolingual canal on the radiograph.



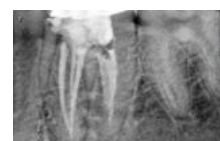
**Figure 2a – diagnostic IOPA**



**Figure 2b – orifices of mesial canals**



**Figure 2c – working length IOPA**



**Figure 2d – post-obturation IOPA**

**Case report 3:**

A 23 year old male presented with pain in the 46 which increases on biting (Figure – 3a). His medical history was non-contributory. On examination there was old composite filling present which was one year old. The tooth was tender on percussion. The gingival tissue and periodontium surrounding the tooth was healthy. Root canal treatment was started under 2 % mepivacaine with adrenaline and rubber dam. All the five orifices were located with careful observation of the pulp chamber following the dental map and removing the dentinal protuberance over the isthmus. After determining the initial working length with 15 k files (Figure – 3b), the canals were prepared with Protaper next rotary NiTi file system with copious irrigation with 5% sodium hypochlorite and lubricant. The canals were dried with protaper next paper points. After taking the master cone with corresponding protaper next gutta percha (Figure – 3c), the obturation (Figure- 3d) was done using MM-seal resin sealer (Micromega, France) . The access cavity was sealed with temporary cement.

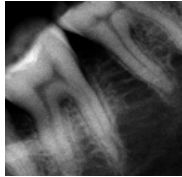


Figure 3a – diagnostic IOPA

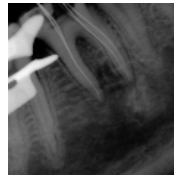


Figure 3b – working length IOPA



Figure 3c – master cone IOPA



Figure 3d – post-obturation IOPA

#### Discussion:

The mandibular first molar commonly present with two mesial canals and one distal canal. But with advanced technology and better understanding of the root canal anatomy, many cases of the unusual anatomy of mandibular first molar have been reported. The presence of middle mesial canal was first reported by the Vertucci and Williams in 1974<sup>[4]</sup> and Bakers et al<sup>[5]</sup>. Pomeranz et al<sup>[3]</sup> in 1981 reported many cases with middle mesial canal and discussed the method of the treating these cases. Azim et al<sup>[6]</sup> reported presence of middle mesial canal in 37.5 % of cases using dental microscope. Fabra-Campos<sup>[7]</sup> have suggested techniques to easily locate the middle mesial canal. According to them the dentinal protuberance should be removed between the mesiobuccal and mesiolingual canal with ultrasonic tips followed by the exploring the area with endodontic explorer to locate the orifice or bleeding point can be observed in the case of vital pulp. Then negotiate the canal with the small number files that is #8 or 10 k file. Most of the time, these intermediate canals join the mesiobuccal or mesiolingual canal.

Careful interpretation of the preoperative radiographs is always important in determining the presence of the extra canals. But in cases of the middle mesial canals their presence in radiograph is difficult because the radiographs are only two dimensional pictures<sup>[8]</sup>. The removal of the dentinal protuberance between the mesiobuccal and mesiolingual canals was done with the help of the round bur. The isthmuses between the two canals were carefully explored with the endodontic explorer and a depression was felt. In case report 2 on exploring the isthmus there was a bleeding point which indicated presence of canal. There are many ways to find the extra orifice for extra canal like white line test, red line test, performing the champagne bubble test with sodium hypochlorite, using methylene blue dye, using magnification etc<sup>[9]</sup>. With the help of one or more of the above said methods, extra canal orifice can be located. In all our case reports the orifices were located with the proper exploration with the endodontic explorer and careful visual inspection.

The canals were prepared with protaper next rotary niti file system

(mailefer, Dentsply). These files are based on M – wire technology<sup>[10]</sup> which is claimed by the manufacturer as highly flexible and resistant to cyclic fatigue. Also the asymmetric motion enhances the canal shaping efficiency<sup>[11]</sup>. But the rotary ni-ti files should be used very cautiously in these cases as the instrument may pass through sharp bend that make it more prone to fracture<sup>[12]</sup> and also because of thin root configuration, it is very near to danger area which increases the chances of strip perforation. Copious irrigation of the canal system is very important using the standard and very effective combination of the sodium hypochlorite and EDTA alternatively.

In all our three cases, the middle mesial canals were confluent type. In all of the three cases there were two distal canals which are not very uncommon but with the presence of the three mesial canals make it rare anatomical variation in this subpopulation. The incidence of presence of five canals in mandibular first molar is only 1- 15 %<sup>[7]</sup>. If there is failure to recognize these anatomical variations, it can lead to unfavorable endodontic outcomes which may require retreatment of the cases. This paper stresses on thorough inspection of the pulp chamber with all the means possible for success of the treatment.

#### Conclusion:

This article showed the possibility of finding extra middle mesial canal and five canals in mandibular first molar with careful exploration of the pulp chamber. This knowledge may help to avoid procedural errors and help in long term success of endodontic case.

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