Management of Single Rooted Mandibular Second Molar with Single Canal: Two Case Reports

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Abstract

Background: The root canals of mandibular molar teeth show a wide variation in its system ranging from single to multiple canals. Thorough understanding of the variations present in internal anatomy of teeth is imperative for favorable outcome of the endodontic treatment. The insight of the tooth morphology, variations present related to its root structure, shape and information regarding root canal, with number of orifices and canal configuration, all this should be assessed prior to commence the endodontic treatment

Case Presentation: The present case report describes the variation in second mandibular molar, which is infrequently mentioned in literature. Variation present may not always be in the form of extra canal, it can be in the form of fewer or lesser canal than what is usually seen. On inspection of the pulpal floor with endodontic explorer, a single round orifice was seen at the centre of the floor of pulp chamber. Numerous angulated radiographs were obtained to assure the presence of independent single canal. Individual canal preparation was carried out using ProtaperNiTi instruments (Maillefer, Dentsply) till F5. Using lateral condensation technique along with sealapex sealer, obturation was carried out.

Conclusion: Knowledge of the number of root canals present within the tooth is imperative for successful root canal treatment. Some teeth may show extra canals, while other may show fewer than normal number of canals present. Mandibular second molar may present with single canal and this should be promptly recognized. Single canal identification helps to conserve the tooth structure by eliminating the need for removal of excessive tooth structure in search of extra canal.

Keywords: *Mandibular second molar, Root canal variations, Single canal, Single Root, One canal.*

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Introduction

The root canal system presents one of the most complex anatomies in the human body. The thorough understanding of tooth anatomy is prerequisite for favorable long term prognosis of the root canal therapy. The insight of the tooth morphology, variations present related to its root structure, shape and information regarding root canal, with number of orifices and canal configuration, all this should be assessed prior

to commence the endodontic treatment.[1] The routine intraoral periapical radiographs, radiovisiography and recently three dimensional imaging modality such as Computed beam tomography helps us to visualize the otherwise hidden root canal system.[2] The Endodontic literature has constantly discussed the variations in the form, configuration and number of canals present. The variations present in multirooted teeth are most commonly noticed in the number of canals present. The mandibular molars are one of the most common teeth to present with this variation. According to Vertucci FJ, the second mandibular molar is nearly same as the first mandibular molar with only difference observed in root length (shorter) and canal curvatures (more curved).[3] Mandibular second molars generally present with two clearly distinct roots, mesial and distal root. Mesial root mostly presents with two canals and a distal root with one or two canals. Any variation from this should be promptly recognized as it may affect the outcome of the endodontic treatment.[4]

Maggiore C et al. (1998) reported that lower second molar could range from one to three roots.[5] Manning SA (1990) studied the morphology of second molar and reported incidence of single root in 22%, two roots in 76% and three roots in 2 % of the teeth examined.[6,7] Weine F.S et al (1988) studied extensively the mandibular second molar for canal variation and he stated that amongst the entire molar, this tooth is most common to show the anatomical variation. He reported single canal in only 1.3% of the cases. Single Root and Single canal, though present, is an unusual and rare occurrence in the mandibular second molar.[8]

The purpose of this case report is to report occurrence of single canal in single rooted mandibular second molars that required endodontic therapy.

Case Report 1: A 27-year-old female reported to the dental OPD with complaint of pain in the lower right back region of jaw from past 10 days. Pain was localized, sharp and constant type. It got aggravated on intake of cold and associated with posture and relieved on intake of medication. There was no history of swelling, pus discharge and fever. Medical history was not significant. On examination of the area of complaint, occlusal caries was seen with 47. Tooth was tender on percussion and non-mobile. Radiographic and neural sensibility investigations were carried out. On radiographic examination of tooth 47, caries was found to be involving enamel dentin and pulp chamber and fused root with single canal was appreciated. (Fig -1)

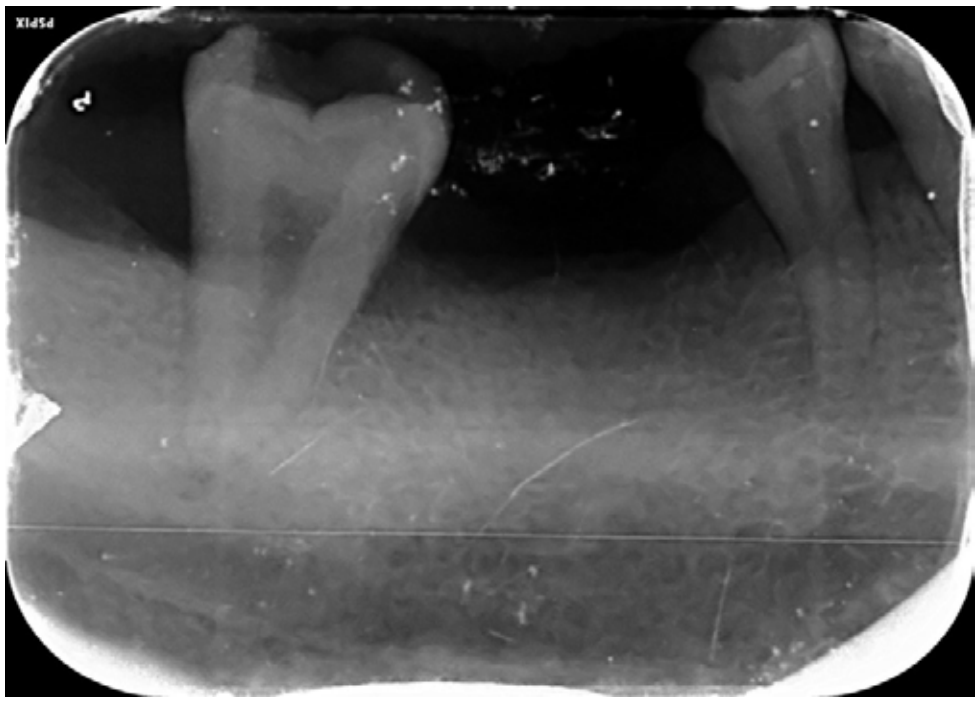

Figure 1- Pre-operative Radiograph

Periodontal ligament space around the roots was found intact with widening of the ligament. On neural sensibility test, the affected tooth showed an exaggerated lingering response to pulp testing. The clinico-radiographic diagnosis was symptomatic Irreversible Pulpitis with Apical Periodontitis with 47, indicating the need of endodontic therapy. The treatment was then initiated; right IANB anesthesia was injected with 2% lignocaine with 1:100,000 adrenaline. Rubber dam was used to isolate single tooth. Caries excavation was done with 47. Access cavity preparation was done with BR-45 (Mani Inc, Japan) round bur and modified using EX-24 (Mani Inc, Japan). Pulp tissue in the floor was removed and canal was copiously irrigated with 5.25% NaOCl(Chloraxid 5.25%, Cerkamed, Poland) for hemostasis. On inspection of the pulpal floor with endodontic explorer, a single round orifice was seen at the centre of the floor of pulp chamber. (Fig 2).

Figure 2: Access opening showing single canal

Cavity walls were extended slightly to check for any other canal, but only single canal was present. The canal patency was obtained using a no. 10 K- file. Numerous angulated radiographs were obtained to assure the presence of independent single canal. Working length was determined using apex locator and confirmed with the help of radiograph.(fig 3)

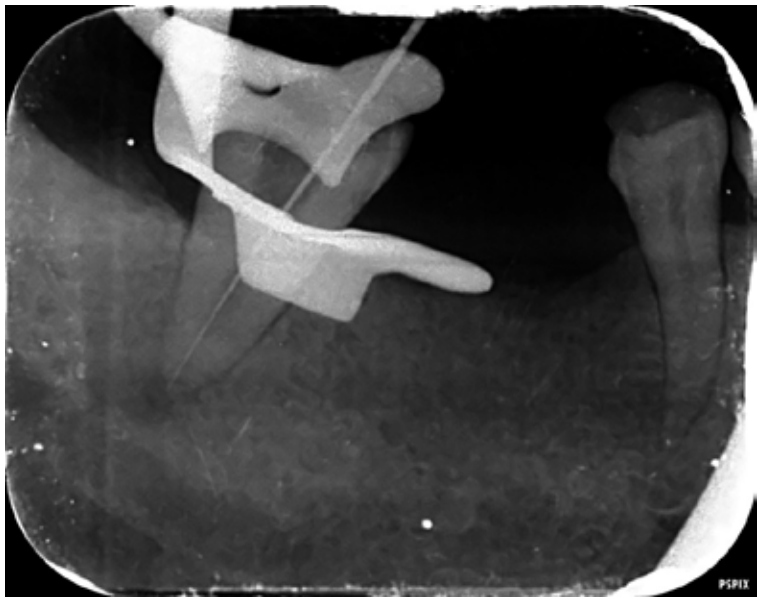

Figure 3: Working length determination

Individual canal preparation was carried out using ProtaperNiTi instruments (Maillefer, Dentsply) till F5. Profuse irrigation was done with 5.25% NaOCl and EDTA alternatively with normal saline. Calcium Hydroxide as an intracanal medicament was placed for 5 days. Intracanal medicament was removed using ultrasonic tip. Canal was again irrigated with 5.25% NaoCl and EDTA alternatively with normal saline. Final flushing with chlorhexidine was done followed by drying of canals using absorbent points. Master cones were selected. (Fig 4).

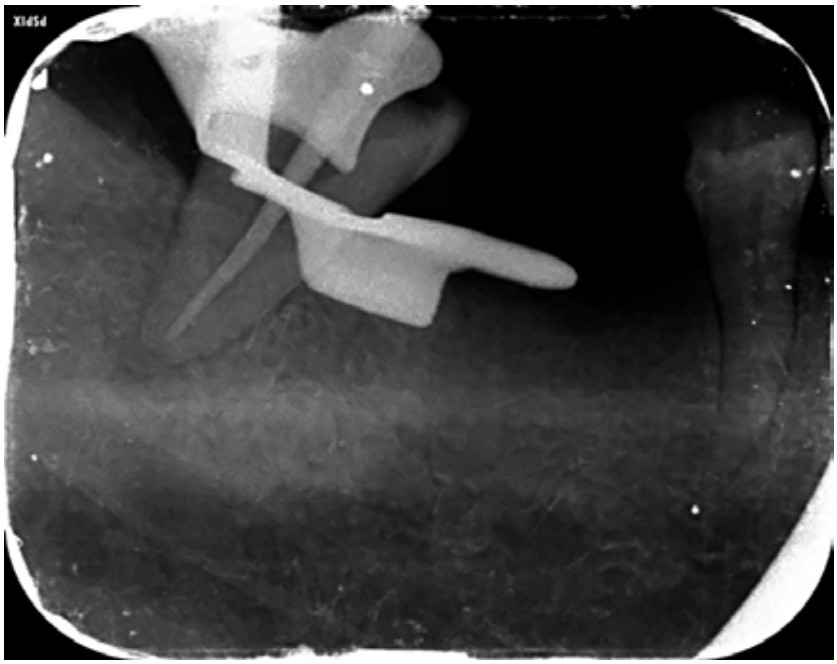

Figure 4: Master cone selection

Using lateral condensation technique along with sealapex sealer, obturation was carried out. (Fig 5 and 6). The post-endodontic restoration was done using composite resin restoration.

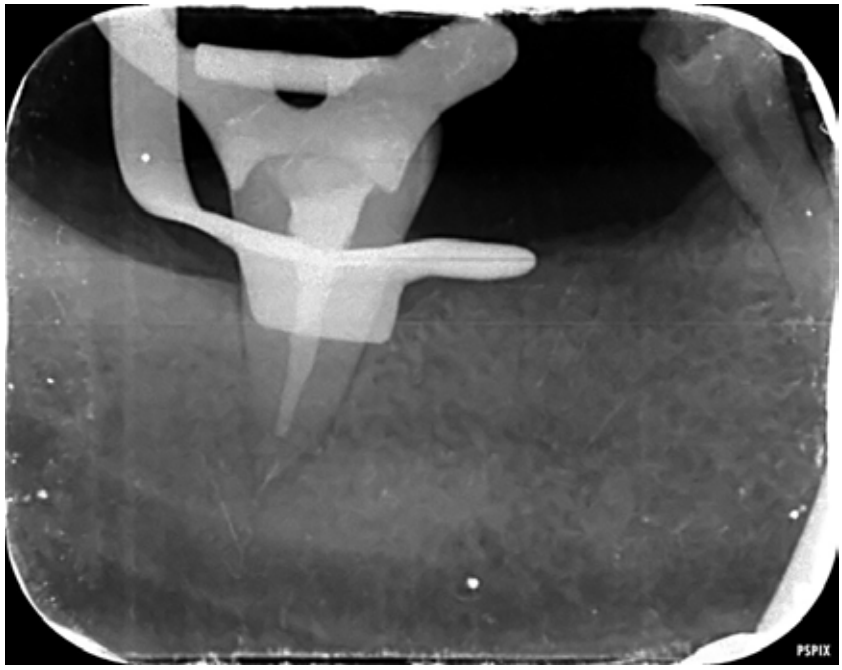

Figure 5: Obturation

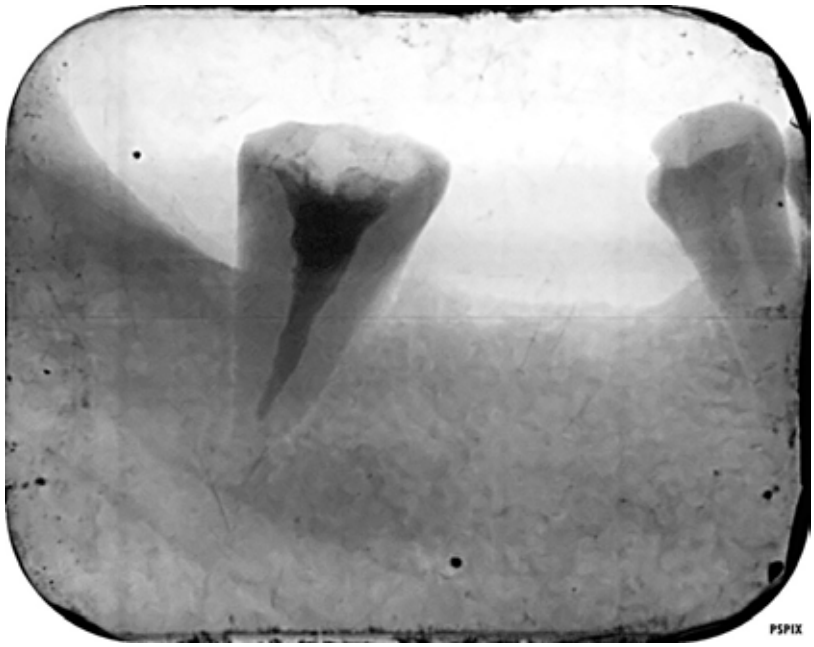

Figure 6: Inverted image showing complete filling of canal

Case report 2: A 30-year-old male reported to the dental OPD with complaint of pain in the lower right back region of jaw since 5 days. On examination of the area of complaint, mesio-proximal caries was seen with 47. Tooth was tender on percussion and non-mobile. Radiographic and neural sensibility investigations with 47 were carried out and root canal therapy was suggested for same. On radiograph, fused root with single canal was appreciated. (Fig 7). After access cavity preparation similar single canal configuration was seen. The further technique performed was similar as discussed above. (Fig 8).

Figure 7: Pre-operative radiograph

Figure 8: Obturation

Discussion

The endodontic therapies of multi-rooted teeth are often challenging, mainly due to existence of countless variations of root canal system. The knowledge of this complex root canal morphology is essential for success of endodontic therapy since missing of even one canal can lead to failure.[9] The diversities in multi-rooted teeth are seen in terms of number of roots, root canals, ramifications, apical deltas.[10] The pattern of such complexity is determined by age, sex and ethnicity of individual.

In case of mandibular molars, mandibular 2nd molar shows more variation than mandibular 1st molar. One of the deviations includes fusion of roots. The external morphology of mandibular 2nd molars seems to be conical or square shaped. The buccal or lingual aspect of fused roots shows presence of radicular grooves. The extensions and depth of grooves decides the internal canal anatomy. If groove is shallow, single wide canal is expected whereas if groove is deep, C-shaped anatomy is expected.[11]

In single rooted mandibular 2nd molar, the root canal may have following presentation: single wide canal, two canals that may or may not join and c- shaped canal. Pansiera & Milano found 6 out of 102 (5.88%) mandibular 2nd molar having single root and single root canal.[12] The present two case also showed single root and single canal configuration. Sabala et al. stated that "the more rare the aberration, the more probable that it is bilateral."[13] Hence suspecting similar morphology on contralateral side, periapical radiograph was evaluated. But no such configuration was found on contralateral side. Fava et al reported rare existence of a single canal in all four 2nd molars.[14]

For diagnosis of such cases periapical radiograph is commonly used. However, limitation of such 2D vision is well documented. The 3D radiography such as CBCT allows studying external and internal morphology. With aid of CBCT, the differentiation of shallow groove with single wide canal and deeper groove with c-shaped canal is possible. In search of canal in fused molar, possibility of perforation is higher. This can be eliminated with proper illumination and magnification and minimally invasive technique.[15,16,17] Since the canal is wider and tapering, the chemo-mechanical preparation should be such that it should be able to eliminate all the debris. The obturation technique used can be cold lateral condensation, warm lateral, thermo-plasticized technique. The thermo-plasticized gutta percha offers better adaption to canal irregularity however, in present case conventional gold standard lateral condensation has been used for obturation.

Conclusion

Knowledge of the number of root canals present within the tooth is imperative for successful root canal treatment. Some teeth may show extra canals, while other may show fewer than normal number of canals present. Mandibular second molar may present with single canal and this should be promptly recognized. Single canal identification helps to conserve the tooth structure by eliminating the need for removal of excessive tooth structure in search of extra canal.

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