

A Rare Occurrence of Single Round Canal and a Single Root in Mandibular Second Molar

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Abstract

An adequate and accurate knowledge about root canal morphology leads to a proper access opening, canal detection and working length negotiation followed by enough irrigation, bio-mechanical preparation and exact obturation establishing a successful root canal treatment. This case presents a rare case of a single round root canal system in a uni-rooted mandibular second molar tooth.

Keywords: Mandibular Second Molar; Molar Single Root; Molar Single Canal; Molar Round Canal; Single Root Single Canal

Introduction

A successful endodontic treatment is a combined result of proper knowledge about the anatomy of the tooth, its root canal system, proper access opening [1], adequate bio-mechanical preparation [2] along with continuous irrigation [3] with intra canal medicaments [4], distilled water and finally an exact obturation to seal the apex along with coronal orifice simultaneously [5,6]. Determining the root morphology of a tooth and its canal is a prerequisite to commence an appropriate treatment. Radiographs are the cheapest and conventional process find out the root and root canal anatomy before starting the treatment and to plan the treatment accurately [7]. Radio Visualgraphy (RVG) is more convenient than traditional radiography [8]. The other adjuncts can be micro computed tomography scan [8] and Cone Beam Computer Tomography.

The normal anatomy of a mandibular second molar tooth is that it contains one large distal canal and two canals as mesio-buccal and mesio-lingual [9]. Vertucci said the canals in mandibular second molar are more curved and broader in comparison to mandibular first molar. According to him in 64% cases there are two canals in the mesial root out of which 38% were of type II and 26% were of type IV. On the distal side there is a single canal in most of the cases among which 92% is of type I, 3% is type II and 4% is of type IV type [10]. The roots in mandibular second molar are fused to each other in most of the cases [11]. Even though there had been discussion about mandibular second molars having three or two apical foramina having three canals [12], a study in Iranian population have shown 7.2% prevalence of c-shaped single canal mostly in single rooted mandibular second molar tooth [13]. Studies have shown the prevalence of single canal in mandibular second molar is higher in south Asian population [12,14,15]. Though there are reports on c-shaped canals in mandibular second molar there is no mention of round or oval canals in literature [16]. Franklin S Weine., *et al.* found single canal configuration in mandibular second molar in only 1.3% (i.e.1 out of 75 teeth) teeth in their *in vitro* study where 2.7% (i.e. 2 out of 75 teeth) were found to be having C-shaped canals [17]. In 1982 Hartwell and Bellizzi reported only 4 teeth out of 416 endodontically treated mandibular second molars were having single canal [18]. In another study Pansiera and Milano showed 5.88% mandibular second molar having single root with single root canal [19]. Rou., *et al.* found only 1 single canal in a single rooted mandibular tooth out of 55 single rooted mandibular second molars out of 155 in total [20]. Many cases of mandibular second molar having two, three, four or five canals has been reported as well [10,21-24].

Materials and Method

Mandibular second molar, Rubber dam, 2% K files, HERO shapers, PRO-TAPER, 5.5% Sodium Hypochlorite, 17% EDTA, Densply Endo Z bur, J Morita Root ZX mini apex locator, RVG, Root Canal Sealer- Kerr Sybron Endo, Gutta percha 6% and 2%, GIC type II.

Case Report

A 32 year old Indian lady patient came to the clinic with the complaint of pain in her left lower back tooth region. A detailed intra-oral examination revealed a deep occlusal caries involving 37 (mandibular left second molar).

Radio graphical examination revealed a large coronal radiolucency approaching the pulpal radiolucency. There was widening of periodontal space. It also showed the presence of a large single canal constricting towards the apex (Figure 1).



Figure 1: Pre-operative radiograph showing deep occlusal caries involving pulp chamber.

Based on this finding the condition was diagnosed as irreversible pulpitis.

Thus root canal treatment followed by porcelain fused to metal (PFM) cap was planned.

The carious lesion was cleaned using round diamond bur. The same was used to gain the access to the pulp chamber. After accessing the pulp chamber enlargement was done by Densply Endo Z bur.

After establishing a proper access opening 10 no 2% hand file (Dentsply K-file) was used to access the canals which confirmed the presence of a single canal. J Morita Root ZX mini apex locator was used to determine the working length which was confirmed by RVG later on using the same file. The working length was later again confirmed using F2 PRO TAPER file (Dentsply Pro-Taper) (Figure 2). The pulp was extirpated using barbed broach (Dentsply). The pulp was single and round in shape (Figure 3).

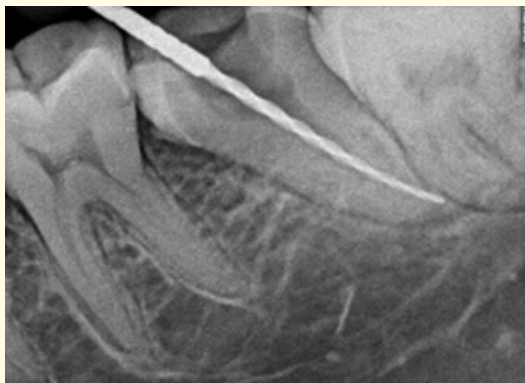


Figure 2: Working length determination using PRO-TAPER file.

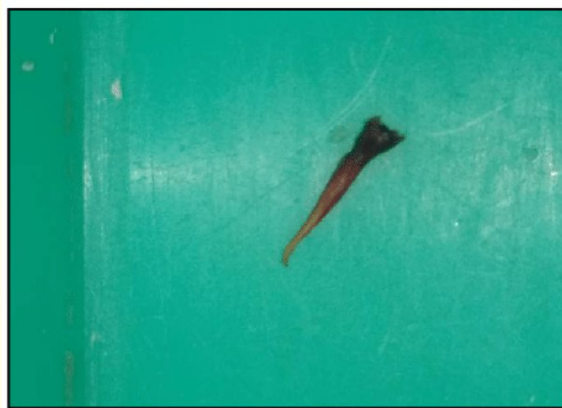


Figure 3: The extirpated round single pulp.

After extirpating the pulp a combination of 2% K files, PRO-TAPER files and HERO shapers (Dentsply) was used to proper shaping of the canal. Step back technique was performed.

Sodium Hypochlorite (5.5%) and 17% EDTA was used as irrigating solution followed by saline flush.

A 6% 30 no gutta- percha cone (Diadent) was used as master cone (Figure 4). Many other 2% gutta-percha cones were used to obturate the canal. Obturation was done by cold lateral condensation technique (Figure 5). Sealapex Root Canal Sealer- Kerr Sybron Endo was used as sealing agent. The pulp chamber was filled with GIC restorative type(type II).

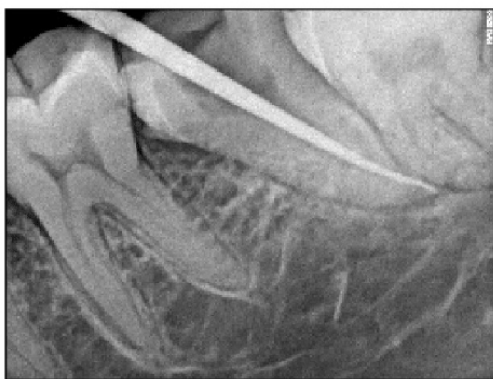


Figure 4: Master cone.



Figure 5: Obturation.

Discussion

The understanding of root canal anatomy and morphology is most important to provide the best Endodontic treatment. A wrong understanding most likely will lead to a failure of such treatment on an individual.

To understand the root canal anatomy a pre-operative radiograph is the key factor. It almost always clears the presence of variations within the root canal system which can be in the form of bifurcation, lateral canal and accessory canal because of root fusion, gemination or any other abnormality. A little change in the radiographic angle as 20° mesial or distal shift in horizontal plane can help in determining presence of an extra canal [25,26]. Endodontic surgical microscopes also can be useful in locating extra canals. The other method can be taking radiograph of the contralateral side. 67% bilateral symmetry in mandibular first molar was reported by Yew and Chan [27]. Additionally Tamse and Kaffe observed 89.65% contra lateral symmetry in cases of mandibular second molar with single conical roots [28]. Contra lateral radiograph was taken to find out the chances of similarity. The contra lateral side also showed the presence same root canal morphology.

In cases of C shaped canals radiograph always shows presence of a longitudinal groove in the middle of the fused roots [7,29]. In C shaped canal there is actually two canals having interconnections.

In this case the pre-operative radiograph already indicated presence of a single canal as it contains a typical tapering radiolucency towards the apex. There was a chance of presence of a C shaped canal. The removal of pulpal roof showed a single round orifice. Further exploration did not find any presence of extra canal. The extirpation of single solid pulp confirmed the presence of single root canal later.

A proper biomechanical preparation was done along with copious irrigation to ensure adequate debridement of pulp fragments and inner dentinal wall. This gives the certainty of the long term result of an endodontic treatment.

Conclusion

The clinician should be thoroughly aware of the external and internal anatomy of a particular tooth. He/she must know about the normal and abnormal root canal systems found in a given tooth to perform an Endodontic treatment.

Proper knowledge and radiograph can prevent excess loss of tooth structure in unnecessary search of an extra root canal.

The root canal found in this case can be determined as Vertucci's type I canal system.

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