



Root Canal Treatment of a Mandibular Second Molar With a Single Mesial Canal and Two Distal Canals

KEYWORDS

Mandibular second molar, Single mesial canal, two distal canals, unusual anatomy

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ABSTRACT For each tooth in the permanent dentition, there is a wide range of variation reported in the literature with respect to the frequency of occurrence of the number and shape of the canals in each root, the number of roots and the incidence of molar root fusion. Each case should be investigated carefully clinically and radiographically to detect the anatomical anomaly. The frequency of mandibular second molars with an abnormal anatomic configuration is common; The aim of the present article is to describe a case of a mandibular second molar with an unusual anatomy of having a single mesial canal and two distal canals which is in reverse to usually seen, encountered during routine endodontic treatment.

Introduction:

Normal root and root canal anatomy of the mandibular second molar are well documented in numerous textbooks. Mandibular second molar has two roots—one mesial and one distal with two, three, or four root canals¹⁻³. Normally mandibular second molar shows two mesial canals and a single distal canal. The prevalence of two mesial canals is 40%,⁴ 89%⁵ and one distal canal is 92%⁴ and 95%.⁵ The mesial root of the mandibular second molar has a higher incidence of one canal (14%) than does the mesial root of the mandibular first molar (4.2%)⁵

Unusual root and root canal morphologies associated with the mandibular second molar have been recorded in several studies in the literature⁶⁻⁸. Weine (1988) stated that this tooth may have more anatomical variations than all other molar teeth⁹. The root canals can take up any configuration and variability is not unusual. Castellucci (1987)¹⁰ observed two cases of three-rooted mandibular second molars with one mesial and two distal roots in both specimens. Manning (1990) has studied the root canal anatomy of 149 extracted mandibular second molars using clearing technique. He found that 22% had single roots, 76% had two roots, and 2% had three roots.¹¹ Costa Rocha et al.(1996) studied the external and internal anatomy of 628 extracted mandibular first and second molars. Analysis of mandibular second molars root showed that 84.1% presented two separate roots, 15.9% fused roots and 1.5% three roots.¹² The anatomy of mandibular second molar has racial variations; using periapical radiographs of 328 patients (105, Mongoloid origin; 106, Negro; 117, Caucasian), Ferraz and Pécora (1993) reported an incidence of three-rooted mandibular second molar in 2.8% of patients of Mongoloid origin, 1.8% of Negro origin, and 1.7% Caucasian.¹³ A thorough knowledge of mandibular second molar pertaining to the number of canals, canal morphology, correct radiographic interpretation, and tactile examination of canal walls are important in detecting the presence of multiple canals and ensuring successful completion of the endodontic treatment.

Presented here is a report of a case displaying morphological variations in the permanent mandibular second molar, which is very rarely reported in the literature.

CASE REPORT

A 24-year-old male had reported with a chief complaint of pain in relation to the right mandibular posterior re-

gion since a week. His medical history was noncontributory. Intraoral examination of the involved region, revealed deep caries associated with the tooth 47; 46 was missing. The tooth was also tender on percussion. No swelling or fistula was present. Patient gave a history of extraction of the tooth one-year back owing to carious involvement. Intraoral periapical radiograph (Fig. 1) of the tooth revealed radiolucency in the crown region of the tooth 47 approximating the pulp with a periradicular radiolucency.



Figure 1. Diagnostic Radiograph #47

The distal root of the tooth 47 showed two radiolucent lines extending from the pulp chamber to the apex. The root canal morphology confirmed the presence of two canals in the distal root.

An inferior alveolar nerve block was given to anesthetize the tooth and under rubber dam isolation an access cavity was prepared of the tooth 47. The access cavity preparation revealed the appearance of the floor of the chamber was similar to that of a C-shaped canal. In this case, three separate canal orifices were isolated and the mesiobuccal one was distally positioned. The pulp was extirpated from all the three canals and working length was determined with ISO 15 K file using an apex locator and it was confirmed using an IOPA (Fig. 2). IOPA revealed that the distal and the apparent mesiobuccal canal were associated in a Type II canal configuration.

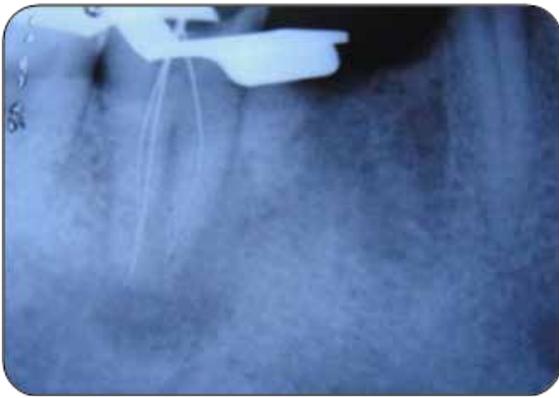


Figure 2. Working Length X-Ray #47

The cleaning and shaping was done using the step-back technique and using sodium hypochlorite and normal saline for copious irrigation

The three canals were enlarged up to a master apical size of ISO 30 K file. Coronal flaring was achieved with Gates Glidden drills (Dentsply-Maillefer) using no. 3 at the cervical and no. 2 at the middle-thirds of the root canals. An apical tug back was achieved with an ISO 30 gutta-percha cone and an IOPA was taken for confirming the master cone length. The canals were obturated using lateral condensation technique using gutta-percha points and root canal sealer (Endomethasone, Septodont). Access cavity was sealed with Type IX, High strength posterior restorative GIC (GC Corporation, Tokyo, Japan). After the patient was completely asymptomatic, fixed partial denture was given #45,46,47 to replace missing #46. Figure 3 shows postobturation IOPA taken after luting FPD.

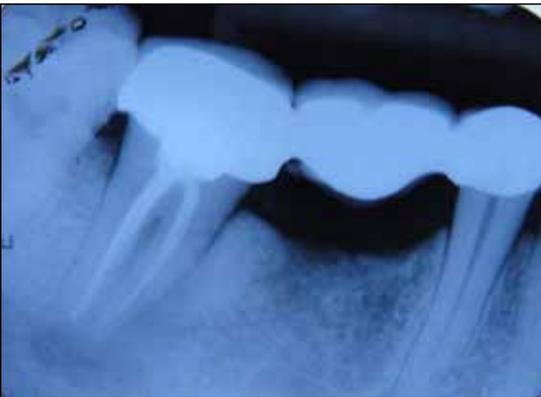


Figure 3. Post-Obturation Radiograph #47 Fixed Partial Denture #45,46,47

Discussion:

The present case described a mandibular second molar with a single mesial canal and two distal canals which is in reverse to the usual anatomy. The absence of apparent fins and a diffuse canal obturation separate this canal morphology from that seen in a C-shaped configuration.

Vertucci (1984), and Maniglia-Ferreira et al (2008) reported that a considerable number of failures could be assigned to anatomical variations, such as the presence of canals not usually found^{14,15}. Thus for good endodontic practice, it is necessary for the clinician to have sound knowledge of dental anatomy and its variations. The clinician should always keep in mind that anatomic aberrations can occur in any tooth and the recognition of these is achieved by thorough examination of the internal anatomy of the tooth and its radiographs. From a clinical standpoint, when the initial radiograph shows the image of an unusual anatomic form it is recommended to take a second radiograph for additional information particularly with a mesial or distal projection.¹⁶ Yoshioka et al. have indicated that sudden narrowing of the canal system on a parallel radiograph suggests canal system multiplicity¹⁷. Miyoshi et al, 1977 gave a general guide line is that if the mid-root image diameter appears equal to or greater than the crown image diameter, then the tooth most likely has a variation in root canal configuration¹⁸. The presence of additional canal should be suspected whenever an instrument demonstrates an eccentric direction on deeper penetration into the canal, termed directional control, as reported by Green(1973)¹⁹, or if the working length file appears off center in the radiograph. When anatomic variations are detected clinically, treatment can be performed with conventional or rotary instrumentation and root canal system filling techniques, respecting technical and biological principles.

Conclusion:

Human mandibular second molars show considerable anatomic variation and abnormalities with respect to number of roots and root canals. The knowledge of common anatomic characteristics and their possible variation is mandatory for the proper successful outcome of endodontic treatment.

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