Maxillary second molar with two separated palatal roots: Case series

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Abstract
Variation in the number or morphology of roots is challenging and may lead to failure of the root canal treatment if not recognized. It is common for the maxillary second molar to have three roots with three or four canals, but it is rare to have four separated roots. The present paper reported three cases of the maxillary second molar with two distinct palatal roots. The patients were Saudi citizen, and the cases were diagnosed after clinical and radiographic examination. Nonsurgical root canal treatments were performed successfully using warm gutta-percha and Adseal sealer. Cone-beam computed radiograph was taken to confirm the root morphology. Dentists should be aware of any deviation in the internal anatomy and morphology of the treated tooth. Different angled periradicular radiographs should be done and analyzed well besides following the principles of access cavity preparation.

Keywords: Cone-beam computed tomography, maxillary second molar, root canal treatment, second palatal canal

INTRODUCTION
Anatomic variation in the number of roots and root canals can occur in any tooth. Although such cases occur infrequently, dentists should be aware of them when considering endodontic treatment.[1] The maxillary second molars usually have three roots with three or four root canals. Anatomical variation of this tooth has been reported by several investigators. Slowey was the first dentist reported an endodontic treatment of the second maxillary molar with two distinct palatal roots,[2] while Baratto-Filho et al. 2002 reported two palatal roots in two maxillary second molars.[3]

The prevalence of two palatal roots in the maxillary second molar based on conventional radiographic examination was reported to range between 0.4% and 6.9%.[4,5] Kim et al. and Yang et al. using cone-beam computed tomography (CBCT) reported a range of 1.1%–1.5%.[6,7] Recently, Alenazy and Ahmad reported a clinical case of Saudi female having four-rooted second maxillary molar with two palatal roots and canals.[8] This paper presented a nonsurgical endodontic management of three cases of the maxillary second molar with two palatal roots of Saudi patients, two of them are sisters and the third was a male.

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CASE REPORTS

Case 1
An 18-year-old Saudi female patient of noncontributory medical history reported to the Dental College Clinic of King Khalid University (KKU) complaining of severe pain in her right upper posterior region of the mouth. She reported a history of previous swelling in that region 6 months ago. Clinical examination revealed deep carious lesion in occluso-distal surfaces of the maxillary right second molar (#17) with redness in its buccal mucosa. Cold test with Endo-ice (Endo-Frost Roeko–Coltene/Whaledent GmbH, Germany) revealed negative response. The patient responded to palpation and vertical percussion. The preoperative diagnostic radiograph showed periradicular radiolucency related to the distobuccal (DB) root. The preoperative radiograph also suggested some type of morphological variations in the number of roots and root canal [Figure 1a]. The case was diagnosed as necrotic pulp with symptomatic apical periodontitis.

Local anesthesia with 1.8 ml of mepivacaine 2% with levonorefrin 1:20,000 was administered. Tooth was isolated with rubber dam. Then, conventional access cavity was performed using round bur #4 and access bur. After complete deroofing, a square-shaped outlined access cavity was established. Four canals were located with a DG-16 endodontic explorer (Hu-Friedy, USA). Mesiobuccal (MB) and DB canals were located in their regular locations at the angles in the floor-wall junction, and two palatal canals, mesial palatal (MP) and distal palatal (DP) orifices, were located at 3 mm distance between them [Figure 1b]. The working length of each canal was determined using the apex locator (J. Morita Dentaport ZX, Japan) and confirmed with a periradicular radiograph. Coronal enlargement was done with Gates Glidden drills to improve the straight-line access. Canals were instrumented to the master files size 30 K (Mani, Inc., Japan) with copious irrigation with sodium hypochlorite 5.25% (LOJIC CHEM, Saudi Arabia) and normal saline (0.9% W/V sodium chloride-PSI, Saudi Arabia) alternatively. Canals were dried with paper points (Sure Dent, Korea) then dressed with a nonsetting calcium hydroxide (USP Pulpodent, USA). The access cavity was temporized with intermediate restorative material (PLASTOR, GHIMAS, Italy).

In the second visit, the canals were stepped back using three more sizes than the master apical file size and the access cavity also temporized. Canals were obturated in the third visit [Figure 2a and b] using Adseal resin sealer (Meta Biomed Co., Ltd., Chungbuk, Korea) and thermoplasticized gutta-percha (Thermafil, DENTSPLY, Maillefer, USA). Finally, the coronal access cavity was sealed using light-cure glass ionomer (Photac™ Fil Quick Aplicap™, 3M, Germany). The patient was referred to fixed prosthodontics department for crowning the tooth.

Case 2
A 19-year-old Saudi female patient of noncontributory medical history presented in a comprehensive dental clinical course in KKU with severe lingering pain in her upper right back tooth since 3 days. A clinical examination of tooth #17 showed a deep carious lesion (occluso-mesially). Pulp sensibility test with Endo-ice revealed severe lingered abnormal response that the last for 20 s. Tooth was severely tender to vertical percussion. Intraoral periradicular radiograph showed occlusal radiolucency involving enamel, dentin, and exposing the pulp with widening of the periodontal ligaments space apically [Figure 3a]. The tooth was diagnosed with symptomatic irreversible pulpitis with symptomatic apical periodontitis. Local anesthesia was administered, and the tooth was isolated with rubber dam then a conventional access cavity was done with complete deroofing of the pulp chamber. Four canals, MB, DB, and two palatal canals (MP and DP) were explored with DG-16 Endo-explorer [Figure 3b]. Pulp was extirpated using barbed broaches #10 (Mani, Inc., Japan) then working length was determined, and initial instrumentation for each canal was done using K-files #10 and #15 (Mani, Inc., Japan) along with irrigation with 5.25% sodium hypochlorite and 0.9% normal saline. All canals were dried with absorbent paper points, and the access cavity was sealed with PLASTOR intermediate restorative material.

Figure 1: Preoperative radiograph of tooth #17 (a). Occlusal photograph showing square access cavity with the four canal orifices (red arrows) mesiobuccal, distobuccal, mesial palatal, and distal palatal (b)

Figure 2: Occlusal view of tooth #17 showing obturation of canal orifices (a). Radiograph after obturation of the canals showing the four canals (b)
The patient came for the second appointment after 4 days with severe pain that disturbed her sleep and hemifacial swelling. An emergency treatment was carried out under rubber dam isolation where canals were irrigated with 5.25% sodium hypochlorite and 0.9% saline. The working length was verified with ZX-apex locator then all canals were shaped to file size 25K and dried with absorbent paper point. The canals were dressed with calcium hydroxide as intracanal medicament then the access cavity was sealed with PLASTOR temporary filling. Ibuprofen 400 mg analgesic was prescribed three times a day for 3 days.

In the third appointment, the patient came with no signs and symptoms; cleaning and shaping were completed using step-back technique; canals were dried then obturated using Thermafil gutta-percha and Adseal resin sealer [Figure 4a and b]. The coronal cavity was sealed with glass ionomer, and the patient was referred for final restoration.

Case 3
A 27-year-old Saudi male patient of noncontributory medical history was referred for elective endodontic treatment after crown removal of the maxillary left second molar (#27). Clinical examination revealed deep cavity preparation. The tooth was having normal response to pulp sensibility tests and was not tender to percussion. Intraoral periradicular radiograph showed no apical abnormalities [Figure 5a]. The treatment was performed in one visit under local anesthesia infiltration using 1.8 ml of lidocaine 2% with epinephrine 1:100,000. The tooth was isolated with rubber dam then access cavity and pulp extirpation were done. The canals were explored, and four canal orifices (MB, DB, MP, and DP) were located. Irrigation was done with 5.25% sodium hypochlorite then working length was determined using ZX-apex locator. Cleaning and shaping of all the canals were done with RaCe rotary system (FKG Dentaire – La-Chaux-de-Fonds, Switzerland) to 40/0.04 MB and DB and 50/0.04 MP and DP. Canals were filled with cone fitting of matching cones and Adseal resin sealer using continuous wave warm vertical condensation [Figure 5b]. The coronal cavity was sealed with PLASTOR intermediate restorative material and glass ionomer. The patient was referred to the prosthodontic department for crowning.

DISCUSSION
Root canal morphological variations of human teeth must be always considered before beginning the treatment. Maxillary second molars have the most complicated root canal system in permanent dentition.8–10 The floor of the pulp chamber is markedly convex, which gives the canal orifices a slight funnel shape, and their roots are shorter than the roots of the first molars and are that much curved.

Figure 3: Preoperative radiograph of tooth #17 (a). Occlusal photograph showing the trapezoidal outline of the access cavity (b)
of two palatal roots in the maxillary second molar in Saudi population has not been reported; however, only one case has been reported in the literature and was classified as Type I. Two of the treated cases were sisters having the same tooth (#17). No such cases were reported, and it could be genetic in that family. The access outline was enlarged in a square shape for better viewing of all canals. This was done because of the two palatal roots have a wider mesiodistal dimensions over the palatal cusps.

The number of roots and canals of the maxillary second molar can occur unilaterally or bilaterally. All cases were checked with CBCT [Figure 6] to view the contralateral tooth. It revealed a unilateral second maxillary molar with four roots.

**CONCLUSION**

Clinician should be aware of unusual root morphologies and canal configurations. Good and careful interpretation of preoperative radiographs of different angles, applying the principles of access cavity preparation and use of magnifying tools, is very important to recognize and detect any aberration in the morphology of the tooth to be treated.

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**REFERENCES**