

Root canal treatment of a maxillary second molar with two palatal roots: a case report

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Abstract

Knowledge of root canal morphology and variations is an essential factor to successful endodontic treatment. The incidence of a separate second palatal root in a maxillary second molar is very rare. The purpose of this case report is to describe the root canal treatment of a maxillary second molar with 4 separated roots and the variations in the internal anatomy of them, especially their palatal portion. A separate second palatal root was diagnosed in the preoperative radiograph. Careful radiograph examination and change in angulations of radiographs seems necessary for detection of normal variations.

Key Words: maxillary second molar, palatal root



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Introduction:

Endodontic treatment success depends on eliminating bacteria from the root canal space and preventing reinfection by obturating the root canal and obtaining a sound coronal seal. However, the complexity of the root canal morphology may present a challenge to clinicians for entire root canal debridement. Knowledge of root canal morphology and probable variations is an essential factor to successful endodontic treatment.

Normally, maxillary second molar has a mesiobuccal, a distobuccal, and a palatal root. The presence of two palatal roots in the second maxillary molars is a rare phenomenon^{1, 2}. Peikoff et al. observed 1.4% of maxillary second molars as having 2 palatal roots³ while, Libfeld and Rotstein reported a 0.4% incidence of 4 rooted maxillary second molars⁴. Some clinical case reports of extra palatal canals and/or roots in maxillary molars exist^{2, 5}. Alani⁶, Shin SJ *et al.*⁷, Barbizam *et al.*⁸, Baratto-Filho *et al.*⁹, de Almeida-Gomes *et al.*¹⁰, Ulusoy and Görgül¹¹, and Deveaux¹² reported maxillary second molars with two palatal roots. Christie *et al.* reported that they could detect maxillary molars with two separated palatal roots once every 3 years in an intense daily practice¹. The aim of the present case report is to describe the root canal treatment of a four rooted maxillary second molar with two palatal and two buccal roots.

Case Report:

A 25-year-old male was referred for root-canal treatment of his maxillary left second molar. The tooth was vital and symptomatic. Subjective and objective assessments were performed. The diagnosis was irreversible pulpitis. Radiographs were taken using XCP-DS® (Dentsply Rinn, USA) sensor

holder for Cygnus Digital Sensors (Cygnus Technologies LLC, Arizona, USA). In the preoperative radiograph evaluation (Fig. 1), the existence of two palatal roots was suspected. At the first appointment, the tooth was anesthetized and isolated with a rubber-dam and the access cavity was prepared. The working lengths of all canals were determined using the digital radiograph (Fig. 2) and electronic apex locator (Elements, Sybron Endo, Anaheim, CA, USA). Then the pulpectomy of four canals were performed. At the second appointment, one week later, the tooth was asymptomatic and the root canals were biomechanically prepared using RaCe (FKG Dentaire, Switzerland) rotary NiTi files. Mesiobuccal (MB) and distobuccal (DB) canals were prepared up to #25 0.06% and distopalatal (DP) and mesiopalatal (MP) were prepared up to #30 0.06%. The canals were irrigated with 2 ml 5.25% sodium hypochlorite between each subsequent file during instrumentation. Smear layer was removed prior to obturation using 17% EDTA for one minute and then irrigated with 5.25% sodium hypochlorite for one minute. Root canals were dried with multiple paper points and obturated by the cold lateral condensation technique with gutta-percha cones (Aria Dent, Tehran, Iran) and AH Plus sealer (De Trey-Dentsply, Konstanz, Germany). A postoperative radiograph was exposed (Fig. 3). Translucent glass post (RTD, St Egrevé, France) was placed in distopalatal canal and also two accessory glass posts were placed in mesiobuccal and distobuccal canals and cemented with resin cement (Xeno Cem Plus, Dentsply-Sankin) (Fig. 4). The tooth was restored with composite core build up material (Lumiglass, St Egrevé, France) and post restoration followed by porcelain fused to metal

(PFM) crown placement. One year follow up radiograph shows healthy tissues (Fig. 5).



Figure 1. Initial radiograph



Figure 2. Working length determination



Figure 3. Final radiograph



Figure 4. Shows a radiolucent post placed in the distopalatal canal



Figure 5. One year follow up radiograph

Discussion:

The usual maxillary second molar has one palatal root and two buccal roots. Four rooted maxillary second molar is a rare condition^{1, 2, and 13}. Alavi *et al.*¹⁴ as well as Lee¹⁵ couldn't find any maxillary molars with two palatal roots in their studies. However, some authors described few cases of maxillary second molars with 2 palatal roots or canals^{2, 5, 10, and 11}. Presence of extra canals or roots in the mesiobuccal portion of these teeth is more common^{15, 16}. Difficulties during endodontic treatment of maxillary second molar are due to its posterior position, superposition of anatomical structures in radiograms (such as zygomatic arch) which leads to failure of diagnosing unusual anatomy. Also, buccal roots of the same tooth could overlap the extra palatal roots, the same as in present case. Thus, tube-shift technique was used to identify the extra palatal root and to avoid the superimposition of the extra palatal root with buccal roots of the same tooth and the maxillary 3rd molar's roots.

Stone and Stoner reported variations of the palatal root of maxillary molars, such as a single root with two separate orifices, two separate canals and two separate foramina; two separate roots, each with one orifice, one canal and one foramen; a single root with one orifice, a bifurcated canal and two separate foramina¹⁷. Also Christie *et al.* classified the maxillary molars into three types according to their root separation level and their divergences

¹. In type I, maxillary molars have two well wide long separated roots, while in type II the roots are parallel and separated but shorter than type I and have blunt root apices. In type III, a web of dentin encages the roots except the distobuccal root. Also Barato-Filho *et al.* ⁹ reported a case that had a palatal root with two distinct root canals, but it was fused with the mesiobuccal root up to the apical level and suggested this variety as type IV in Christie classification.

Race and genetic factors may have an impact on incidence rate of such morphologic variations, but it is almost impossible to get a clear conclusion from few case reports in

certain communities and there is no distinct information in the literature.

In the present case, the extra palatal root could be detected in the digital radiograph. It can be concluded that, although the radiographs have limitations in giving information but careful evaluation of the radiographs are necessary. Moreover, a good knowledge of internal anatomy and possible normal variations is necessary as missed extra canals or roots could lead to root canal treatment failure. Because of having two well wide separated long palatal roots each with a distinct root canal, this tooth can be classified as type I according to Christie *et al.* ¹ classification.



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