

Maxillary second premolar with three canals Report of three cases

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تساعد القراءة الشعاعية الصحيحة في الكشف عن الجذور والأقنية الإضافية ويمكن تأكيد ذلك أو عدمه بالفحص السريري وسير الحجر اللبنة. يمكن للطبيب من خلال المعرفة الجيدة و القراءة الدقيقة للصورة الشعاعية التعامل الصحيح مع الحالات غير المعتادة . يتميز الضاحك العلوي الثاني، عادة، بقناة جذر واحدة أو قناتين . ومن النادر وجود ثلاث أقنية جذرية في الضاحك العلوي الثاني . يعرض هذا المقال ثلاث حالات للضاحك العلوي الثاني لأشخاص من الشرق الأوسط بثلاث قنوات جذور تم تشخيصهم و علاجهم بنجاح .

Clinically, precise determination of the internal structure of teeth, their form and number of canals could be a challenge. Correct radiographic interpretation can help in revealing additional roots or canals and further clinical observation and exploration of pulp chamber are necessary to rule out additional canal. Only a sound knowledge of teeth morphology and correct radiographic interpretation can help a clinician to predictably manage unusual cases. Maxillary second premolar often present with either having single or two canals. It is rare to see three canals in the maxillary second premolar. This article describes three cases of maxillary second premolar with three canals among the middle-east population which were diagnosed and treated successfully.

INTRODUCTION

Many of the difficulties in root canal treatment are due to variations in root canal morphology. Familiarity with the morphology of teeth and its variations before root canal treatment helps a clinician to predictably manage unusual root morphology in routine practice. A clinician can suspect unusual morphology either when radiographs offer clue of additional roots and canals or clinically when he encounters odd shaped pulp chamber of the tooth. Extra roots are an additional challenge which involves all aspects of root canal treatment.

The maxillary second premolar tooth normally has one root canal. Maxillary second premolar shows the percentage of the single canal to be in the range of 40% to 72% and two canals 28% to 58.6% among in vitro and in vivo studies.¹⁻⁸ In vivo studies have demonstrated a lower incidence of three root canals between 0.3 and 2%.^{1,3} Bellizi and Hartweel⁴ found only 1.1% in 630 maxillary second

premolars and Kartal⁵ reported only 0.6% among 300 maxillary second premolars. Pineda and Kuttler⁶ investigated 282 cases and did not report any with three independent roots. There are only few cases of maxillary second premolar with three canals and three independent roots.⁹⁻¹² The possibility of three canals in maxillary second premolar is quite small. However, even a low frequency of abnormal root canal anatomy should be considered in routine endodontic treatment to avoid their presence being noticed only after root canal treatment or postoperative discomfort to patient. This article describes three cases of the maxillary second premolar with three canals which were diagnosed and treated successfully.

CASE REPORTS

Case 1

A 30-year-old Kuwaiti female was referred to the Endodontic Department at Jahra Dental Center for root canal

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treatment of the maxillary left second premolar. The tooth had been pulpotomised by the referring dentist. Upon clinical examination, the tooth was asymptomatic and medical history was non-contributory. Pre-operative radiograph showed possibility of three roots, since the anatomy of tooth showed three root canals similar to that of the adjacent maxillary molars (Fig. 1).



Fig. 1. Pre-operative radiograph of maxillary left second premolar with three roots.

A standard endodontic procedure was carried out after local anesthesia and rubber dam isolation. The access cavity was modified by completely de-roofing the pulp chamber. On close observation, the outline of the access cavity on the buccal side was wider mesio-distally. Complete debridement of the pulp chamber was done by ultrasonic scaler Cavitron (Caulk Dentsply, USA) and further exploration of pulp chamber by a thin K-file lead to three canals, two canals on the buccal side and one on the palatal side. The two buccal canals were placed slightly apart from each other and opened separately. The diagnostic radiograph showed three distinct roots (Fig. 2). Working length was determined and the canals were prepared by crown-down technique with copious irrigation of sodium hypochlorite. Cone selection was made and obturated by lateral condensation technique on the

same visit. After one week, the tooth was asymptomatic and the tooth was restored with a permanent filling (Fig. 3).



Fig. 2. Diagnostic radiograph showing three distinct roots.



Fig. 3. Post obturation radiograph after permanent restoration.

Case 2

A 32-year-old female of Saudi Arabian nationality was referred to the Endodontic Department at Jahra Dental Center for root canal treatment of the maxillary right

second premolar. The patient stated that three months back, she had swelling and pain in relation to the upper teeth. The local dentist had initiated the root canal treatment by opening the tooth. Clinical examination showed that the maxillary right second premolar was slightly tender on percussion. Medical history was non-contributory. Pre-operative radiograph showed the presence of more than one root although the outlines of the root canals were not completely distinct.

A standard endodontic procedure was carried out and after de-roofing the pulp chamber, the outline of access cavity was found wider mesio-distally on buccal side. The palatal canal was located easily and exploring at the isthmus area with a small pre-curved K-file, possibility of two canals on the buccal side was noticed. The access cavity was widened, orifices were slightly enlarged using Gates Glidden bur and the canals were negotiated. Diagnostic radiograph showed three distinct canals and roots. The canals were prepared by crown-down technique with copious irrigation of sodium hypochlorite and obturated by lateral condensation procedure. The patient did not report for checkups. However, after three months, patient returned with pain in the maxillary right first premolar. On examination, the maxillary right second premolar, which was treated earlier was asymptomatic and had intact temporary filling. The first premolar tooth was diagnosed with acute periapical abscess and later treated. Second premolar was also restored with permanent restoration (Fig. 4). The patient was followed up for one year.

Case 3

A 28-year-old Kuwaiti male was referred to the Endodontic Department at Jahra Dental Center for root canal treatment of the maxillary left second premolar. The patient reported history of throbbing pain three weeks previously



Fig. 4. Postoperative radiograph after obturation.

in relation to the left upper quadrant for which he visited his local dentist who had initiated the root canal treatment by opening the tooth. Clinical examination showed that the maxillary left second premolar was slightly tender upon percussion. Medical history was non-contributory. The pre-operative radiograph revealed more than one root with indistinct canal outlines. A standard endodontic procedure was carried out. After access cavity preparation, it was wider slightly mesio-distally on the buccal side. Exploring at the isthmus area with a small pre-curved K-file, lead to two canals on the buccal side. The access cavity was widened, orifices enlarged and the canals were negotiated. Diagnostic radiograph showed three distinct canals and roots. The canals were prepared by crown-down technique with copious irrigation of sodium hypochlorite and obturated by lateral condensation technique and the case was followed up (Fig. 5).



Fig. 5. Post-operative radiograph of the maxillary left second premolar.

DISCUSSION

Failure to find and fill a canal is one of the reasons for failures in endodontic treatment. Prior to treatment, a tooth with unusual anatomical appearance on a radiograph should be carefully assessed, and additional radiographs with different angulations should be taken as its interpretation may reveal external and internal anatomic details that suggest the presence of extra canals and /or roots. Most often the pulpal floor maps of a tooth would lead to orifices of the canals. However, premolar teeth usually have a narrow pulp chamber, undefined floor and often the floor maps are difficult to visualize. Hence, it becomes more difficult to identify additional canal orifices and negotiate them routinely. Sometimes a close observation of the outline of pulp chamber may offer help in predicting unusual morphology. Usually, the outlines of the pulp chamber of a premolar tooth are bilaterally similar in shape of a ribbon. If any one side shows wider mesio-distal width, then one can suspect additional canal.⁹ Furthermore, to rule out additional canal, a suspected tooth needs modification of the access cavity, better visualization and manual exploring of the pulp chamber with a small size pre-curved file. Only awareness in variation of the morphology will help the clinician to

treat even uncommon tooth morphology predictably. The present finding of three canals in maxillary second premolar only reassures their presence among the Middle-East population.

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