

# Endodontic Treatment of a Mandibular Second Premolar with Three Roots and a Maxillary Second Molar with Two Seperated Palatal Roots

Üç Köklü Alt Çene İkinci Küçük Azı Dişi ve İki Ayrı Palatinal Kökü Bulunan Üst Çene Büyük Azı Dişinin Endodontik Tedavisi

## ABSTRACT

Presence of missed canals results in unsuccessful root canal treatment because of insufficient cleaning and obturation. The incidence of a maxillary second molar with two palatal roots and a mandibular second premolar with three roots has been rarely reported in literature. This case report describes the endodontic management of a maxillary second molar with two buccal and two palatal roots and mandibular second premolar with three separate roots. Successful endodontic treatment requires a detailed knowledge of root canal anatomy to overcome the anatomic variations of the root canal system. This would help in reducing endodontic failure due to incomplete cleaning and obturation.

**Key words:** Mandibular premolar, Maxillary second molar, Two palatal roots.

## ÖZ

Gözden kaçmış kanallar yeterli olmayan temizleme ve doldurma işlemine bağlı olarak başarısız kök kanal tedavilerinin ortaya çıkmasına yol açmaktadır. Üst çene ikinci büyük azı dişlerinde iki palatinal kök ve alt çene ikinci küçük azı dişlerinde üç kök görülme sıklığı literatürde nadir görülen bir durumdur. Bu olgu sunumunda iki bukkal ve iki palatinal köke sahip üst çene ikinci büyük azı dişi ve üç ayrı kökü bulunan alt çene ikinci küçük azı dişinin endodontik tedavisi anlatılmaktadır. Başarılı endodontik tedavide, kök kanalındaki anatomik farklılıkların üstesinden gelebilmek için iyi bir kök kanal anatomi bilgisine ihtiyaç duyulmaktadır. Bu durum yetersiz temizleme ve doldurmaya bağlı endodontik başarısızlıkların azalmasına yardımcı olur.

**Anahtar sözcükler:** Alt çene küçük azı dişi, Üst çene ikinci büyük azı dişi, İki palatinal kök.

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## INTRODUCTION

A successful endodontic treatment is related to the knowledge of the anatomy and morphology of the root canal system. Different variations like multiple foramina, apical deltas, furcations, and accessory canals have been reported in most teeth (1,2). Problems like apical leakage and the presence of micro organisms caused by insufficient canal obturation and presence of untreated canals lead to endodontic failures (3).

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Mandibular second premolars are declared as a teeth with single root and single canal. A successful root canal treatment may be challenging for them because of complex variations in their root canal morphology. The ovoid shaped root in cross section normally has developmental grooves or depressions on the mesial and distal surfaces. Cleghorn et al. reported 99.6% of mandibular premolars had one root, 0.3% of them had two and 0.1% of them had three roots (4).

The incidence of a maxillary second molar which has two palatal roots has rarely been seen in literature (5). Libfeld and Rotstein reported a 0.4% incidence of four rooted maxillary second molars in a radiographic survey done on 1200 teeth. Christie reported 14 cases of maxillary second molars with two palatal roots in a period of 40 years. Slowey reported a maxillary molar with two palatal roots (6). Al Shalabi et al., Green and Vertucci did not notice any maxillary second molars with two palatal root canals in their respective studies (7,8,9).

This paper describes the endodontic management of two cases of unusual variations in root and canal morphology

of mandibular second premolar with three separate roots and a four-rooted maxillary second molar with two buccal and two palatal canals.

## CASE REPORTS

**Case 1:** A 30-year-old male patient with no history of any systemic diseases referred to the Bülent Ecevit University, Faculty of Dentistry, Department of Endodontics. The patient had complaint of pain in the posterior area of the left lower arch. Clinical examination revealed a carious lesion in the mandibular second premolar. Tooth had positive response to vitality tests. Sensitivity to percussion was in the normal range. The preoperative radiographic evaluation revealed normal periodontium and presence of more than one root (Figure 1A, 1B). The tooth was diagnosed with irreversible pulpitis with normal periradicular tissues and it was decided to perform root canal treatment. Isolation was achieved by rubber dam after local anesthesia. To gain sufficient access to the canals, the conventional access cavity preparation was modified in the way that it was wider mesially. Evaluation

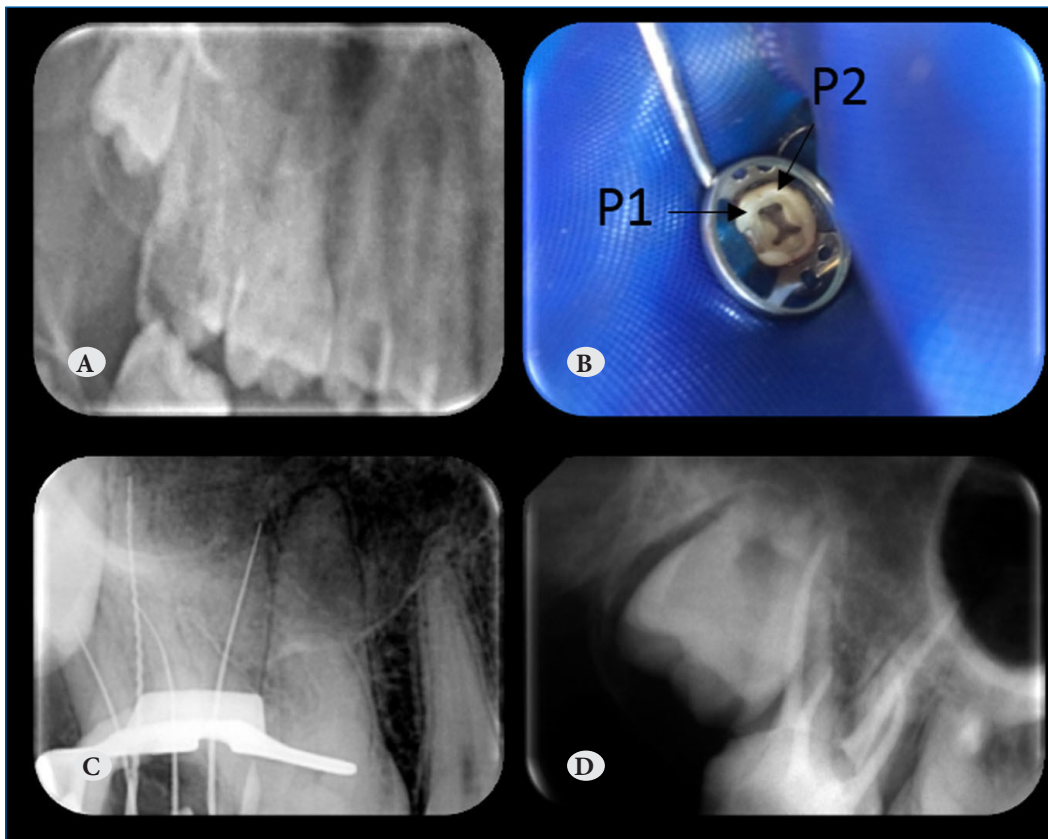


**Figure 1:** A,B) Preoperative images of mandibular premolar, C) working length determination, D) Radiograph after the obturation of root canals and coronal restoration, E) control radiograph.

on pulp chamber revealed three separate mesiobuccal, distobuccal and lingual orifices. Working length of each canal was determined with an apex locator (Root ZX, J Morita Inc, USA) and confirmed by taking a radiograph (Figure 1C). Shaping of the canals were carried out by ProTaper Universal nickel-titanium rotary file sup to size F2 (DentsplyMaillefer, Ballaigues, Switzerland). The canals were irrigated with 2.5% sodium hypochlorite and 17% EDTA during instrumentation. After final irrigation with saline solution, the root canals were dried with steril paper points and obturated with tapered single cone gutta-percha (DentsplyMaillefer, Ballaigues, Switzerland) and AH26 root canal sealer (Dentsply, De Trey, Konstanz, Germany) (Figure 1D). Final restoration was performed with amalgam. The tooth was asymptomatic with normal radicular conditions at 1 week follow-up (Figure 1E).

**Case 2:** A 15-year-old-female patient reported with a chief complaint of pain in the maxillary right posterior region. The clinical and radiographic examinations revealed a maxillary right second molar with deep disto-occlusal caries (Figure 2A). The clinical and radiographic findings led to a diagnosis of chronic irreversible pulpitis with maxillary right second molar, necessitating endodontic therapy. The tooth was anesthetized and the caries were

removed with stainless steel round bur. The standard access cavity was prepared. Laser assisted gingivectomy was performed to remove the gingiva on distal edge of tooth. The distal part of the tooth was restored with resin composite in order to place the rubber dam. Examination of the pulp chamber confirmed the presence of four orifices: two on the buccal aspect and two on the palatal aspect (Figure 2B). Access cavity was modified from conventional triangular to square shape in order to achieve straight line access for all canals. It was located mesial to the usual location of palatal canal and under the palatal aspect of the mesial marginal ridge. The two palatal canal orifices were more widely placed compared to the two buccal orifices. The working length of the each canal was determined by an apex locator (Root ZX; Morita). Furthermore, working length was checked with taking radiographs and confirmed the presence of four separate roots (Figure 2C). A biomechanical preparation was made by using crown down technique. The teeth were instrumented using ProTaper Universal nickel-titanium rotary files up to size F3 (DentsplyMaillefer, Ballaigues, Switzerland). Irrigation was performed with 2.5% NaOCl and 17% EDTA. The canals were dried and obturated with tapered single cone gutta percha and AHplus (Dentsply, De Trey, Konstanz, Germany) sealer



**Figure 2:** A) Preoperative radiograph of maxillary second molar, B) presence of four orifices: two on the buccal aspect and two on the palatal aspect, C) working length determination, D) radiograph after the obturation of root canals.

(Figure 2D). The final restoration was performed with composite resin. A recall after one week showed that the patient was asymptomatic.

## DISCUSSION

The internal morphology must be identified definitely to achieve intended endodontic treatment in second mandibular premolars which have varying morphology (10). Present case has shown the presence orifice on the lingual aspect and two orifices on the buccal aspect as Borna et al. reported in a case report (11). Even if the tooth was determined to have three different root canals before the initiation of the treatment, after working lengths were determined using an apex locator, they were confirmed by radiography to achieve more successful treatment result in this present case. The incomplete removal of pulpal tissue apart from imperfect instrumentation and incomplete filling is the most common cause for the failure of root canal treatment. This may occur due to the missing of extra canal during root canal procedure. Besides that, failure to determine extra canals and obturate them with care can lead to acute flare-ups during treatment and subsequent failure in endodontic therapy (12,13).

Four-rooted maxillary second molars' incidence is rare in the literature (14-16). Because of the maxillary molars' posterior location, it is difficult to determine their unusual anatomy. Beside that second palatal root canal of maxillary molars may not be diagnosed due to the superimposition of the anatomical structures on the radiographs of this region. To overcome the superimpositions and enable the clinician to identify abnormalities, taking several radiographs which exposed from different angles may be recommended. The possibility of two palatal roots must be considered when indistinct images of palatal roots are presented in preoperative radiographs. If this variation is confirmed, a modified coronal access will allow the correct localization of all root canals because location and management of all anatomy is crucial for endodontic success. Thus, thorough knowledge of the root canal system will help to reduce endodontic failures caused by incomplete debridement and obturation (17).

## CONCLUSION

Successful endodontic treatment requires a detailed knowledge of root canal anatomy to overcome the anatomic variations of the root canal. This would help in reducing endodontic failure due to incomplete obturation. However it is very rare for a mandibular

second premolar to have three roots and a maxillary second molar have two palatal roots, every tooth should be carefully examined radiographically and clinically before treatment.

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