Maxillary Canines with Two Root Canals

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ABSTRACT

The internal anatomy of the maxillary canine usually presents with one root and one radicular canal system. The purpose of this article is to highlight anatomical variations in permanent maxillary canines and also to present the treatment carried out on two cases of maxillary canines with two root canals with type II canal configuration of Vertucci classification. The first case is a 46-year-old female with a chief complaint of spontaneous pain associated with a maxillary left canine diagnosed as having irreversible pulpitis; the second case is a 55-year-old female patient who has been referred to our clinic for endodontic treatment before the prosthetic rehabilitation of a maxillary right canine. Both cases have been treated endodontically in single appointments.

KEYWORDS
Maxillary canine, root canal anatomy, two canals
INTRODUCTION

The main objective of endodontic therapy is the thorough mechanical and chemical cleansing of the entire pulp cavity and its complete obturation with an inert filling material. Variations in root and root canal anatomy are thought to affect endodontic treatment. A failure in endodontic treatment usually occurs because of insufficient debridement or incomplete canal obturation. In some cases, however, a root canal may be left untreated because of the failure to recognize its presence. The dentist must have a thorough knowledge of root canal morphology before he can successfully treat a tooth endodontically.

Maxillary incisors may vary dramatically in their internal and external morphology. Multiple canals and multiple roots of maxillary anterior teeth with or without any developmental anomalies have so far been reported. Maxillary canines are statistically more common to be single-rooted, single-canaled teeth and two root canals in a permanent maxillary canine is a rare condition.

This report presents two cases of maxillary canine having two root canals and their treatment procedures.

CASE REPORTS

CASE 1

A 46-year-old female patient was referred for endodontic diagnosis with a chief complaint of spontaneous pain associated with a maxillary left canine. The patient’s past dental history indicated that a direct pulp capping had been performed on the maxillary left canine with composite resin approximately one month before the referral. The medical history was noncontributory. The tooth was asymptomatic to palpation and responded within normal limits to electric pulp test. It responded with severe pain to percussion, severe and lingering pain to cold thermal test. No mobility was noted. Periodontal probing was within normal limits. Radiographic examination revealed a tooth with abnormal root canal morphology (Figure 1). The tooth was diagnosed as having irreversible pulpitis.

Following local anesthesia the tooth was isolated with rubber dam, and a lingual access was made. The vital pulp tissue was extirpated, and initially two canal orifices were located. The working length was determined visually by subtracting 1 mm from the length of a size 15 K-file (Dentsply Maillefer, Ballaigues, Switzerland) at the apical foramen. The middle and coronal thirds were prepared using Gates Glidden drills 1-3 (Produits Dentaires S.A., Vevey, Switzerland). It was found that the palatal canal joined the buccal canal just in the apical third of the root (type II canal configuration of Vertucci classification). The two canals were shaped to a size 40 master apical file using a step-back technique. The preparation was carried out with manually used nickel-titanium files. One milliliter of 1.25% sodium hypochlorite (NaOCl) was used for irrigation between each instrument. After the final irrigation, the canals were dried with paper points and obturated with lateral condensation technique using gutta-percha (Diadent, Chongju, Korea) and AH Plus sealer (Dentsply De Trey GmbH, Konstanz, Germany) (Figure 2). The tooth was restored with composite resin.

The patient was recalled after a 12-month period and found to be asymptomatic (Figure 3).

CASE 2

A 55-year-old female patient was referred to our clinic for endodontic treatment before the prosthetic rehabilitation of a maxillary right canine. A root retained removable maxillary overdenture was planned to preserve bone height and provide better denture stability.

The patient’s past dental history revealed that she had suffered from uveitis and had experienced allergic reactions to several antibiotics and prilocaine hydrochloride as a local anesthetic. The tooth was totally asymptomatic and palpation and percussion were negative. It responded within normal limits to electric pulp test. Peri-
odontal examination revealed gingival recession of 1 to 3 mm from cemento-enamel junction was noted in multiple areas. A periodontal pocket measuring about 5 mm in depth and a moderate bone lost were found. No mobility was noted.

Following local anesthesia the access established and the vital pulp tissue was extirpated. The canal was instrumented without rubber dam isolation because of patient’s refusal to accept a rubber dam application. A size 15 K-file was inserted to the estimated working length and a radiographic image was taken. A radiolucent line similar to an extra canal located laterally to the root canal instrument was seen (Figure 4). A further exploration in the access cavity demonstrated the presence of a different canal orifice, lying palatal to the main canal with type II canal configuration of Vertucci classification. After the middle and coronal third was prepared using Gates Glidden drills 1-3, two canals were shaped to a size 35 master apical file using a step-back technique. One milliliter of 1.25% NaOCl was used for irrigation between each instrument. After the final irrigation, the canals were dried with paper points and obturated with lateral condensation technique using gutta-percha and AH Plus sealer (Figure 5). About 10 mm of coronal gutta-percha was removed with a heated plugger to create space for a post. Seven days after the initial visit, the crown of the tooth was sectioned at the cemento-enamel junction using a water-cooled diamond disk and Dalbo-Rotex (Cendres & Métaux SA, Biel-Bienne, Schweiz), a root canal spherical anchor was placed in the canal space using glass ionomer (Figure 6). The exposed dentin around the ball attachment was restored with composite resin.

DISCUSSION

During the past years, there have been many studies of pulp morphology. The anatomical studies of Vertucci, Pineda and Kuttler, Black, and Green all state that maxillary incisors have a single root 100% of the time. A study by Caliskan et al. using the clearing technique has shown a different
type and number of root canals, their ramifications, and frequency of apical deltas of permanent teeth in a Turkish population. The percentage of permanent maxillary canines with type V canal configuration (one canal leaves the pulp chamber and divides short of the apex into two separate and distinct canals with separate apical foramina) was 2.17 and type III canal configuration (one canal leaves the pulp chamber, divides into two within the root, and merges to exit as one canal) was 4.35. However, they could not find any type II canal configuration in their study.

A review of the literature revealed that Alapati et al. was reported a maxillary right canine with type II canal configuration and Weisman was reported a bi-rooted maxillary left canine. The present cases have similar characteristics to that reported by Alapati et al. Two distinct canal orifices were located in a labial/palatal configuration. In both case the palatal canal coursed laterally and then curved back to join the main canal in the apical third, forming a type II canal configuration.

Teeth with type II canal configuration may present problems in treatment. Although one of the two canals, the one most continuous with the large main passage, is usually amenable to adequate enlarging and filling procedures, the preparation and filling of the other canal is often extremely difficult.

Failure to find and fill a canal has been demonstrated to be a causative factor in the failure of endodontic therapy. It is utmost importance that all canals be located and treated during the course of nonsurgical endodontic therapy. Although the prevalence of the root canal anomalies is rare, they can be detected by careful examination. Prior to the beginning of the treatment, a thorough knowledge of the root canal anatomy, radiographs from several different angles and a careful endodontic exploration may lead to suspicion or identification of additional canals and is certainly essential to give the highest possible chance for success.
REFERENCES


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