

CANAL VARIATION IN MAXILLARY CANINE

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ABSTRACT:

To report a rare case of maxillary canine with two root canals. The case describes the treatment of a maxillary canine with two root canals which was referred from department of prosthodontia for intentional root canal treatment for prosthetic rehabilitation. Clinical examination revealed a maxillary canine with carious lesion and responded within normal limits to electric pulp test. Radiographic examination revealed a distal carious lesion (close proximity to pulp) and also appeared to be an additional canal in this permanent maxillary canine.

Keywords: Endodontic treatment, maxillary permanent canine, root canal anatomy, two root canals

INTRODUCTION:

The etiology of endodontic failure is multifaceted, but a significant percentage of failures are related to the lack of knowledge of pulp cavity anatomy and failure to negotiate and obturate the canal in its entirety.^[1-3] The rate of failures after endodontic treatment as apical percolation because of incompletely obturated or a totally missed out canal.^[3] These missed canals contain tissue, as well as microbiota and irritants, which inevitably contribute to failure of endodontic treatment.

The pulp canal system in any tooth has the potential of being very complex with branching and divisions throughout the length of the root (Burns RC, Buchanan LS 1994)^[2]. The varying number of root canal systems in different teeth, their anatomy and interconnections have been studied and reported in several studies

(Pineda & Kuttler 1972, Bellizzi & Hartwell 1983, Vertucci 1984, Caliskan et al. 1995)^{[3],[4],[5],[6]}. Alapati et al^[7] and Onay and Ungor (2008)^[8] reported the presence of Type II canal configurations in maxillary canines. The clinician must be familiar with the various morphologic patterns in order to have the greatest chance of performing successful endodontic treatment procedures.

CASE DETAIL:

A 39 year-old healthy female patient reported to the Department Of Conservative Dentistry and Endodontics, Sharad pwar dental college India, with a chief complaint of pain for one week in the maxillary right anterior region. The pain was severe, sharp, localized and was initiated upon consuming hot substances. The pain lingered for several minutes, even after removal of stimulus and led to a disturbed sleep. Clinical examination

revealed a large carious lesion associated with the maxillary right canine, 13 and this tooth gave an exaggerated response to the cold thermal test. The tooth was asymptomatic to palpation, responded with severe pain to percussion and no mobility was noted. Radiographic examination revealed a distal radiolucency consistent with active caries that appeared to invade the pulp chamber space. There appeared to be a slight widening of the periodontal ligament space at the apex of the tooth 13 Figure 1.



Figure 1: Preoperative radiograph of maxilla right canine

A diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was established. Local anesthesia was administered and a medium thickness rubber dam of 6x6 inches (Hygienic; Coltene Whaledent) was placed to isolate tooth 13. Access to the pulp canal space was achieved using a round diamond bur (ISO 801001016, Komet, and Lemgo, Switzerland). Working length of 25mm was determined electronically using a Dentaport ZX Apex locator (J. Morita Mfg. Corp.). The canal was cleansed and shaped using ProTaper rotary NiTi files to size F1 (DENTSPLY Maillefer, Ballaigues, Switzerland). Even

after thorough cleansing & shaping of the canal, bleeding was observed at the location of the root canal orifice. A confirmation radiograph was taken with a ProTaper file in place at the predetermined working length using a shift cone technique and a second root was noted. The access cavity was extended in a palatal direction to facilitate the location of the extra canal. A digital radiograph was taken with instruments in both root canals Figure 2. Working length for the palatal canal was established as being 24mm using the apex locator and verified radiographically. The palatal canal was then instrumented with ProTaper files to a final size of F1. A 5.25% solution of sodium hypochlorite (Nicol 5, Ogna, and Milan, Italy) and 17% EDTA with +0.2% cetrimide (Largal Ultra, Septodont, Saint Maitre, France) were used alternatively as irrigants at every change of instrument. The canals were obturated with gutta-percha and AH-26 sealer (De Trey; DENTSPLY, Switzerland) using a lateral condensation technique with size A and B spreaders (Maillefer) Figure 3. The patient was recalled after 3 months and found to be asymptomatic Figure 4.



Figure 2: Radiograph showing working length of maxillary canine with two canals (B-buccal, P - palatal)



Figure 3: Post Operative Radiograph Obturated With Gutta-percha & Ah-26 Sealer



Figure 4: Radiograph of maxillary canine after 3 months follow-up

DISCUSSION:

The objectives of root canal treatment are to debride the root canals of pulp tissue remnants, microorganisms and bacterial products prior to obturation, thus inducing a favorable environment for healing of periradicular tissues (Seltzers S and Bender I B 2000) ^[9]. Diagnosis and identification of the root canal system morphology is therefore imperative. The difficulties of diagnosis and the possible

superimposition of canals on radiographic examination should be borne in mind when examining such cases. When locating extra canals, it is important to identify the periodontal ligament space that often projects onto the root surface and may resemble a canal. In this case report, examination of the pulpal floor and angled radiographs taken with a file in place confirmed the existence of the extra canal.

Many of the difficulties associated with root canal treatment are due to variations in root canal morphology. Knowledge of anatomic variations is essential because endodontic success is related to a thorough debridement of the root canal system. Vertucci (1984) ^[5] classified root canal systems into eight types, according to the number of canals present and their configuration.

Studies of maxillary canines revealed only one root canal to be present (Pineda & Kutler 1972, Vertucci 1984) ^{[3],[5]}. Caliskan et al (1995) ^[6] reported that the main root canal system in maxillary canines could diverge into two separate root canal systems as the canal progressed apically. The root canals either converged along their course to end in a common apical opening or terminated as two distinct apical foramina. The highest reported incidence; however, is that of a single root canal system, accounting for 93.48% of all screened teeth in a Turkish population (Caliskan et al. 1995) ^[6], 75.4% in Chinese Guanzhong population (Weng X et al. 2009) ^[10] and 94.2% in Sri Lankan Population (Peiris R et al. 2008) ^[11]. The majority of maxillary canines have one

root canal system, but according to Caliskan *et al.*^[6] 4.35% and Weng X *et al.*^[10] 2.3% may have two root canals but exit as single canal (Type III) and 2.17% may have two distinct root canals with separate apical foramina (Type V)^[6], both of which should be identified and managed (Hulsmann M and Schafer E 2009)^[12]. To the best of our knowledge the occurrence of two roots and two separate canals as described in the present case, has not yet published

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CONCLUSION:

This report shows a case of the presence of a second canal in a single-rooted maxillary canine. This case report is given to increase the awareness of clinicians on aberrations in tooth morphology of anterior teeth and to show that special care is needed to detect and treat possible extra canals.

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