



ENDODONTIC MANAGEMENT OF MAXILLARY FIRST MOLAR WITH AN ANATOMICAL VARIATION OF TWO PALATAL CANALS: A CASE REPORT

Endodontics

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ABSTRACT

An in-depth knowledge of the root canal anatomy is important for any successful root canal treatment; however, complexities exist within the root canal morphology. The maxillary first molar has variations in its root morphology and canal configurations. In literature, this variation is only observed in an estimated 1.12%-1.17%. One such case is described in this case report which provides the endodontic management of a right maxillary first molar with two palatal canals using loupes magnification.

KEYWORDS

Anatomical variation of two palatal canals, complex root canal morphology, endodontic management, loupes magnification, maxillary first molar, successful root canal treatment, two palatal canals.

Introduction

The basic concept of root canal treatment is thorough mechanical cleaning and complete debridement with copious amounts of irrigation followed by three-dimensional obturation thereby obtaining a hermetic seal. The concept of a hermetic seal was first termed by Grossman in 1967.[1] It is necessary to identify the aberrant anatomy of the root canal prior to treatment, as failure to recognize such variations may lead to unsuccessful treatment.

The normal anatomy of maxillary first molar is three roots (two buccal and one palatal) with three canals (one mesiobuccal, one distobuccal and one palatal). The occurrence of two palatal roots in a maxillary first molar is a rare phenomenon. The occurrence of two palatal roots is rare but a few cases were reported by Stone and Stroner with anatomical variations.[2] In literature, this variation is only observed in an estimated 1.12-1.17%.[3]

This case report discusses the successful endodontic management of maxillary first molar with an anatomical variation of three roots and four canals.

Case Report

An 35-year-old female patient presented with dull, aching pain in her right upper back tooth region for the past 2 weeks. The patient's medical history was non-contributory. On clinical examination, distoproximal decay was seen in the right maxillary first molar. The tooth was tender on percussion. Radiographic examination revealed a prosthesis given without endodontic therapy and a deep distoproximal caries extending up to the pulp chamber [Figure 1]a. These findings led to the diagnosis of symptomatic irreversible pulpitis for which root canal treatment was deemed necessary. Prosthesis was removed using crown removal kit. Topical anesthesia of 20% Benzocaine was applied at the injection site. Local anesthesia of 2% lidocaine with 1:80,000 epinephrine was administered. Caries excavated with the help of a round bur. Access cavity was prepared using endo access bur. Safe-ended access bur used for complete deroofing. Coronal enlargement was done using Gates Glidden (GG) drills for straight line access. The pulp tissue was removed using 3% sodium hypochlorite. Mesiobuccal distobuccal and palatal canals were located. Troughing was done using an ultrasonic tip. Following which mesiobuccal 2 and a second palatal canal was negotiated with the help of DG-16 endodontic explorer under endodontic loupes and was confirmed radiographically.

The working length was determined using an Apex locator and RVG with #15 K- files [Figure 1]b. Initial instrumentation was done up to #25 K- file to full working length with copious Sodium hypochlorite irrigation (2.5%) and normal saline (0.9%). Final instrumentation was done using ProTaper Gold up to F2 with 17% Ethylenediaminetetraacetic Acid (EDTA). Final irrigation was done with copious amount of saline.

Master cone radiograph was taken [Figure 1]c. The canals were dried with absorbent paper points. The canals were obturated using standardized 6% taper 25 size gutta-percha points and AH-Plus root canal sealer. Post – endodontic restoration was done using Hi-dense [Figure 1]d.

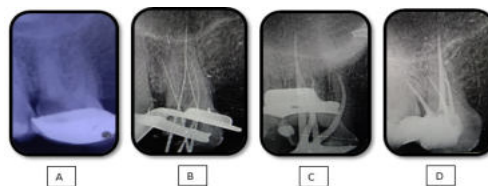


Figure 1

A) Preoperative periapical radiograph; B) Working Length; C) Master cones; D) Post-obturation periapical radiograph

Discussion

Poor oral hygiene in a localized area or fissure that is difficult to clean leads to decay, which is caused by the release of proteolytic enzymes by cariogenic bacteria. It leads to the destruction of the organic matrix by chelation. Chelation refers to a negatively charged chelating agent which releases positively charged calcium ions from enamel and dentin. This leads to detachment of organic crystals from one another thereby leading to cavitation. Exposure of blood vessels, lymphatics and nerves to the decaying area leading to dental infection/abscess.

Endodontic infection develops in root canals devoid of host defenses, as a consequence of pulp necrosis (as a sequel to caries, trauma, periodontal disease, or invasive operative procedures) or pulp removal in incomplete root canal treatment.

In advanced stages of the endodontic infectious process, bacterial organizations resembling biofilms can be observed adhered to the canal walls.[4] Depending on several bacterial and host-related factors, endodontic infections can lead to acute (symptomatic) or chronic (asymptomatic) apical periodontitis.

This article presents with a variation of the maxillary first molar which the dental practitioners do not frequently consider. The unusual anatomy of the maxillary first molar is difficult to diagnose because of its location. Superimposition of the anatomical structures on the radiographs may result in difficulty to diagnose a second palatal canal. Several radiographs from different angles may help to overcome the superimpositions and enable the clinician to identify this rare abnormality. One of the most important reasons for endodontic treatment failure is due to the presence of micro-organisms as a result of incomplete instrumentation, inadequate cleaning, insufficient obturation and missed canals.[5]

Thorough knowledge of the root canals and its variations is essential to reduce endodontic failures. Vertucci's proposed a classification for root canal morphology in the year 1984. Christie et al. proposed a classification system for four-rooted maxillary first molar variations depending on root separation level and divergence.

The incidence of a maxillary first molar with two separate canals is less than 1%.[8]

Endodontic loupes aid in proper visualization and identification of root canal morphology and their variations. Although these variations are not common, it is important for the clinicians to be aware of the unusual root morphologies to avoid incomplete root canal treatment and thereby minimizing root canal treatment failures.

Conclusion

This article demonstrates the successful management of a left maxillary first molar with four canals. Clinicians should have a thorough knowledge of unusual anatomical variations and canal configurations. It is also essential to look for anatomical variations even in a seemingly normal tooth. Proper clinical examination and visualization are essential for a successful endodontic treatment.

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