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CASE STUDY

EXPECT THE UNEXPECTED- CASE SERIES ON MAXILLARY MOLARS WITH EXTRA PALATAL ROOT AND TWO PALATAL CANALS

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ABSTRACT

A good understanding of variations, aberrant anatomiesmainly concerning the location and treatment of all canals, is a prerequisite for the success of endodontic therapy. Clinicians often relate the success of endodontic treatment with the detection of MB2 canals neglecting the possibility of occurrence of rare entities like additional palatal root and canals. Thus this case report highlights the need to have an eye for the variations in canal morphology occurring palatally contributing to the successful diagnosis and treatment of such cases.

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INTRODUCTION

Maxillary molars have huge variations seen in the number of roots ranging from one to five roots. However, three roots are most commonly encountered. An extra root is a developmental radicular morphological variant. Accessory root formation usually occurs through two means, either by splitting or folding of the HERS. (Cleghorn *et al*., 2006; Tu *et al*., 1998) Maxillary molar teeth with four-roots have been reported to occur in 0.9%, 1.4% and up to 7% in first, second and third maxillary molar teeth, respectively. (Peikoff *et al*., 1996; Sidow *et al*., 2000; Neelakantan *et al*., 2010) Baratto-Filho *et al*. (2009) evaluated internal morphology of maxillary molars and found that second palatal canal prevalence in ex vivo assessment, 2.05%, in clinical assessment 0.65%, and by cone-beam computed tomography, 4.55%.

Case 1

A 51 year-old male patient presented with the chief complaint of spontaneous toothache in his right posterior maxilla for one week. The pain exaggerated by thermal stimuli and on mastication for the past 1 month. Clinical examination revealed a carious maxillary right second molar (tooth 17), which was tender to percussion. Vitality testing of the involved tooth with heated gutta-percha (Dentsply Maillefer, Ballaigues, Switzerland) and dry ice caused an intense lingering pain, whereas electronic pulp stimulation (Parkel Electronics Division, Farmingdale, NY) caused a premature response. A preoperative radiograph revealed disto-occlusal radiolucency, approaching the pulp space (Fig. 1A). From the clinical and radiographic findings, a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made and endodontic treatment was suggested. The tooth was anesthetized followed by rubber dam isolation. An endodontic access cavity was made and the three canals mesio-buccal, disto-buccal and palatal were located. On careful examination, the dentinal map on the floor of the pulp chamber revealed an extra palatal orifice under the microscope and the access cavity was refined to a more square form wider palatally. Orifice enlargement was done with a nickel-titanium ProTaper series orifice shaper (Dentsply Maillefer, Ballaigues, Switzerland). (Fig. 1B). The working length was determined with the help of an apex locator (Root ZX; Morita, Tokyo, Japan) and later confirmed using a radiograph, which revealed the two palatal canals joined in apical third (Fig.1C). Cleaning and shaping was performed using ProTaper nickel-titanium rotary instruments (Dentsply Maillefer) with Irrigation using 3% sodium hypochlorite solution, and 17% EDTA; 2% chlorhexidine was used as the final irrigant. The canals were dried with absorbent points (Dentsply Maillefer), and obturated with standarised gutta-percha points (Dentsply Maillefer) and

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AH Plus resin sealer (Maillefer, Dentsply, Konstanz, Germany) (Fig. 1D, 1E). The tooth was then restored with a posterior composite resin core. (Fig.1F). The patient was advised for full-coverage crown.

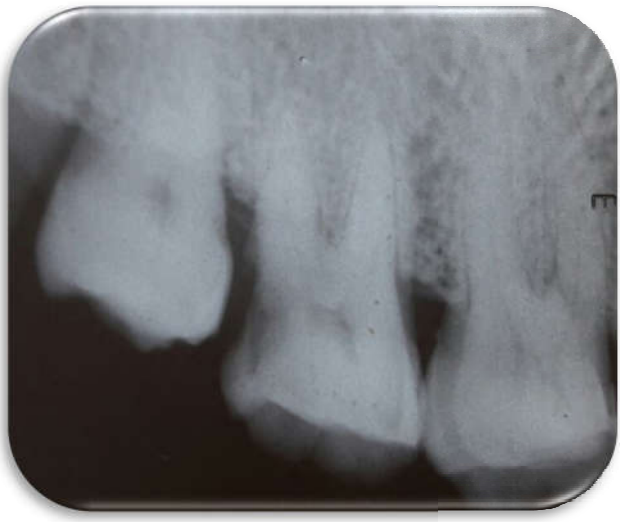

Figure 1A. Pre-operative X- ray

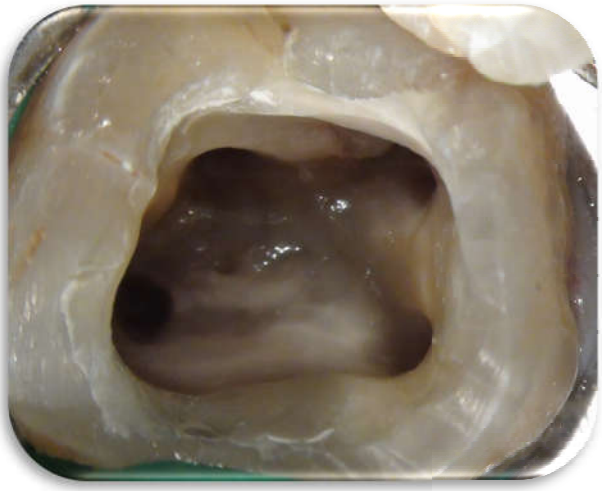

Figure 1B. Access opened

Figure 1C. Working length

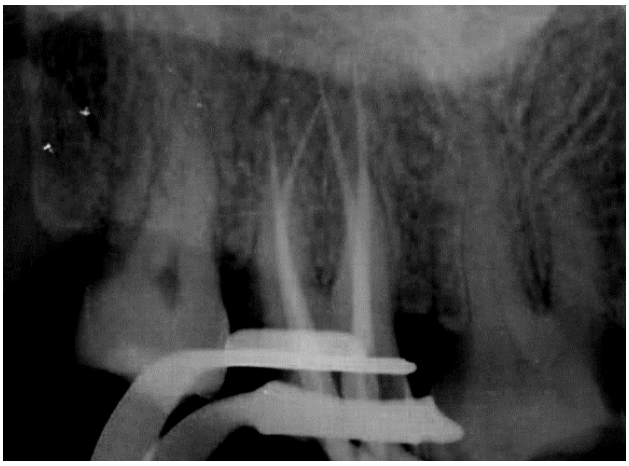

Figure 1D. Mastercone

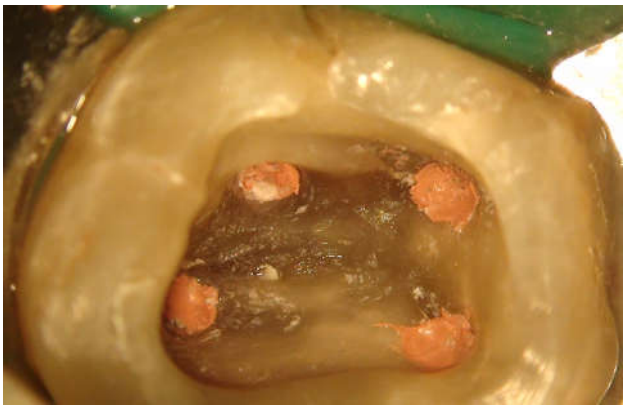

Figure 1E. Microscopic image after obturation

Figure 1F. Access closure

Case 2

A 34-year-old female patient reported with symptomatic irreversible pulpitis in upper second premolar and first molar. Preoperative radiograph revealed an additional palatal root on 16. This unusual morphology and canal configuration was confirmed with cone beam computerized tomography (CBCT) scans (Fig. 2B, 2C). It showed two independent palatal roots, which were relatively broad, presenting two distinct foramina till the apical level. This indicates a type 1 tooth, according to the classification of Christie *et al*. (1991) Preparatory measures were made as in case 1. Theaccess cavity was wider on the

palatal than usual, with a rhomboidal shaped access rather than triangular (Fig. 2D). After removing the tissues located in the pulp chamber, two orifices were observed on the palatal part of the tooth. Coronal flaring was carried out with Gates-Glidden (numbers 3 and 2; Dentsply Maillefer). All canals were cleaned and prepared with nickel-titanium Mtwo (VDW GmbH) files with a crown-down technique. One week later, obturated with AH plus and laterally condensed gutta-percha points and tooth was restored with a posterior composite filling. (Fig 2E, 2F and 2G)

Figure 2A. Pre-operative X-ray

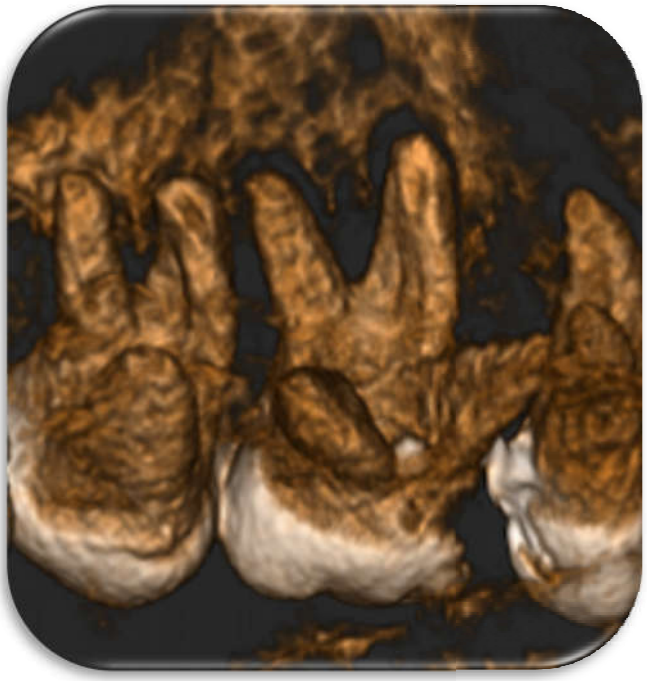

Figure 2B. CBCT image

DISCUSSION

The dental pulp has a variety of configurations and anatomy throughout the dentition. It is noteworthy to see that 42% incidence of missed roots or canals that contribute to 19.7% failure rates in endodontically treated teeth. (Hoen and Pink, 2002; Song *et al*., 2011) These missed or untreated canals contain necrotic tissues and bacteria that cause chronic symptoms and nonhealing periapical lesion.

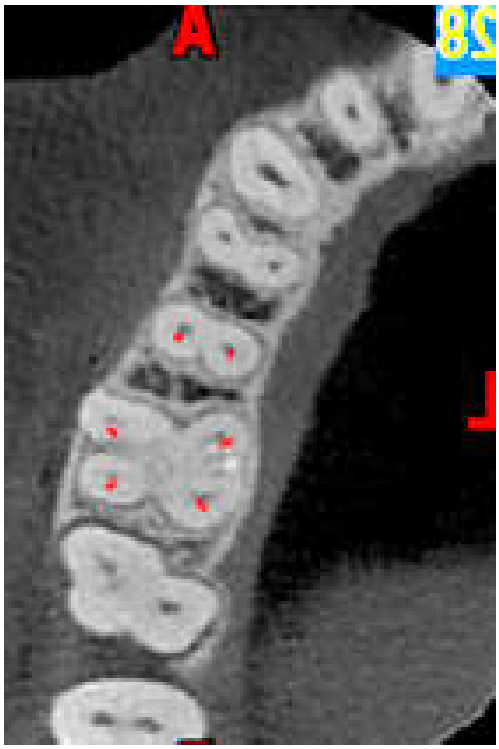

Figure 2C. Cross- sectional image

Figure 2D. access opened

Figure 2E. Obturation

Therefore, a thorough knowledge of tooth morphology, careful interpretation of radiographics, adequate access to and exploration of the pulpal space are prerequisites for all root canal procedures. (Rubinstein and Kim, 2002) This is enhanced

by magnification and illumination, troughing of anatomic grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, performing a sodium hypochlorite "champagne bubble" test, (Krasner and Rankow, 1990) and root canal bleeding points.

Figure 2F. Working length

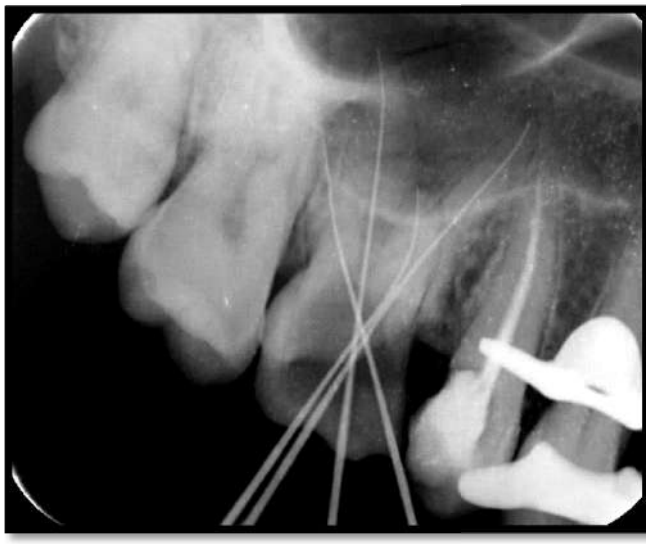

Figure 2G. Mastercone

Sequential application of 17% aqueoethylenediaminetetraacetic acid (EDTA) and 95% ethanol has been recommended for effective cleaning and drying of the pulp chamber floor before visual inspection. (Stropko, 1990) The recommended guidelines for treating and filling such complex canals – includes unobstructed access cavities, pre-curving of files, careful progression through each file size, thorough irrigation, and filling of the canals using suitable-sized flexible spreaders should be strictly followed to avoid procedural complications and mishaps.

Conclusion

The root and root canal morphology varies greatly. Although rare, knowledge of existence of such oddity like additional palatal canals or two separate roots each with its own canal should be considered when treating maxillary molars. The undetected extra roots or root canals are a major reason for the failure. Hence the ability to locate all the canals in the root canal system is an important factor in determining the ultimate success of a case.

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