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RESEARCH ARTICLE

PERPLEXING ANATOMIC VARIATION IN MAXILLARY FIRST PREMOLAR WITH THREE ROOTS AND THREE ROOT CANALS: A CASE REPORT

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ABSTRACT

The maxillary first premolar, which is said to be a metamorphic tooth between incisors and molars, normally has two roots with two root canals. But, an endodontist must always be expecting aberrant anatomical variations as these teeth may have a third canal present, which is easy to miss if the tooth anatomy is not understood and the canals are not searched meticulously. This article presents one such anatomical variation in maxillary first premolar, which presented with three roots and three root canals.

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INTRODUCTION

The first step, towards achieving a successful root canal treatment, is a detailed and an in-depth knowledge about the comprehensive anatomy and the morphology of a tooth. A proper access, shaping and cleaning, disinfection and obturation are surely significant and indispensable, but if a clinician is uncertain about his anatomical knowledge, then the outcome of a root canal treatment becomes questionable. Root canals are left untreated when the dentist fails to identify them particularly in teeth that have additional root canals (Pitt Ford, 2004; Bander *et al.,* 2010). The maxillary first premolar normally presents with two cusps, where the buccal cusp is larger than the palatal, two roots and two root canals but, the literature suggests that maxillary first premolar exhibits the greatest variation in root anatomy and root canal morphology (Bander *et al.,* 2010; Dax and Pravin, 2011; Ash and Nelson, 2003). Thus, one should always be anticipating disparities from the normal. Radicular irregularities consist of fused roots with separate canals, fused roots with interconnections or "webbing", fused roots with a common apical foramen and the unusual but always to be considered three- rooted tooth (Sulaiman *et al.,* 2013).

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The incidence of one root varies from 22% to 49.9%; two roots, 50.6% to 72% and three roots, 0 to 6% (Carns and Skidmore, 1973; Vertucci and Gegaulf, 1979). Mariusz et al. (2005) found 9.2% of first maxillary premolars with three canals. Three rooted premolars are anatomically similar to molars and are sometimes called "small molars or radiculous molars" (Maibaum, 1989; Goon, 1993). Persons with turner's syndrome may often present with three rooted upper premolars (Midtbø and Halse, 1994). The case report presents the endodontic management of a maxillary premolar with three roots and three canals.

CASE REPORT

A 37-year-old male presented to the department of conservative dentistry and endodontics with a chief complain of severe, continuous pain in the maxillary right upper back tooth region since last two day .Dental history revealed that the pain was moderate and continuous in nature and intensified by thermal stimuli and on mastication. The medical history was non contributory. Facial inspection did not reveal any pathologic signs. Clinical examination revealed a proximal lesion in the maxillary right first premolar. The tooth was also tender on percussion. The preoperative radiographic of the involved tooth indicated caries which approximated the pulp (Fig. 1).The clinical and radiographic findings led to a diagnosis of

symptomatic irreversible puplitis, for which a nonsurgical endodontic therapy was planned. The tooth was anaesthetized by using 2% lidocaine with 1:200,000 adrenaline. An access cavity was established under rubber dam isolation (Fig 2). #2 and #4 round burs were used in the beginning followed by endoaccess bur (DentsplyMaillefer, Switzerland). Initial outline form was oval and two orifices, buccal and palatal were located following the dentinal map, bleeding points and a DG16 explorer (Hu-friedy, Chicago IL). On exploration of the pulp chamber, aberrant anatomy was found so to confirm the aberrancy a CBCT was advised (Fig 3, 4). The images confirmed the presence of a second buccal canal.

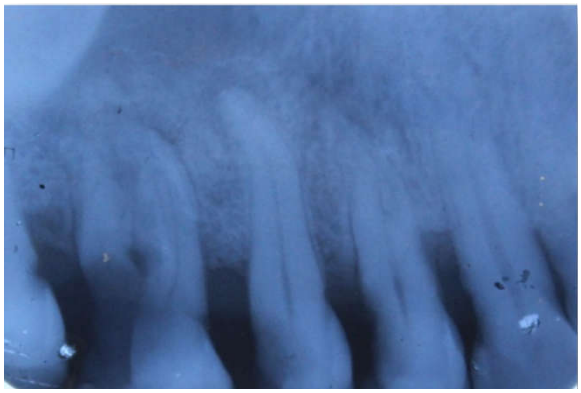

Fig. 1. Pre-Operative Iopar

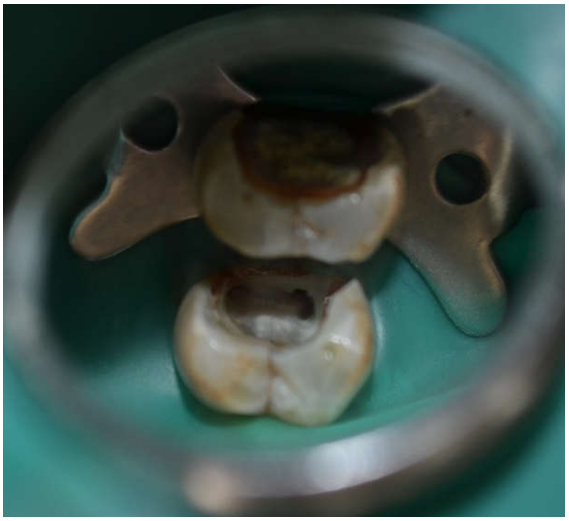

Fig. 2. Rubber Dam Isolation & Access Opening

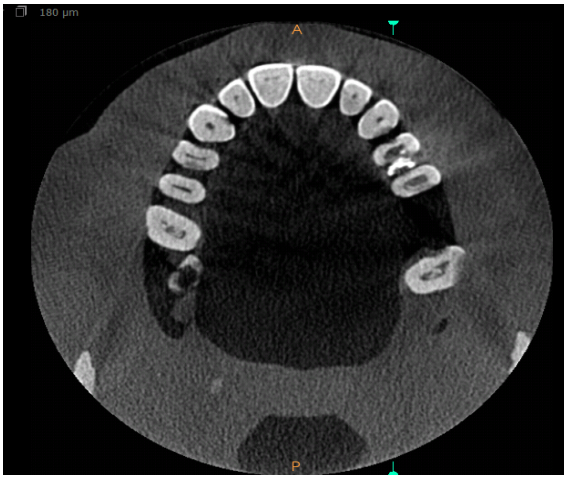

Fig. 3. Cbct Image 1

Troughing was performed with the help of an ultrasonic tip (Endosonic, Woodpecker Mectron handpick) after which a second canal orifice was also discovered bucally. The canals were explored by using a no. 10 K stainless steel file. The working lengths were determined with apex locater (Propex II, DentsplyMaillefer, Switzerland) and confirmed radiographically.The working length radiograph shows the presence of 3 distinct roots and their 3 respective canals, the mesiobuccal, the distobuccal and the palatal (Fig 5).

Fig. 4. Cbct Image 2:Confirmation Of 3 Roots & 3 Canals

Fig. 5. Working Length Iopar

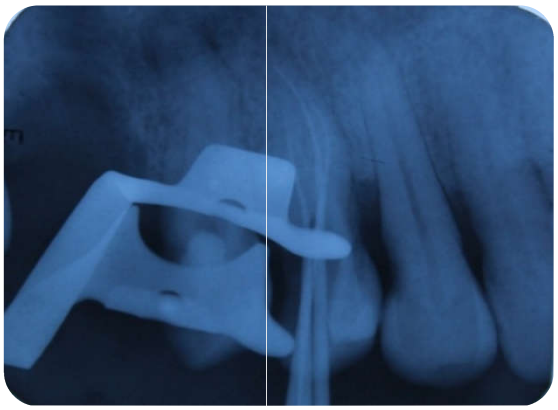

Fig 6. Master Cone Iopar

Chemo mechanical preparation was performed by using the 2% taper k –files till no 20 (Maillefer, Dentsply, Ballaigues, Switzerland), then final prepration was made with 20 -4% in Mesio-buccal and Disto-buccal canals and 25-4% in palatal canal (HERO shaper) under irrigation with 5.25% sodium hypochlorite and 15% EDTA (Glyde, Maillefer, Dentsply, Ballaigues, Switzerland) with intermittent irrigation with saline in all the 3 canals.

The master cone radiograph was taken (Fig 6). The root canals were dried with paper points (Maillefer, Dentsply, Ballaigues, Switzerland) and they were obturated with cold, laterally condensed gutta-percha 20-4% and 25-4% in buccal and palatal canals respectively. (Maillefer, Dentsply, Ballaigues, Switzerland) (Fig 7)

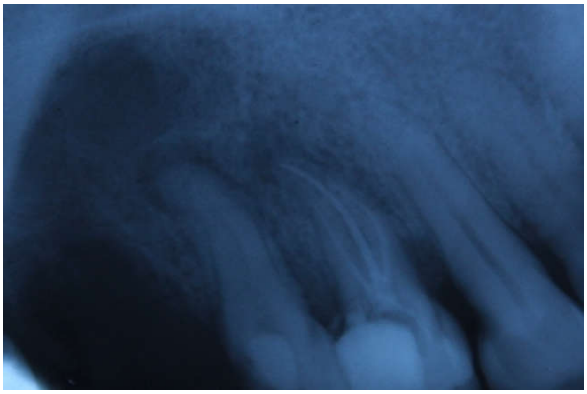

Fig. 7. Obturation

DISCUSSION

The presented case report contributes to the review of the literature for the presence of aberrancy in maxillary first premolar. Thus, an endodontist must always be extremely careful while studying the pre-operative radiograph and then, while taking an access into the tooth. The pre-operative radiograph must always be shot in various angulations. This gives a lot of hint in determining the presence of extra roots and canals. Whenever there is an abrupt straightening or loss of radioluscent canal in the pulp cavity, a third canal should be suspected, either in the same root or in the other independent root (Soares and Leornado, 2003). According to Sieraski et al. three roots should be expected in a premolar when the mesio-distal width of the mid root image is equal to or greater than the crown image (Sieraski *et al.,* 1989). Multiple canals are common when a radiograph shows an intra canal instrument as eccentric in the roots (Caliskan *et al.,* 1995). A third canal should be suspected clinically when the pulp chamber does not appear to be aligned in its expected bucco-palatal relationship. Additionally, if the pulp chamber appears to deviate from normal configuration and seems to be either triangular in shape or too large in a mesiodistal plane, more than one root canal should be suspected (Al-Fouzan, 2001). The access cavity for maxillary premolars is usually oval shaped in bucco-palatal cross section. Chauhan and Singh have suggested a T-shaped access cavity for a three rooted maxillary first premolar. This modification is for convenient access to the buccal roots (Chauhan and Singh, 2012). CBCT is another auxiliary in determining the presence of aberrancy. It is an advanced diagnostic tool, which gives a three dimensional picture in determining the morphological variations in the anatomy. Searching for canal bleeding points, following the dentinal map, staining the pulpal floor with 1% methylene blue dye and champagne bubble test are another ways to locate extra canal orifices.

Conclusion

The canals missed and the canals located, both bear so much significance, that they actually decide the success or the failure of an endodontic treatment. Thus, to make an extra effort to look for these variations are worth the endeavour.

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