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RESEARCH ARTICLE

MANAGEMENT OF MAXILLARY THIRD MOLAR WITH FOUR DIFFERENT ROOTS DIAGNOSED USING CBCT: A RARE CASE REPORT

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ABSTRACT

Aim: To present a case with variation in the canal configuration and morphology of maxillary third molar, which was diagnosed and endodontically treated successfully. Knowledge about root canal anatomy and morphology of root canal system plays an important role in the prognosis of endodontic treatment and its success. There are many variations in number of roots and canal configuration in maxillary molars. Undetected anatomical variations of roots or root canals which remain untreated are one of the main reasons for endodontic failure. Moreover, treating the third molars present a great challenge for endodontists because of their known inaccessibility and variability. The present paper describes a case of a right maxillary third molar with a canal configuration rarely reported in the literature. The tooth had four different roots with four root canals, two individual palatal roots one mesiopalatal and one distopalatal.

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INTRODUCTION

A 34 year old male patient presented with chief complaint of pain in tooth in upper right back region of the jaw for last 15 days. History of present illness revealed intermittent throbbing pain, localized with moderate intensity, lingering after removal of stimulus. On clinical examination tooth showed temporary restoration on the occlusal surface. Pulp testing revealed that the tooth responded abnormally to thermal and electrical pulp testing. Preoperative diagnostic radiograph revealed radiopaque temporary filling material approaching to the pulp with same tooth i.e 18 and root canal treated tooth number 17 with separated instrument and short obturation with mesial canal (Figure 1). There were no periapical or furcal radiolucencies. Patient reported a history of root canal treatment with adjacent tooth 6 months ago and a treatment on the tooth with chief complaint (i.e 18). Patient's medical history was non-contributory. Based upon the history, clinical examination, pulp testing and the radiograph, the condition was diagnosed as chronic irreversible pulpitis and the endodontic treatment was scheduled.

Root canal treatment was explained to the patient for tooth number 18 and retreatment was advised for tooth number 17. Patient declined for the retreatment of tooth number 17. Root canal treatment with tooth number 18 was initiated after obtaining the consent. The opposing third molar was healthy and in good occlusion. The temporary restoration was removed and access was obtained to the pulp chamber after administration of local anaesthesia (2% Lignocaine with 1: 100000 epinephrine), under rubber dam isolation (Hygienic Dental Dam, ColteneWhaledent Germany). The endodontic access cavity was done using a pedo-head hand-piece which improves the access to the third molars. After careful inspection and examination under a surgical operating microscope (Global Surgicals Corporation, St Louis, MO, US), floor of the pulp chamber revealed a peculiar 'X' type pattern of the dentinal map that indicated presence of four canal orifices. Patency was ascertained using a 10 no K-file (Kerr, Orange, California). Canals were thoroughly irrigated with normal saline followed by 5.25% sodium hypochlorite. The working length of the tooth was first measured manually and

then by Root ZX apex locator (J. Morita Mfg. corp., Kyoto, Japan) which was confirmed radiographically (Figure 2). On radiograph there was an evidence of an extra root which appeared as file going in the perforation. A CBCT scan was performed to ensure the exact morphology of root canal in a three dimensional manner which confirmed the four separate roots on tooth number 18 (Figure 3 a, b, c). Biomechanical preparation was done with 21mm Hyflex EDM Nickel Titanium files (Coltene / Whaledent) to get the improved access. Root canals were irrigated with 5.25% NaOCl and activated using the EndoActivator (Dentsply) to achieve a complete chemo-mechanical debridement followed by a final rinse with 5ml of sterile saline. Subsequently a calcium hydroxide dressing (RC CAL, Prime Dental Products,India) was placed for a period of 7 days. A small sterile cotton pallet was placed and the access cavity was temporarily sealed with Cavit (3M ESPE, Saint Paul, MN). After 7 days, the root canal was re-entered and irrigated alternately with 5.25% NaOCl and sterile saline to remove the temporary dressing; 17 % EDTA solution was used for 5 minutes which was later rinsed with 5 ml of sterile saline. Appropriate gutta-percha master cones (Dentsply, Maillefer, Switzerland) were selected and confirmed radiographically (Figure 4).

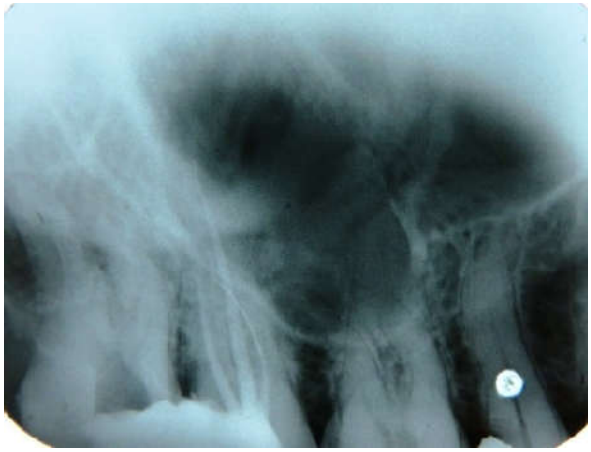


Figure 1. Preoperative radiograph

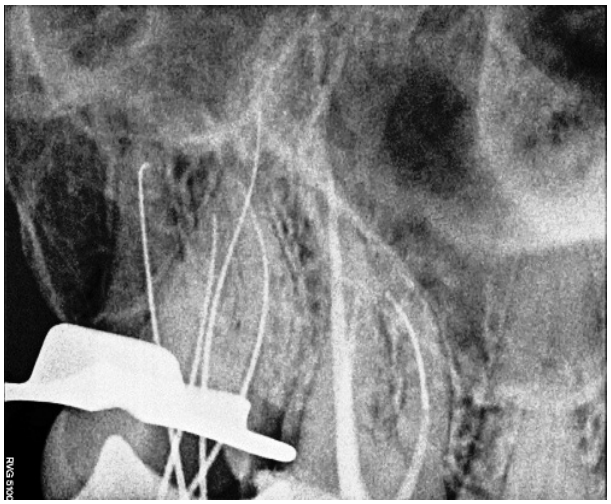
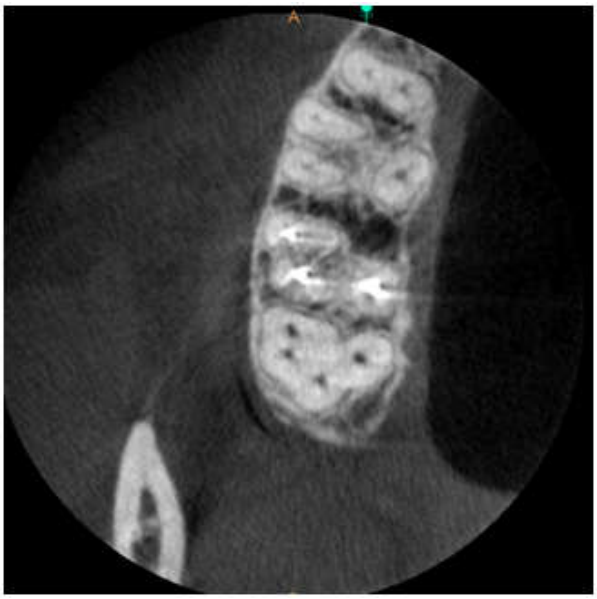


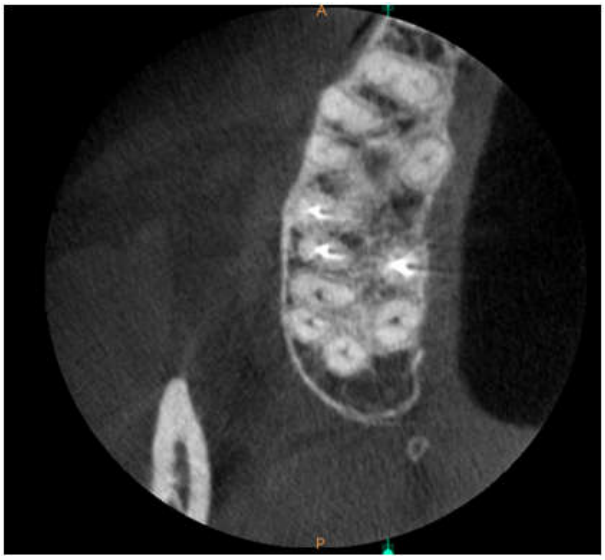
Figure 2. Working length radiograph

The root canals were then thoroughly dried with sterile absorbent paper points and obturation was performed using AH plus sealer (Dentsply, Maillefer, Switzerland) and gutta-percha by cold lateral condensation technique. Due to the limited access, hand spreaders were used instead of finger spreader to have better access over treating tooth.

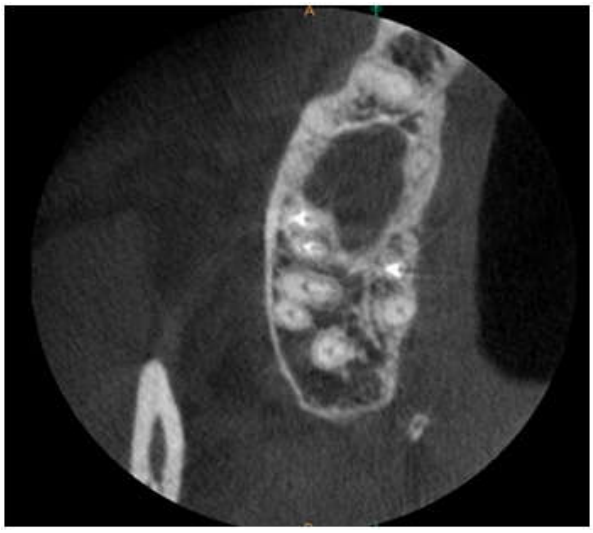
Radiographs were taken from different angulations to confirm the apical sealing of all four different roots (Figure 5 a,b,c).



(3a)



(3b)



(3c)

Figure 3. (a) CBCT Coronal section (b) Middle section (c) Apical section

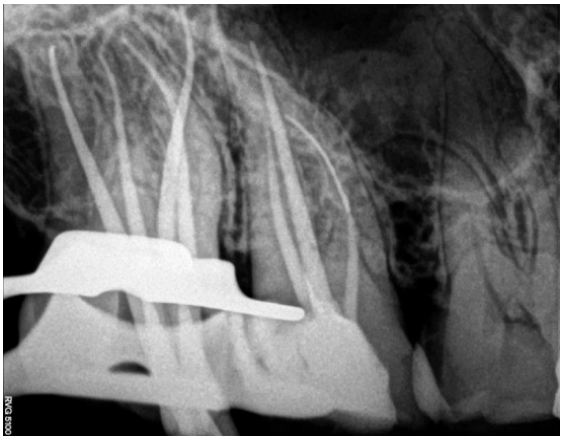
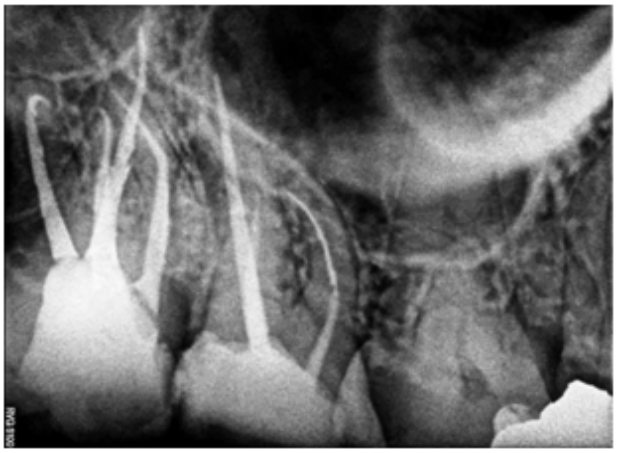
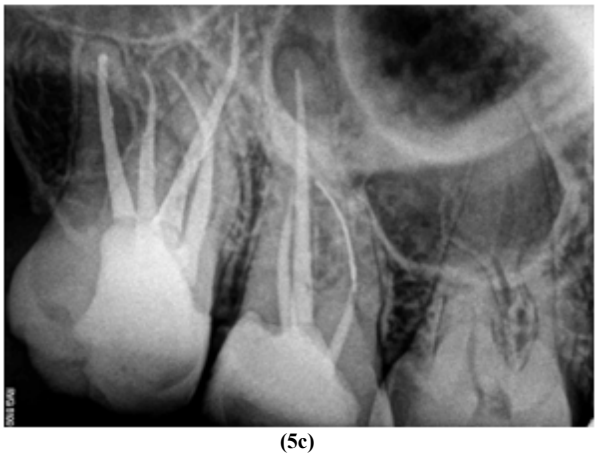


Figure 4. Master cone radiograph

(5a)



(5b)



(5c)

Figure 5. (a,b,c) Obturation Radiograph from different angulation

Figure 6. Six months follow up Radiograph

Post endodontic obturation, tooth was restored using posterior resin composite (P60; 3M Dental Products, Saint Paul, MN). The patient was advised with full - coverage crown. After six-month follow-up, the patient was asymptomatic and demonstrating a functional tooth number 18. On clinical examination, there was no mobility or pain in response to percussion, palpation, or biting and the patient had a healthy gingiva with no periodontal pockets on probing. Radiographic examination revealed the tooth and its surrounding tissues to be within normal limits with intact obturation (Figure 6).

DISCUSSION

The major goal of endodontic treatment is to completely remove the microorganisms and debris by cleaning and shaping and three dimensional obturation of the entire root canal system. The up-to-date knowledge about the anatomy and morphology of root canal system is an important factor for endodontic treatment. Adequate knowledge, precision of work and patience to find the canals are all important in this respect. Undetected extra roots and extra canals can lead to endodontic failures. Hoen and Pink reported an incidence of 42% of missed roots or canals in their analysis that required retreatment (Hoen, 2002). The number of roots/canals in maxillary third molars varies from one to five. In 2000 Sidow *et al*. evaluated 150 maxillary third molar roots and reported the prevalence of one root 15%, two roots 32%, three roots 45% and four roots 7% of maxillary third molars (Sidow *et al*., 2000). The major objective of contemporary dental practice is the minimum intervention and retention of every functional tooth in the dental arch including third molars. The fully erupted and functional third molars may serve as abutments for fixed or removable prosthesis. Furthermore, these molars may be auto-transplanted to replace badly decayed or missed first or second molars (Ahmed, 2012). Occurrence of four roots in maxillary third molar is a rare clinical scenario and is least documented in the literature. The majority of maxillary molars are found to have three roots (one palatal, one mesiobuccal and one distobuccal root). Christie *et al*. reported that the circumstance of four rooted maxillary molars was once in every three years of busy endodontic practice and they recorded as low as only 16 cases in forty years of clinical experience. The occurrence of two palatal roots though rare should be considered to ensure a thorough cleaning, shaping and obturation of the root canal system for successful endodontic therapy (Christie, 1991). The four rooted third molar has been reported in 1-3% incidence in various studies.

In 1998, Guerisoli *et al*. examined 155 maxillary third molars of which only 5 (3.2%) were four-rooted (Guerisoli *et al*., 1998). In 2002 Alavi *et al*. examined 151 maxillary third molars of which 3 (2%) were four-rooted (fused) and 3 (2%) were four-rooted (other types) (Alavi *et al*., 2002). In 2008 Cosic *et al*. reviewed 56 maxillary third molars and reported1.8% to be four-rooted (Cosic *et al*., 2008). In the present case the challenge was the inaccessibility of third molar which was managed by using pedo-head contra-angle hand-piece, small size 21 mm files hand as well as rotary and hand spreaders instead finger spreader. Radiographs play an important role in detecting such anatomic variations. When examining the preoperative periapical radiographs of maxillary molars, if the outlines of the roots are unclear, the root canal shows sharp density changes or the apices cannot be well defined, then extra roots can be suspected (Kannan, 2002). When a straight-on periapical radiograph is being assessed, and the palatal root cannot be identified between the mesiobuccal and distobuccal roots; the existence of two palatal roots should be suspected (Ahmed, 2012). In the present case, a straight on periapical radiograph of the maxillary right third molar revealed the outline of the periodontal ligament space of the two buccal and two palatal roots as the palatal roots were longer and divergent compared to the buccal roots. The confirmation was done by limited volume CBCT scan. Use of modern methods such as cone beam computed tomography (CBCT) and dental operating microscope can help clinicians to identify the accurate morphology of canals and pulp chamber to perform a successful endodontic treatment. In this case, reading the dentinal map of the chamber floor was also a major guidance for the location of the extra disto-palatal root orifice. To date, there is no case report in the literature documented for presence of four rooted maxillary third molar with two buccal and two palatal roots. This case report highlights the importance of looking for additional roots and root canals so as to enable clinicians to treat the case successfully, which might have otherwise ended in treatment failure.

Conclusion

Root canal treatment of third molars is challenged by their limited accessibility and variable morphology. Identification of additional roots and root canals is critical as untreated roots and canals can lead to endodontic failure. Nevertheless, with proper diagnosis and treatment planning, endodontically involved third molars may be successfully treated and retained as a functional component in the dental arch.

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