Endodontic management of bilateral maxillary 2nd molar with a single root and a single canal diagnosed using spiral Computed Tomography scan

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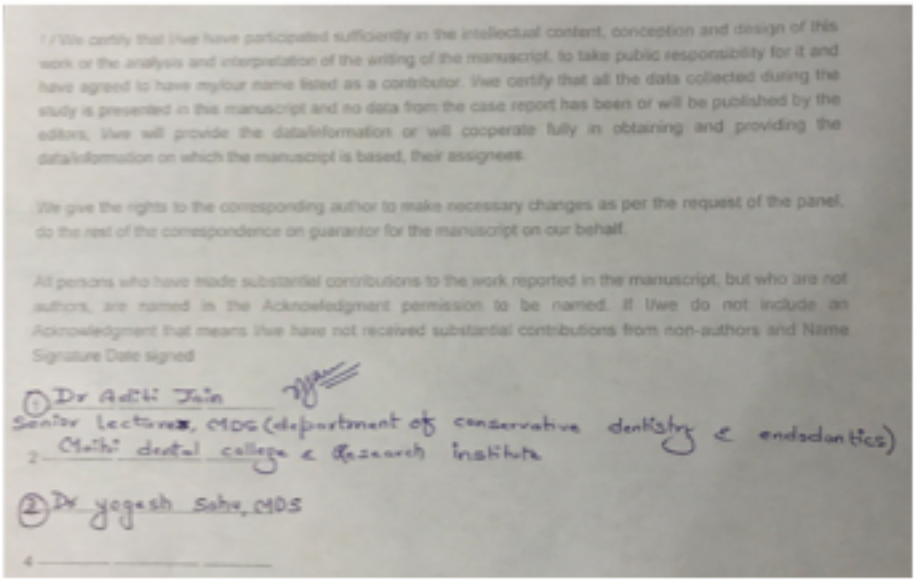
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Abstract

Unusual root canal anatomy in multirooted teeth represents a continuous challenge for diagnosis and successful endodontic treatment. Presence of extra root and canals is commonly encountered but the possibility of existence of fewer numbers of root and root canals also exists. For this reason, clinicians should be aware that variations of root canal systems need not always be in the form of extra canals, for this reason thorough knowledge of root canal morphology, appropriate assessment of the pulp chamber floor and critical interpretation of radiographs are a prerequisite for successful root canal treatment. This case report presents a maxillary second molar with an unusual morphology of single root with single canal.

Keywords: single root, bilateral, maxillary 2nd molar, spiral CT

Introduction

A complete knowledge of the root canal anatomy and its most frequent changes, especially in multirooted teeth is of paramount importance for diagnosis and successful endodontic therapy. It has been observed that the variation in root canal morphology can occur in any racial groups depending on various factors such as age, sex and ethnicity that play a role in determining the pattern of the root canal.[1]

Endodontic literature is replete with studies showing unusual morphology both in maxillary and mandibular 2nd molar. Morphologic variations in permanent maxillary molars that have been frequently reported pertain to the presence of extra roots, canals or fused roots, apical ramifications, apical deltas or lateral canals and "C" shaped canal. The occurrence of a single root in the maxillary molar is rare, and even rarer in case of permanent maxillary second molar. The primary step in root canal treatment is the identification of the internal morphology of canal system as precisely as possible. Routinely, root canal anatomy can be diagnosed using conventional radiographs but nowadays spiral computed tomography scan is a new three dimensional diagnostic modality to determine root canal morphology.

A case of single root in the deciduous maxillary first molar is also reported. In the light of the above context, the present paper highlights the role of spiral computed tomography to confirm the three dimensional anatomy of a relatively rare case of single rooted permanent maxillary second molar with type I root canal configuration.

Case report

A 40 year old male reported to the department of conservative dentistry and endodontics with the chief complaint of spontaneously occurring moderate pain in upper right back teeth region since 4 days. Pain aggravated on taking hot beverages and during night while sleeping. A diagnosis of acute irreversible pulpitis was made. Medical history was noncontributory. Intraoral examination revealed distal carious lesion with 17 and 27. Preoperative radiographic examination suggested unusual root canal morphology with both the maxillary molars. Hence, multiple radiographs in different angulations were taken, that revealed a single root and a single root canal. Once the

confirmatory diagnosis was made with spiral CT the root canal treatment was planned (Figure 1) Treatment plan comprised of nonsurgical endodontic treatment with teeth 17 & 27.

Patient's informed consent was obtained. Under local anaesthesia and rubber dam isolation, caries were removed from both the teeth and standard access opening was done at the center of the pulp chamber. Working length was determined using Electronic apex locator (Root ZX) and confirmed using RVG.

Cleaning and shaping was done using a step back technique upto ISO master apical #50. Irrigation was performed with 3% sodium hypochlorite solution. Calcium hydroxide paste was used as an intracanal medicament. Canals were then irrigated with 17% aqueous EDTA solution as a final flush. Root canals were obturated with gutta-percha and AH Plus sealer using cold lateral compaction technique (Figure 2 and 3). The tooth was subsequently restored. Follow up was done for 6 months and the patient were found to be clinically asymptomatic.

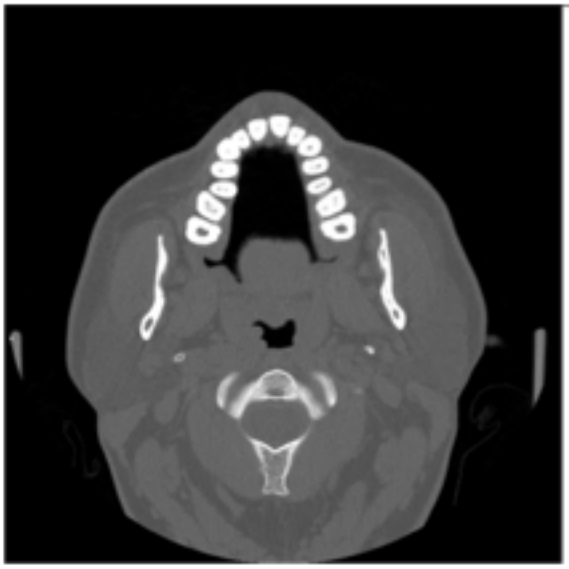

Figure 1 – Preoperative spiral computed tomography scan showing single root and single canal with 17 and 27

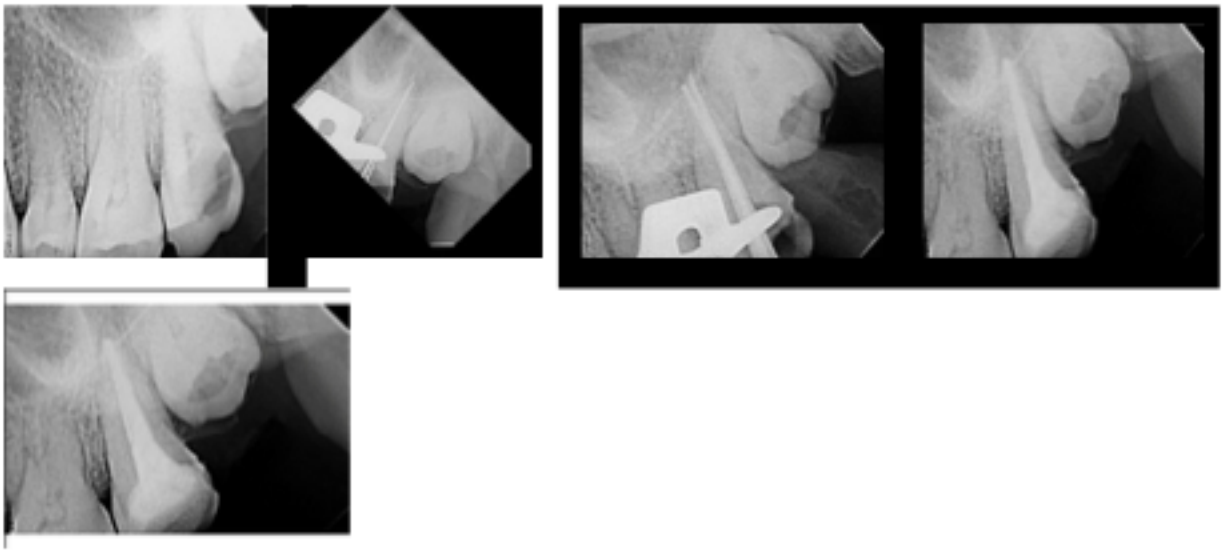

Figure 2 – Preoperative IOPA of 17, working length, Master cone, Obturation and follow up after 6 months

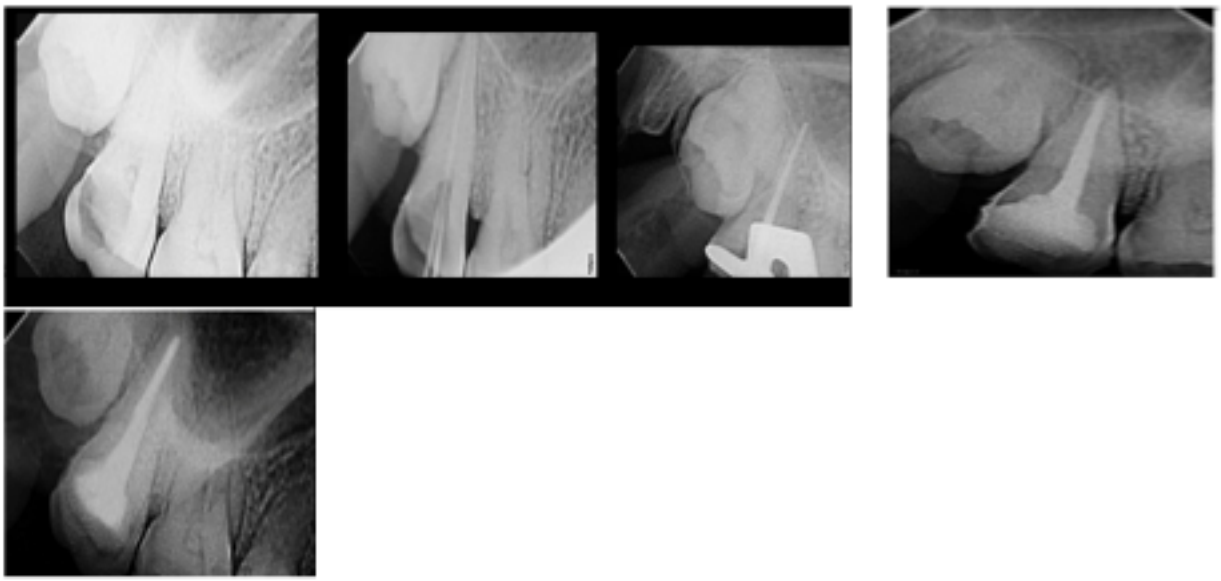

Figure 3 – Preoperative IOPA of 27, working length, Master cone, Obturation and follow up after 6 months

Discussion

Anatomic variations constitute a formidable challenge to endodontic success and Clinicians must be aware of the finding that the variations in maxillary molars are frequent. The anomalies in the root canal morphology need not always be extra canals sometimes it can also be in the form of fused or fewer canals. This case report describes a unique external and internal root and canal morphology involving single roots and canals in both the maxillary second molars.

Some of the common iatrogenic errors during access opening errors are caused during the search for the missing or extra canals. Such iatrogenic errors can be minimized if the clinician has the knowledge of the general location and dimensions of the pulp chamber. Although extra canals are more common, the clinician should be aware of the fact that in certain cases, there is a possibility of fewer canals than the normally presumed canal morphology.

In our case multiple preoperative radiographs were taken and it revealed a single root and a single root canal but it was confirmed using spiral CT. In doubtful cases where there is diagnostic dilemma about root canal anatomy, spiral CT is a good three dimensional investigation tool to confirm root canal morphology.

Sabala et al. reported that the rarer is the aberration, the more probable that it was bilateral.[2] As bilateral anatomic discrepancies are usually found, the clinician should suspect its presence on the contralateral pair when viewing the initial radiograph. In our case report, the radiologic examination of the contralateral pairs confirmed the bilateral existence of morphologic variation. Thus, it is highly recommended to take a radiograph of the contralateral tooth as soon as an unusual anatomical variation is detected or misinterpreted.

Libfeld and Rotstein reported of the incidence of maxillary second molar with single root and single canal in their in vivo study.[3] They assessed 200 radiographies of patients treated in an endodontic way and reported that this feature was evident in 0.5% of cases. Similar results were also found by Rwenyonyi et al. but in fused roots of maxillary second molar.[4] Hartwell & bellizi stated that the maxillary second molar with a single root and a single canal is present in 0.6% of cases.[5] Cobankara et al. reported a case of a 36 year old male and used radiographs to diagnose unusual morphology of permanent maxillary molar with single root and single canal.[6]

Peikoff et al. in their retrospective study included 520 endodontic treated maxillary second molar

Peikoff et al. in their retrospective study included 520 endodontic treated maxillary second molar teeth and using radiograph they found 3.1% of these teeth had a single root and a single canal.[7] On the other hand, Carlsen et al in their research included 104 maxillary second molar teeth with single root. Their study was conducted using stereomicroscope and concluded that 25.96% of cases had a single canal found on the central portion of the root.[8]

Literature has shown that the presence of a single canal in all four second molars is very rare. Fava et al reported the presence of one single root and one root canal in all second molars.[9] Gopi Krishna et al reported a case of maxillary first molar with a single root and a single root canal which was identified using spiral CT.[10]

According to Hua XI et al. the incidence of maxillary second molar with single root and single canal is very rare.[11] YL Ng and Alavi failed to find a case in their 77 maxillary second molar with a presence of a single root and a single canal.[12] Pansiera and Milano studied 102 extracted mandibular second molars and stated only six teeth (5.88%) had one root and one root canal.[13]

Conclusion

The root canal anatomy of the maxillary second molar can be aberrant so clinician should be aware of unusual anatomic variations and should not compromise tooth structure in search of 'other' canals which are usually found in these teeth, . Three-dimensional CT examination is an excellent diagnostic tool for evaluation of unclear root canal configurations over radiographs for successful management of such cases.

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