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Case Report

Endodontic management of rare aberrant root canal morphology with two palatal canals in maxillary first molar using cone beam computed tomography: A case report

Mariyam Belim[1*], Nitin Mirdha[2], Tarun Gupta[3], Bobbin Gill[4], Nirmala Bishnoi[5]

[1]Post Graduate, [2]Professor, [3]HOD, [4]Reader,[5]Senior Lecturer, Dept. of Conservative & Endodontics, Vyas Dental College And Hospital, Jodhpur, Rajasthan, India

Abstract

A detailed acquaintance of root canal anatomy is essential for the endodontic root canal therapy. Aberrations or unusual variations in the root canal morphology, mainly in multirooted teeth, can cause a substantial challenge to the endodontist during endodontic management. Knowledge of these variations, mostly concerning the position and treatment of all canals, is very essential for the successful outcomes of endodontic therapy; the failure to find and properly treat the root canals may cause treatment failure because it is important to assess individual case for variations. Endodontist should be suspicious while treating maxillary first molars because of its root curvatures, additional canals and variations in internal morphology.

Keywords: Two palatal canals, Maxillary first molar, Endosequence BC Sealer.

Introduction

The ambition of endodontic management is greatly dependent on the meticulousness of the root canal instrumentation through biomechanical preparation and disinfection and good quality of obturation.[1] Incapable to diagnose the aberrant root canals and extra roots are most common causes for root canal failure.[2] Human maxillary permanent molars reveal comparatively high anatomic variations and abnormalities with respect to number of roots and root canals. The most common root canal morphology of permanent maxillary first molars having three roots i.e. mesiobuccal with two canal, distobuccal and palatal root with one canal. Shahi et al. reported the prevalence rate of 0.73% of the maxillary first molars with two palatal canals[3] and Zheng et al. reported a prevalence rate of 1.17% for presence of an extra canal in the palatal roots of maxillary first molar.[4] Baratto-Filho et al. (2009) assessed internal morphology of maxillary first molars by 3 different methods and reported that second palatal canal prevalence in ex vivo appraisal, 2.05%, in clinical assessment, 0.65%, and by cone-beam computed tomography, 4.55%.[5]

Most of the case reports have used radiographs for the diagnosis and management of these cases. Since the radiographic image is a 2D image it has its limitation and a 3D imaging modality like a spiral computed tomography (SCT) or a cone-beam computed tomography (CBCT) provides the clinician with other information which can be important in the management of cases with such root canal aberrations. The current case report discusses the endodontic management of aberrant root canal morphology with two palatal canals in maxillary first molar using Cone Beam Computed Tomography.

Case Report

A 35 years old male patient reported to the Department of Conservative Dentistry and Endodontics in Vyas Dental College and Hospital with chief complain of toothache in upper left maxillary region for past 3 months. History revealed intermittent pain in the same tooth
with hot and cold stimuli for the past 3 months. Patient's medical history was non-contributory. Clinical examination concealed that the upper left maxillary first molar (#26) had deep dentinal caries, which was sensitive to probing, and tender on percussion. Radiographic examination of the concerned tooth revealed coronal radiolucency involving enamel, dentin and pulp by thickening of periodontal space and with no periapical lesion (Fig. 1). The tooth was diagnosed with irreversible pulpitis with apical periodontitis.

Fig. 1: Pre- operative radiograph of maxillary first molar (#26).

*Corresponding Author: Mariyam Belim, Dept. of Conservative & Endodontics, Vyas Dental College And Hospital, Jodhpur, Rajasthan, India
Email: mariyambelim2002@gmail.com
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After clinical and radio graphical evaluation the tooth was referred for endodontic management. The tooth was anaesthetized using 1.8 ml, 2% lignocaine 1:80000 adrenaline. The carious was excavated from the tooth and access cavity preparation was done for left maxillary permanent first molar under rubber dam (Fig. 2).

Fig. 2: showing access cavity preparation of maxillary first molar (#26).

On inspecting with a DG-16 endodontic explorer the pulp chamber floor bare an unusual two openings in the palatal aspect of the tooth. (Fig. 3). The mesiobuccal and distobuccal canal was found to be present slight curvature canals and dumbbell shaped 2 palatal canals was pragmatic with respect to #26. Negotiation of the canals was done with ISO files10 and 15 stainless steel hand files. To assure for 2 palatal canals in #26 Cone Beam Computed Tomography Scan was performed (CBCT Scan) (Fig. 4 A,B,C).

Fig. 3: showing two different palatal canal orifices with respect to #26.

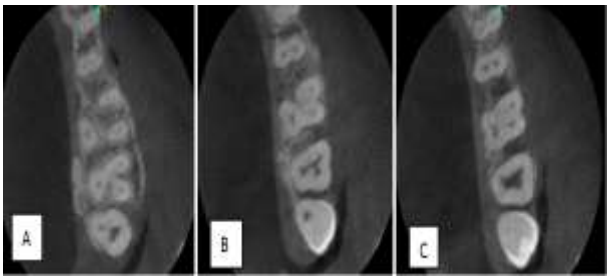

Fig. 4: (A). Showing axial view of coronal one third of root. **(B)** Showing axial view of middle one third of root. **(C)** Showing axial view of apical one third of root.

Working length wad determined by inserting #15k hand files in all the canals (Fig. 5).Cleaning and shaping was done using Universal ProTaper Gold System up to, 25, 6% in mesiobuccal and distobuccal canal and #30 K hand files in 2 palatal canals and canals were irrigated with 3% NaOCl, and saline. Master cone was selected and the canals were dried with absorbent paper point and obturation done by using gutta percha with combination of lateral compaction technique along with bioceramics root canal sealer (Endosequence BC Sealer, Brasseler USA) (Fig. 6 and 7). The access cavity was sealed with composite resin.

Fig. 5: showing working length determination radiograph of #26.

Fig. 6: Showing master cone radiograph of #26.

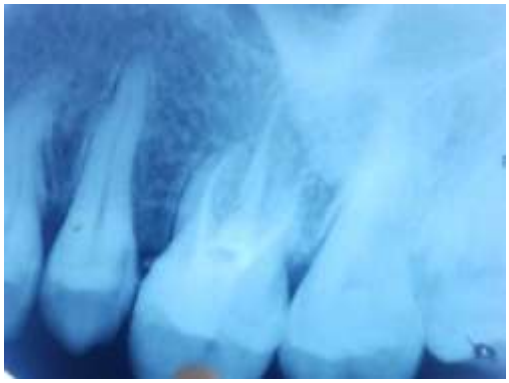

Fig. 7: Obturation radiograph of #26.

Discussion

The most frequent rationale of endodontic failure is apical percolation or untreated and hidden canals especially in multirooted teeth. The current case reports described the nonsurgical management of permanent maxillary first molar with two palatal canals in single palatal root. Weine et al [6] and Vertucci's provided the clinical classification of variations in the root canal system and stressed the importance of knowledge with the root canal morphology before starting the endodontic treatment.[7] Consequently, proper identification of the canals is necessary for the successful endodontic management. Radiograph produces 2 dimensional images, resulting in superimposition and distortion. As, it cannot be positive in such cases with complex root canal anatomy, it is essential to use all of the armamentaria to diagnose and treat the entire root canal system.[8] With the use of Cone Beam Computed Tomography (CBCT), detailed assessment of the intact root canal system has now become possible as thin slices of dental roots and root canal systems can be viewed. Additionally, advanced dental software permit 3-dimensional reconstructions of images across a multitude of planes.

The present case report maxillary permanent first molar had Type 2 canal configuration according to Vertucci's and Weine classification.[6,7] Two separate palatal canals from the pulp chamber converging to a single canal at the apex, which is reported rare in maxillary palatal root. Holderrieth and Gernhardt and Aggarwal et al reported cases with two palatal canals in a single palatal root. [9] Pradeep Gade et al [10] reported a similar case with two palatal canals in maxillary first molar. Anshuman Kharbanda et al also reported a same case with two palatal canals. [11] Stone and Stroner reported variations of the palatal root of maxillary molars, such as a single root with two separate orifices, two separate canals and two separate foramina, two separate roots each with one orifice, one canal and one foramen, single root with one orifice, a bifurcated canal and two separate foramina.[12] The ability to discriminate between the two closely located canals within a root has always been a matter of concern for the endodontist. Barrato *et al*. stated that when indistinct images of palatal roots are presented in pre-operative X-ray images, the endodontist must consider the possibility of two palatal roots.[13]

Conclusion

Variations in the root canal morphology of the maxillary first molar are frequently common. During endodontic management if the clinician is unable to perceive these variations the root canals might be left untreated which may be a reason for the failure of the endodontic treatment. Thus a clinician should be aware of such root canal variations and should release to advanced diagnostic techniques resembling Cone Beam Computed Tomography (CBCT) that would help in the detection or evaluation of such abnormalities or unusual variation to make root canal treatment successful.

Source of Funding

None.

Conflict of Interest

None.

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