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ENDODONTIC ENIGMA – A CASE REPORT

Dental Science

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ABSTRACT

For endodontic success, thorough knowledge of pulp anatomy i.e. normal and usual configuration of the pulp cavity and its variations from normal, can no be ruled out. These aberrations make the cleaning and shaping of root canal space difficult there by increasing the chances of failure. The only way to clean webs, fins and anastomoses is through effective use of an irrigant solution. In this article, a case series showcases normal, variations from normal and ramifications that are obliterated following simple techniques.

KEYWORDS

Apex Locators, Endoactivator, Protaper files, Working Length, Ramifications

Introduction:
Two hallmark features of the apical region are its variability and unpredictability. This tremendous variation in canal anatomy often poses problem to the clinician while preparing and filling the root canal space. 1

Investigators in various studies have shown multiple foramina, additional canals, fins, deltas, intracanal connections, loops, furcation and lateral canals in most teeth. Therefore, while treating each tooth the clinician must assume that complex anatomy occurs often enough to be considered normal. Although such teeth present challenges for shaping, cleaning and obturation.

More than 70percent maxillary 1st molar have shown occurrence of 2nd mesiobuccal canal, which is attributed as one of the most common reason for retreatment.2 Similarly mandibular incisors are reported to have two canals in 41percent of cases and mandibular premolar has two canals in 11 percent of cases.2

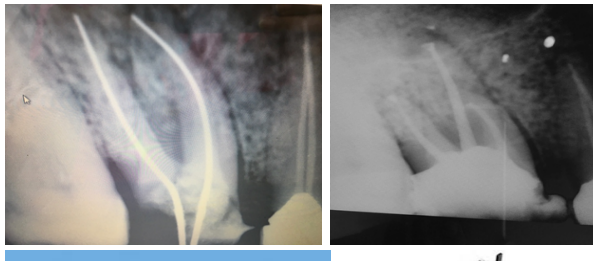
The main objective of root canal treatment are thorough shaping and cleaning of the entire pulp space and complete obturation of this space with an inert filling material. This triad of biomechanical preparation, pulp space disinfection and three dimensional obturation is the hallmark of endodontic success. Complete disinfection of the pulp space can not be attained with the sophisticated instrumentation techniques alone. One can not underestimate the role of root canal irrigants in accomplishing it. However, currently there is no universally accepted standard protocol for irrigation of root canal space. This article, highlights the different diversifications in canal anatomy and the filling of these intricate areas of apical 3rd following simple shaping, cleaning and fillings protocol.

Case1:
Patient reported with pain and intraoral swelling in root canal treated upper right 1st molar since three days. Clinical and Radiographical examination revealed failed root canal treatment owing to silver points extending beyond apex in Mesiobuccal and Distobuccal canal and unfilled palatal canal. The silver points from both the buccal canals were retrieved in toto following which the pulp chamber was flushed with NaOCl. Canal patency was confirmed in all the three canals and working length determined with radiographs. The length was then reconfirmed with an Electronic Apex locator (Propex Mini DENTSPLY).

The shaping protocol of Protaper universal (DENTSPLY) was followed along with use of Glyde and copious irrigation with NaOCl. The canals were recapitulated with No 10 k file (DENTSPLY) after every instrument. Intracanal medicament Ca(OH)2 (AvueCal DA) was placed in the canals and temporary cement placed. Patient was reappointed after two weeks. In the next visit patient showed no signs and symptoms. The canals were irrigated followed by sonic activation with Endoactivator (DENTSPLY) for at least 30 seconds in each canal. While this activation was being done continuous fresh solution was delivered in the pulp chamber at a constant rate of 5ml per minute.

Subsequently corresponding master apical cone was selected which was placed up to working length and its fir was checked for tug back. Followed by 15-20 strokes with the fitting master cone, following which canals were dried using paper points. Sealer was coated with the master cone using similar action and obturation was done using lateral condensation technique.

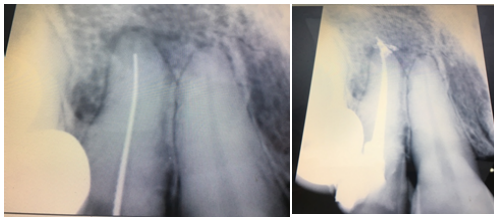
Post obturation radiograph showed the filling of intricate apical areas especially in the palatal and the Distobuccal root of the upper 1st molar.



Endoactivator

Apex Locator

Case 2: Report a case of upper right second premolar with a single canal. Patient reported with sensitivity to hot and cold in upper right region. Radiographic examination revealed radiolucency involving periapex of upper second premolar. Diagnosis of Apical periodontitis was made based on clinical and radiographic features. The tooth was root canal treated following the similar shaping, cleaning and filling protocol as in case 1. The post obturation radiograph shows the obliteration of the intricate areas in the apical 3rd of the canal.



Case 3: Patient reported sensitivity in upper left 1st molar being crowned by the previous dentist. No previous root canal must have owed to sensitivity and radiograph revealed periapical changes. The crown was removed and root canal treatment was initiated. All the canal orifices were located and shaping and cleaning protocol was followed for al four canals- Mb1, Mb2, Db, P. Intracanal medicament was placed and on next appointment the obturation was done, the post operative radiograph revealed the similar obliteration at the apical 3rd in the buccal canals filled with the sealer.

Case 4: Lower 1st premolar presented with two roots. Patient complained of pain in the lower left back region. Clinical and radiographic diagnosis of acute apical periodontitis was made.

Following the similar technique the tooth was root canal treated and post operative radiograph revealed similar filling of the spaces in the apical area.

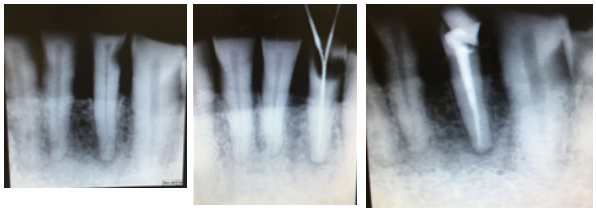
Case5: case of Lower central incisor with two canals.

Patient reported with sensitivity and pain in lower front region.

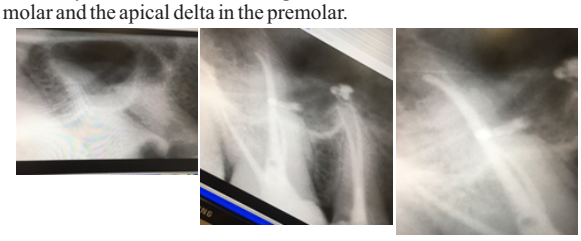
Preoperative radiograph revealed some deviation in the pulp anatomy towards the apical area indicating the presence of an extra canal.

A separate orifice was located after access preparation both the canals were treated in similar fashion as the previous cases.

Post obturation radiographs shows the filling of lateral canals and ramifications in the apical area.

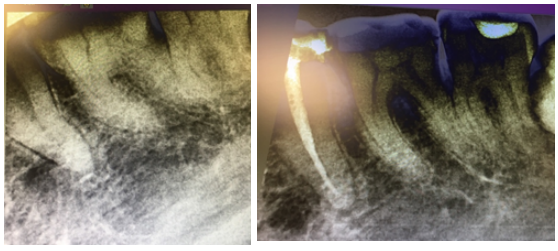


Case 6:
Upper right first molar and premolar. Patient complained of sensitivity and pain on chewing in upper back region since couple of days. Radiographic revealed proximal decay in both the molar and the premolar approaching pulp. Periapical radiolucency was seen in respect to the palatal root of the upper 1st molar. The filling of lateral or accessory canals is evident in the palatal toot as well the mesial root of molar and the apical delta in the premolar.

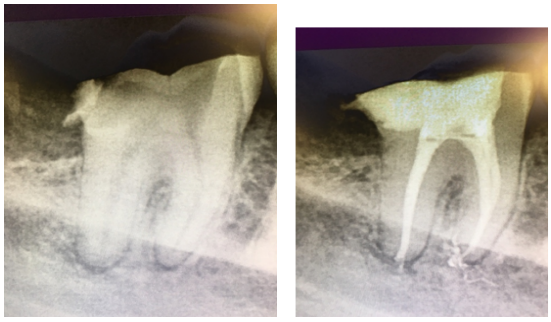


Case7:
Patient reported complaint of food lodgment in lower left back region and pain on chewing that lingered for couple of hours. No tenderness on percussion was present.

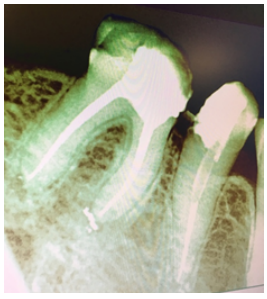
The filling of lateral canal as well as loop is evident in the apical third.



Case8:
Patient reported with pain in her wisdom tooth in the lower left quadrant. OPG was advised which revealed that proximal decay in respect to the lower 2nd molar approaching pulp with slight periapical changes. After the third molar was extracted the root canal treatment of second molar was initiated. Post operative radiograph shows the filling of intricacies at the apical end.

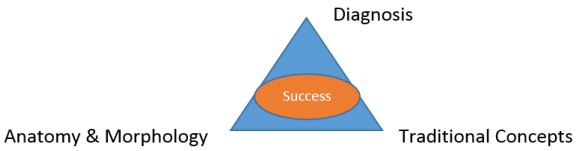


Case 9:
Patient reported with pain in lower right back region and broken premolar necessitating root canal treatment in molar and premolar followed by Fiber post and core in the premolar. Both the teeth showed filling of accessory canals and the lateral canals.



Discussion:
This case series emphasizes on the importance of the role modern endodontic triad for successful completion of root canal treatment.

As opposed to the historical or traditional perspective that mainly concentrated on cleaning, shaping and filling, the modern endodontic traid centers around traditional concepts as well as concenters on diagnosis plus the anatomy and morphology as pivotal areas for the success in root canal treatment.



So, diagnosis is the first step to success of root canal treatment. Radiographs are the "eyes" of the dentist when performing many procedures. They play a pivotal role in diagnosis and treatment planning, determining anatomy and morphology to managing treatment and to assess outcome.

After access preparation root canal orifices were located. The pulp chamber was flooded with NaOCl followed by coronal flaring. The canal patency was checked. The working length was determined by radiograph and the estimated radiographic length was reconfirmed with an Electronic Apex Locator. This was done to make sure that the shaping, cleaning and filling of the canals terminated to the cemento dentinal junction as it is considered as an ideal apical termination for root canal preparation and obturation. More over apical foramen usually exits lateral to the anatomical tip of the apex. This means the apparent apex on the radiograph seldom represents the true level of the foramen.3 The other reason necessitating the use of apex locator to determine the anatomic apex was presence of periapical root or bone resorption around one or more root canals in almost all cases reported.3

All the canals were shaped with Protaper universal file system according to manufacturers instructions along with copious irrigation with 3percent NaOCl between each successive instrument and 17 percent EDTA as an emulsifier. Choudary Et al in a SEM study concluded that the combination of EDTA and NaOCl was beneficial as it removed smear layer I 20 minutes and did not affect the dentin surface. It also reduced the working time for smear layer removal.5

With careful use, the benefits of deep intracanal irrigation clearly seems to outweigh the risks. This was followed by the use of Endoactivator that causes sonic vibration to activate the root canal irrigant. The Sonic activation was done 2mm short of the working length for at least 30 seconds in each canal with continuous replacement of the irrigant solution at a constant rate. The Endoactivator system was reported to be able to effectively clean debris from lateral canals, remove the smear layer and dislodge clumps of simulated biofilm within the curved canals of molar teeth. 6

During use the action of the tip produces a cloud of debris that is simultaneously was cleared because of the continuous supply of irrigant. Vibration of the tip in conjunction with the up and down short vertical strokes, synergistically produces powerful hydrodynamic phenomenon.7

After this 15-20 strokes with selected Master apical GP were given up to the working length. This technique has been advocated to disrupt the apical vapor lock which otherwise prevents the irrigant to flow in the apical area. 4

The canals were then dried with paper points and the sealer was coated in same fashion and the canals were obturated using the lateral condensation technique.

Conclusion:

When properly performed, endodontic treatment is the cornerstone of restorative and reconstructive dentistry.

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