

Dilemma: Endodontic Retreatment of Maxillary Lateral Incisor with Midroot Radiopacity and Micro-Crack

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ABSTRACT

Background: Endodontic failure can result primarily from recurrent infection caused by remaining bacteria in the root canal. Consequently, retreatment is the best way to deal with failed cases. Cracked or fractured teeth present a diagnostic dilemma to the dentist and greater chances to save the tooth is possible as soon as correct diagnosis is made. This case report describes the nonsurgical endodontic retreatment of maxillary lateral incisor tooth, emphasizing the importance of three-dimensional imaging techniques for the diagnosis of tooth with radiopacity and microcrack in a 56-year old female patient referred for the endodontic evaluation of tooth #12 because of failed root canal treatment. This article also describes usage of three-dimensional oral radiology (CBCT) tools leads to a better understanding of microcrack and radiopacity in the root canal.

Keywords: Retreatment maxillary incisor, microcrack, midroot radiopacity, vertical root fracture, internal root resorption, cold lateral compaction technique, missed canal, CBCT.

INTRODUCTION

The aim of endodontic treatment is thorough debridement of entire pulp space and its obturation with an inert filling material. [1] While, inadequate shaping and cleaning of root canal space leads to post-treatment disease. [2,3] This can happen especially in cases where teeth have morphological deviations from their normal anatomy. One such example is cracked teeth. The American Association of Endodontics (AAE) has divided cracks into 5 types: (i) Craze lines, (ii) Fractured cusp, (iii) Cracked tooth, (iv) Split tooth, (v) Vertical root fracture.[4]

Diagnosing a tooth crack as well as determining the appropriate treatment can be extremely challenging. [5] In certain cases, the cracks cannot be easily visualized and the symptoms can vary depending on the direct and rate of progression of the cracks. Cracked teeth may cause sharp pain upon biting, cold sensitivity, pain on release of pressure. [6,7,8] Nevertheless, crack lines occurring at an early stage may not be visible and may also not present any pain or reaction to cold and hot stimuli.

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Therefore, biomechanical and periodontal prognosis as well as treatment requirements of a cracked tooth depends upon the existing fracture of the stress plane. The present study aimed to report a clinical case of an anterior cracked tooth.

CASE HISTORY

A 56-year old female patient reported to Department of Conservative Dentistry and Endodontics, Bharati Vidyapeeth Deemed to be University Dental College and Hospital, Navi Mumbai with a chief complaint of throbbing pain for past 2 days. The pain kept her awake at night and it was located at upper right front region of the jaw. Clinical evaluation revealed temporary restoration in maxillary lateral incisor of right side.

On radiographic examination, radiopaque obturating material seen in canal of tooth #12 and periapical radiolucency seen with the same. Therefore, a diagnosis of post-treatment disease secondary to bacterial leakage was made.

Investigations:

RVG (Radio-Visio-Graph) and CBCT (Cone Beam Computed Tomography).



Fig 1: Pre-op RVG

Differential Diagnosis:

Internal root resorption, Vertical Root Fracture (VRF).

Treatment:

The emergency treatment began with administration of local anaesthesia in a concentration of 1:200000 and access opening was

done using high-speed handpiece. On access, the obturated canal was found and gutta-percha was removed using H-file of #50 and RC Solve. On removal of entire gutta-percha, there was still flecks of radiopacity seen on RVG in the middle third and distal of apical third of the canal. On examination under microscope of 12.5x magnification it was clear, that the filling material was entirely removed from the canal but the persisting radiopacity in middle third of the canal was unusual. The tooth was then restored with a temporary filling material.



Fig 2: GP removed

The patient was then advised for CBCT for proper diagnosing of the radiopacity in the canal and was sent off and was placed on recall after a week along with the CBCT reports.

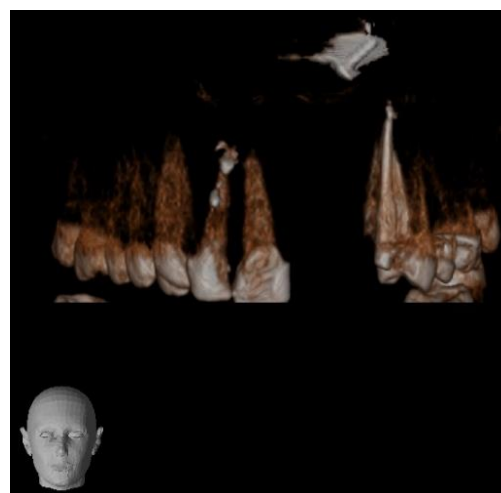


Fig 3: CBCT scan of entire maxillary arch.



Fig 4: X slice of CBCT scan.

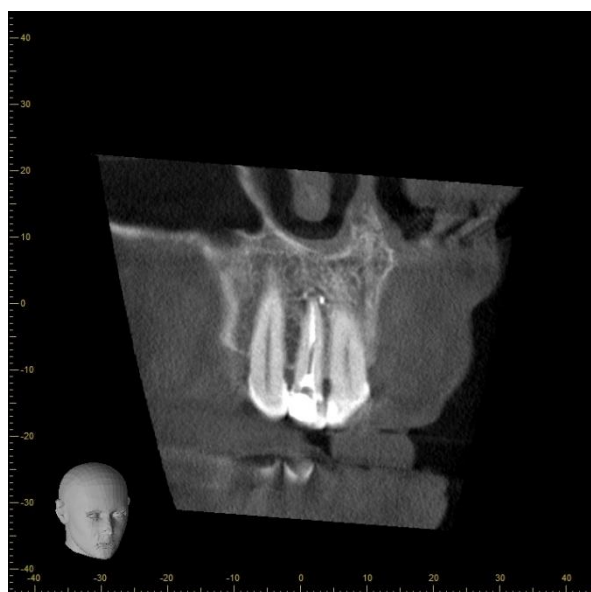


Fig 5: Y slice of CBCT scan

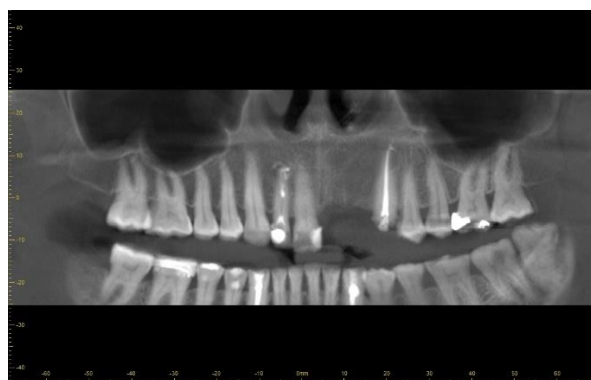


Fig 6: Orthopantomogram (O.P.G).



(g) Working length determination



(h) Master cone selection



(i) Obturation using CLC technique



(j) 1- year follow-up

After a week, the patient returned to our department for her 2nd visit and she was asymptomatic. The report of CBCT test revealed that there was a 'micro-crack' on the labial aspect of the tooth #12 with no lateral canal evident and the sealer material of previously treated root canal filling revealed a huge radiopacity in the midroot of the main and only canal. The tooth was isolated using rubber dam followed by removal of temporary restoration. Working length of the canal was determined using the electronic apex locator and then confirmed radiographically. Working length of the canal was found to be 19.5mm. Cleaning and shaping was done with the Protaper Nickel-Titanium hand instruments up to 30/09 and 17% EDTA. Copious irrigation was performed using 5.25% NaOCl and saline intermittently followed by final irrigation with 2% Dentachlor. The canal was dried with paper points, and obturated using cold lateral compaction technique with gutta percha cones and AH Plus sealer. Subsequently, temporary restoration was done and patient was recalled after 3 days for composite restoration.

Outcome and follow-up:

A follow-up of 1 year showed a significant reduction in the periapical pathosis of the retreated tooth. Tooth #12 was asymptomatic and functional. Patient was satisfied with the outcome of the

treatment with no discomfort. The patient was advised to receive a full coverage restoration as soon as possible. But due to her financial crisis, she was not ready for PFM prosthesis at that time and she returned back after a year for the same.

DISCUSSION

Establishing an accurate diagnosis is very critical for the management and prognosis of the case as well as to influence success of the treatment. Clinicians normally begin root canal procedures based on observation of external root canal anatomy as guided by radiographs. However, the presence of internal anatomic variances and anomalies is not uncommon. Cracked teeth have been a diagnostic challenge owing to the challenge of locating the crack lines of incomplete fracture.^[10,11] Although occurrence of cracked teeth are more commonly reported in molars but many times the anterior teeth may also be affected as reported in this case. In the present case, a previously restored anterior tooth with a “microcrack” was detected along with the symptoms of pain. According to the literature, in such cases, non- surgical root canal retreatment along with follow up is required.^[11]

The clinical symptoms vary accordingly to the position and extent of the cracks and most clinicians may not find the presence of a crack if the fracture plane is < 18um wide.^[10,11] According to a study, the most common methods to diagnose a cracked tooth includes naked eyes (48%), transillumination (18%), dye staining (17%), microscopic examination (9%) and diagnostic surgery (8%).^[9,12] Diagnosis of this rare and complicated findings are challenging for endodontist too. Clinicians, in order to be successful in managing such atypical case, should hold a philosophical belief and a strong familiarity with canal anatomy and its associated variances. Likewise, techniques such as multiple angulated radiographs, magnification and CBCT imaging can maximize the outcome for exploring the microcrack.

Internal root resorption is the progressive destruction of intra-radicular dentin and dentinal tubules along the middle and apical thirds of the canal walls as a result of clastic activities.^[13] It is seen as a radiolucent area around the pulpal cavity, usually of incisors and mandibular molars. The various etiological factors suggested for internal

root resorption include traumatic injury; infection and orthodontic treatment.^[14]

Clinical detection of Vertical Root Fracture (VRF) by endodontists is becoming more frequent, where as it is rather underestimated by the general practitioners. There is no particular clinical characteristic feature that indicates their existence. They are also difficult to diagnose, as they resemble other conditions. Hence, the diagnosis of vertical root fractures needs to be more predictive rather than a definitive identification. A cumulative evaluation of the clinical signs and symptoms and the radiographic features may help us reach an absolute diagnosis. Since, vertical root fractures almost exclusively involve endodontically treated teeth; it often becomes difficult to differentiate a tooth with this condition from an endodontically failed treatment. Cone beam computed tomography has been shown to be very accurate in this regard.^[15] CBCT imaging produces an image recombination which allows accurate visualization and assessment of VRFs, and thus has superior diagnostic detection accuracy.

Surgical intervention was not planned as the patient was diabetic and was on medication since 30 years for the same and her latest blood sugar level was way beyond the normal limit and so non-surgical re-treatment was attempted for treating this case.

The previous root canal treatment was done about 3 months back and ideally, any root canal filling material or sealer starts resorbing in the periapex after 3 months of treatment. But, in this case following retreatment, the root canal sealer was still intact in the periapex even after 1 year of follow-up. The possible reason for this, it might depend upon the reaction of peri-radicular tissues to the obturating material or it may depend upon the interaction between the extruded root canal filling materials and the host's defence.^[16]

This article reports the successful management of maxillary lateral incisor with radiopacity in the canal which was diagnosed as “microcrack” with sealer material entrapped in it. Furthermore, it also informs clinicians of the abnormality in the canal which can occur with any case that may appear otherwise normal. Hence, a careful diagnosis, appropriate case treatment and continuous

monitoring are fundamental to que accurate management of cracked teeth.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol* 1984;58:589-99
2. Cleghorn BM, Goodacre CJ, Christie WH. Morphology of teeth and their root canal systems. In: Ingle JI, Bakland LK, Baumgartner JC, editors. eds. *Ingle's endodontics*. 6th ed Hamilton, Ontario: B C Decker Inc, 2008:151-220
3. Christie WH, Peikoff MD, Fogel HM. Maxillary molars with two palatal roots: a retrospective clinical study. *J Endod* 1991;17:80-4
4. Anu Dhawan, Sumit Gupta, Rakesh Mittal. Vertical root fractures: An update review. *J Res Dent* 2014;2:107-13
5. Capar ID, Uysal B, Ok E, Arslan H. Effect of the size of the apical enlargement with rotary instruments, single-cone filling, post space preparation with drills, fiber post removal, and root canal filling removal on apical crack initiation and propagation. *J Endod*. 2015; 41: 253-256.
6. Krell KV, Rivera EM. A six- year evaluation of cracked teeth diagnosed with reversible pulpitis: treatment and prognosis. *J Endod*. 2007; 33: 1405-1407.
7. Banerji S, Mehta SB, Millar BJ. Cracked tooth syndrome. Part 1: aetiology and diagnosis. *Br Dent J*. 2010; 208: 459-463.
8. Homewood CI. Cracked tooth syndrome--incidence, clinical findings and treatment. *Aust Dent J*. 1998; 43: 217-222.
9. Ellis SG. Incomplete tooth fracture--proposal for a new definition. *Br Dent J*. 2001; vol: 190: 424-428.
10. Imai K, Shimada Y, Sadr A, Sumi Y, Tagami J. Non-invasive cross-sectional visualization of enamel cracks by optical coherence tomography in vitro. *J Endod*. 2012; 38: 1269-1274.
11. Paul RA, Tamse A, Rosenberg E. Cracked and broken teeth--definitions, differential diagnosis and treatment. *Refuat Hapeh Vehashinayim* (1993). 2007; 24: 7-12.
12. Cameron CE. The cracked tooth syndrome: additional findings. *J Am Dent Assoc*. 1976; 93: 971-975.
13. Patel S, Ricucci D, Durak C, Tay F. Internal root resorption: A review. *J Endod*. 2010;36:1107-21.
14. Silveira FF, Nunes E, Soares JA, Ferreira CL, Rotstein I. Double 'pink tooth' associated with extensive internal root resorption after orthodontic treatment: A case report. *Dent Traumatol*. 2009;25:43-7.
15. Sandhya Anand Khasnis, Krishnamurthy Haridas Kidiyoor, Anand Basavaraj Patil, Smita Basavaraj Kenganal. Vertical root fractures and their management. *J Conserv Dent*. 17(2); Mar-Apr 2014.
16. Sari S, Duruturk L. Radiographic evaluation of periapical healing of permanent teeth with periapical lesions after extrusion of AH Plus sealer. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 104:e54-e59.