

Management of Maxillary Central Incisor with Calcified Canal: Case Report.

Dr Yagnesh Sardhara¹, Dr Mansi Dhanak², and Dr Girish Parmar³

¹Post Graduate Student, Dept. of Conservative Dentistry and Endodontics, Govt. Dental College & Hospital, Ahmedabad.

²Assistant Professor, Dept. of Conservative Dentistry and Endodontics, Govt. Dental College & Hospital, Ahmedabad.

³Dean, Professor and Head, Dept. of Conservative Dentistry and Endodontics, Govt. Dental College & Hospital, Ahmedabad.

Abstract:

Introduction: The aim of this article was to emphasize the challenges that are phased while management of calcific- metamorphosis.

Case report: Root canal treatment was planned for maxillary central incisor which was non-vital upon pulp testing. No canal was located upon access opening. Further access was made by small round bur & K-files for locating the canal. Then finally access was gained to the canal. The working length was determined. Chemo-mechanical preparation was done with K-Files & protaper next rotary file system. Tooth was obturated by using lateral condensation technique with AH plus sealer.

Conclusion: Thorough knowledge of tooth morphology, certain amount of patience, use of appropriate instruments and materials are essential to successfully manage such cases.

Key Words: Calcified canals; Calcific Metamorphosis; EDTA

I. Introduction

The primary aim of endodontic treatment is to reduce or eliminate micro-organisms and their by-products from the root canal system. This can be achieved by chemo-mechanical debridement, disinfection and obturation of the root canal system. However, it may be difficult to achieve if the pulpal space is obstructed, narrow or calcified. Dental pulp sometimes shows the phenomenon of dystrophic mineralization or calcific metamorphosis. Calcific metamorphosis is defined as a pulpal response to trauma that is characterized by deposition of hard tissue within the root canal space. This may occur following mineralization in response to various irritants, aging or trauma or sometimes idiopathically.¹ These Calcifications can completely or partially block the access into the root canal systems and make preparation, disinfection and obturation very difficult. Searching for calcified root canal systems carries an increased risk of perforation.²

This case report presents endodontic management of canal calcification in the maxillary Right central incisor.

II. Case Report

A 25yr old male patient reported to Department of Conservative Dentistry & Endodontics of Govt. Dental College & Hospital, Ahmedabad for restoration of fractured upper anterior teeth. He gave history of trauma & avulsion of maxillary left central incisor 2 months back. On examination, Ellis class III fracture & yellowish discoloration were found to be associated with maxillary right central incisor. Maxillary Right Central and Lateral Incisors were found to be nonvital on electric pulp testing & thermal stimulation. There was absence of dental caries and periodontal probing and mobility was within physiologic limits. Preoperative radiograph revealed the presence of a single root with no visible root canal space in right central incisor compared to other teeth and resorptive changes associated with apex of the lateral incisor. Periodontal ligament space widening around the apex of both 11 and 12 was observed. Hence a provisional diagnosis of pulpal necrosis with periapical peridontitis was made.

Root canal treatment was planned for maxillary right central and lateral incisors. An access preparation was done with a high speed round and tapered diamond burs. No canal was visible upon access opening initially. On probing only one binding point was found in the access cavity. No. 6 K file was introduced into that point expecting it as a canal but it did not advance in apical direction. It was verified with radiograph. Further access was made apically with the small size round bur for locating the canal. While this procedure the drilling was confined to the darker tooth structure that represents the area of the calcified pulp chamber.

The direction of drilling was repeatedly confirmed by radiographs & K file was inserted to confirm the opening of canal. Then finally after few attempts, patency was gained with No. 6, K file. A radiograph was taken to verify the file position in the canal. The working length was measured with electronic apexlocator & confirmed radiographically. The glidepath was prepared with No. 8 & 10 K Files & Path Files. Complete Chemo-Mechanical Preparation was done using the hand K-files & Rotary Protaper Next File System. For irrigation 3% sodium hypochlorite and 17% EDTA were used. Calcium Hydroxide dressing was given for one week & Tooth was obturated by using lateral condensation technique with AH Plus sealer. After which the endodontic treatment of 12 was also done.

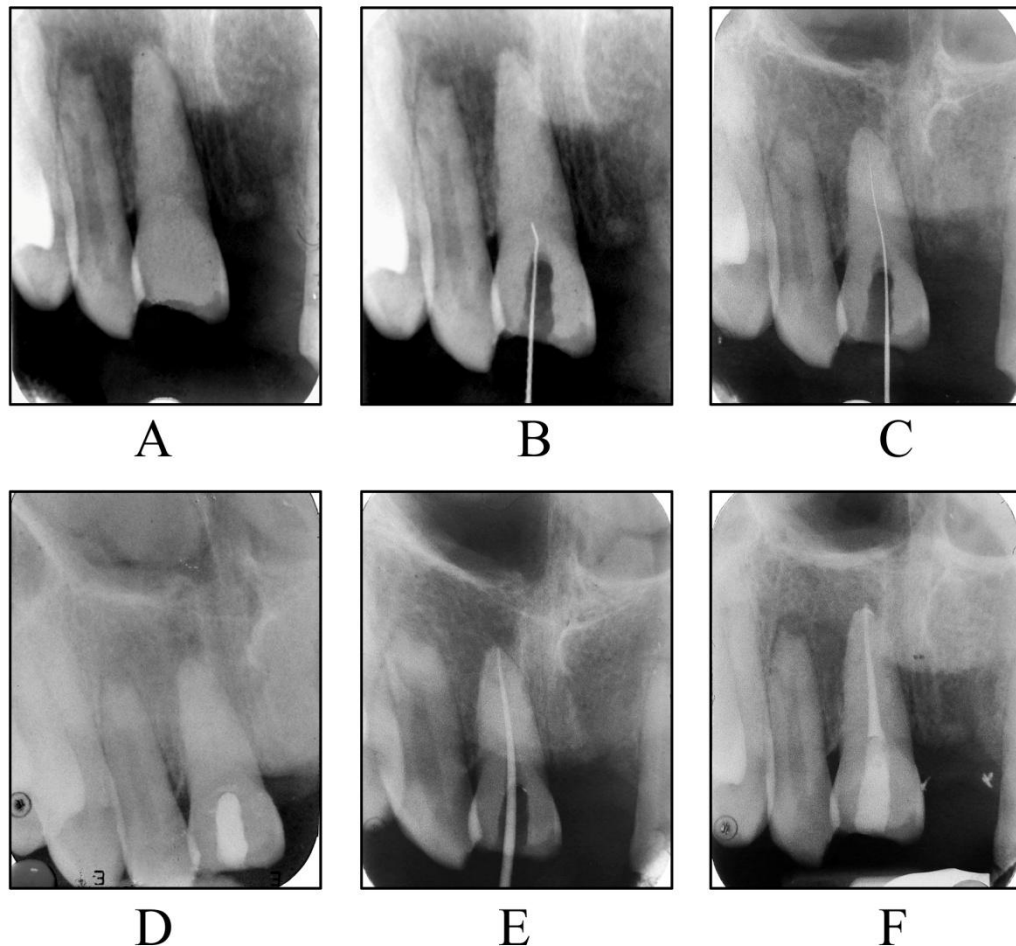


Fig-1, A) Radiograph showing obliterated pulpspace of 11 & edentulous space of avulsed 21. B) , C), Workinglength radiograph, D) Intracanal dressing with calcium hydroxide; E) Mastercone Radiograph, F) Post-Obturation Radiograph.

I. Discussion

The exact mechanism of pulp canal calcification is unknown. It has been suggested that hemorrhage and blood clot formation in the pulp after injury acts as nidus for calcification if pulp remains vital.³ Calcification replaces cellular components of the pulp and may disturb the blood supply of pulp. Approximately 4-24% of traumatized teeth develop varying degrees of canal obliteration that is characterized by the apparent loss of the pulp space radiographically and a yellow discoloration of the clinical crown.^{9, 10, 11}

Treatment should be delayed until there are no symptoms or radiographic signs of periapical disease.^{11, 15} If endodontic treatment is required, these teeth fall into the high difficulty category of the American Association of Endodontists Case Assessment criteria.⁶

The access cavity should be prepared close to or through the incisal edge. This approach facilitates straight-line access and avoids unnecessary damage.¹² The pulp chamber is usually located in the centre of tooth at the level of CEJ.¹⁹ Calcified pulp chamber is darker than rest root dentine.¹⁹ Thus, if the access preparation

remains well-centered, along the long axis of the tooth and limited initially to the level of the CEJ, the root canal system is normally easy to locate.

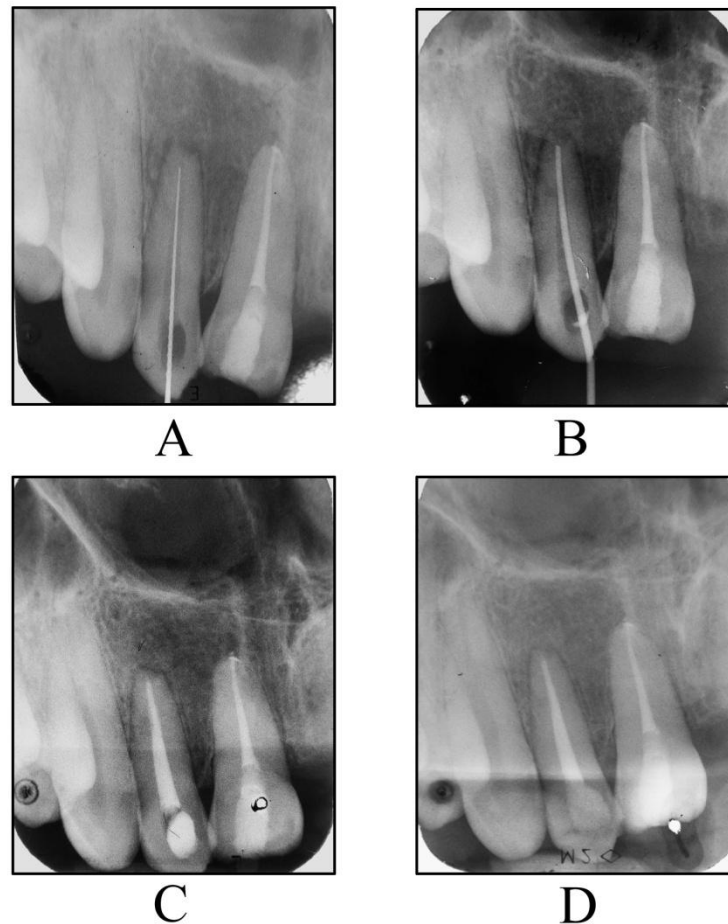


Fig. 2 – A) working length radiograph of 12, B) mastercone radiograph of 12, C) Radiograph after obturation of 12, D) followup radiograph after 3months.

Several studies have recognized the role of the dental operating microscope in treating calcified canals and improving the treatment outcome.²⁰ Various burs and ultrasonic tips have been designed for deep troughing required to locate canals. Dyes such as methylene blue may assist in locating the canal system under the microscope. Sodium hypochlorite may also be used to identify calcified canal enhanced using the ‘bubble’ or ‘champagne’ test. That is, placing 5% sodium hypochlorite into the pulp chamber over a calcified canal containing remnants of pulp tissue will result in a stream of bubbles emerging from the oxygenation of the tissue. This can be seen under the microscope and be used to identify the canal orifice.²¹ In very deep access preparations, it is advised to take radiographic images at multiple angles to maintain alignment and direction.¹⁴

The negotiation of small calcified canals is challenging. Small files (No 6, 8 & 10 K-files) are usually required for initial pathfinding. However, these files lack the rigidity and can often fracture when used with vertical watch-winding forces. One approach is to alternate between size 8 and 10 K-files with a gentle watch-winding motion with minimal vertical pressure with regular replacement of the instruments before fatigue occurs. Varieties of ‘pathfinding’ instruments are also available for this objective. These instruments have various designs, but the most common has a quadrangular cross-section that has enhanced rigidity.¹³ Chelating agents are of limited value as a lubricant or to assist instrumentation after the canal has been negotiated.¹⁷

A ‘crown down’ approach has been recommended to improve tactile sensation and better apical penetration. As a general rule, the calcification process as seen in pulpal obliteration occurs in a corono-apical direction so once the initial canal has been captured, an instrument tends to progress more easily as it advances towards the canal terminus.¹²

Schindler & Gullickson suggested that root-end resection and filling should be considered when a canal cannot be located.¹⁵ Such endodontic microsurgery is an option in the treatment of calcified canals as it offers a direct approach to the root apex.^{6, 18}

II. Conclusion

The success of the root canal treatment depends upon proper access cavity preparation. Thorough knowledge of tooth morphology, certain amount of patience, use of appropriate instruments and materials are essential to successfully manage such cases.

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