NON-SURGICAL MANAGEMENT OF PULP CANAL OBLITERATION USING DIFFERENT ENDODONTIC TECHNIQUES: TWO CASE REPORTS.

Prashant Monga1, Pardeep Mahajan1, Nitika Bajaj2, Manjot Singh1, Deepika Singla1, Roma Goyal3
1)Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India.
2)Department of Pedodontics and Preventive dentistry, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India.
3)Roma Goyal, Consultant Endodontist, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India.

Email: drnitika_bajaj81@yahoo.co.in

Available Online: http://ajsr.rstpublishers.com/

Abstract

Pulp canal obliteration is defined as a deposition of hard tissue within the root canal space. These tissues can eventually produce the radiographic appearance of a root canal space that has become partial or completely calcified. Success in root canal treatment is based on proper debridement, disinfection and obturation of the root canal system. Calcified root canal causes problem during endodontic treatment due to difficulty in canal orifice location, negotiation, preparation as well as there is consideration of operating time. Richman first introduced the concept of using ultrasonics (US) in endodontics. Ultrasonics is considered an effective method in managing calcified canals for gaining access. This article discusses the various management approaches and highlight treatment strategies for calcified canals.

Keywords: Calcified root canal; Pulp canal obliteration; Dental trauma; Ultrasonics.

INTRODUCTION

Pulp canal obliteration (PCO), also called calcific metamorphosis (CM), is sequelae of tooth trauma2–4 and is reported to develop more often in teeth following concussion and subluxation injuries.3 It usually affects the anterior teeth of young adults.4 It is characterized by the deposition of hard tissue within the root canal space and a yellowish discoloration of the clinical crown. This hard tissue is an osteoid tissue produced by the odontoblasts, which results in a simultaneous deposition of a dentin-like tissue along the periphery of root canal walls and within the pulp space proper. These tissues can eventually fuse with one another, producing the radiographic appearance of a root canal space that has become partial or completely calcified.6

The exact mechanism of canal obliteration is unknown but is believed to be related to damage to the neurovascular supply of the pulp at the time of injury.7,8 It is the calcification of the pulp chamber that results in the darker hue, loss of translucency and discoloration of the crown of the tooth.9 The condition may be recognized clinically as early as 3 months after the injury but in most cases it is not detected for approximately 1 year.10–12 Pulp necrosis has also been reported as a complication6,13 with ranges varying from 1% to 16%. Periapical lesion develops in a range of 7.3% to 24% in these cases up to 4 years after initial traumatic injury, especially in completely calcified teeth.8,14 Success in root canal treatment is based on proper debridement, disinfection and obturation of the root canal system. However, this procedure may be difficult or even impossible to achieve if the pulpal space is partially or completely calcified.

The endodontic treatment performed under these circumstances pose the risk of perforating the root15, a complication that seriously affects the long-term prognosis of the tooth. If calcified root canal treatment fails, the endodontic surgical intervention may be the only possible alternative other than extraction of the tooth. There is a lack in the literature regarding the optimum treatment of teeth showing signs of PCO. We herein report clinical technique and two cases of endodontic treatment in teeth with partially or completely PCO.5

Case 1

A 24 year-old female patient was referred to Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur for an evaluation of pain and discomfort associated with the right maxillary canine. PCO could be observed in radiographs, which also revealed the presence of patent canal apically with periapical radiolucency (Fig. 1). Clinically, tooth was tested as non-vital with electric and thermal stimulation, but the mobility and probing depth of the tooth were within normal limits. Tenderness to percussion was associated with the tooth; however occlusal disharmony was not detected.

The clinical and radiographic findings led to a diagnosis of asymptomatic irreversible pulps with symptomatic apical periodontitis, necessitating endodontic therapy. After tooth isolation, the access cavity was deepened with an ultrasonic tip START-X™ (Dentsply/Maillefer) under the use of the operating microscope (Global surgical corporation) (Fig 2,3). To gain access through the calcified dentin, a combination of C-files (Dentsply/Maillefer) and K-files (Dentsply/Maillefer) were used (Fig. 4). These C-files have improved cutting efficiency and get inserted into the calcified tissue with more resistance to deformation and fracture. To ensure the insertion of the file in the correct position centered – lingual, opposite – buccal rule was applied to determine the correct position of file in root canal space. With this approach, same limitations of the two dimensional radiographic view could be compensated. Irrigation was performed copiously with 3% sodium hypochlorite (Prevest DenPro India). Once in contact with organic tissue, the “bubbles” formation could be observed under the operating microscope, demonstrating that root canal space has reached. Biomechanical preparation was done till apical size 30 determined after apical gauzing. Obturation was done with gutta percha (Dentsply/Maillefer) and AH plus sealer (Dentsply/Maillefer) using cold lateral condensation technique (Fig. 5). Patient was completely asymptomatic 30 days after completion of root canal therapy.
Case 1

A 25 years old female patient reported to Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur with chief complaint of persistent pus discharge from upper front teeth region since 6 months. He had suffered a dental traumatic injury 4 years back. On examination 21, 22 (maxillary left central and lateral incisor) were discolor and sinus tract was evident on the attached labial gingiva. On vitality testing (thermal and electrical) 21, 22 had a negative response. An intraoral periapical radiograph of maxillary anterior teeth revealed radiolucent lesion at apical third of 21, 22 (Fig. 6). Apical and middle third part of root of 21 was resorbed, so extraction was planned. A near total calcification was present with the canal space of 22. The clinical and radiographic findings led to a diagnosis of pulp necrosis with chronic periapical abscess, necessitating endodontic therapy. So access to 22 was gained using same technique as in case 1 and biomechanical preparation was carried out with the combination of C- files and K- files up to size 45 determined after apical gauzing (Fig. 7). A calcium hydroxide (Prevest DenPro India) dressing was placed for duration of three weeks. Gaining access through calcified canal seemed to be a challenge since a near total calcification was present. Obturation was done by cold lateral condensation technique using gutta percha and AH Plus Sealer (Fig. 8).

Case 2

A 25 years old female patient reported to Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur with chief complaint of persistent pus discharge from upper front teeth region since 6 months. He had suffered a dental traumatic injury 4 years back. On examination 21, 22 (maxillary left central and lateral incisor) were discolor and sinus tract was evident on the attached labial gingiva. On vitality testing (thermal and electrical) 21, 22 had a negative response. An intraoral periapical radiograph of maxillary anterior teeth revealed radiolucent lesion at apical third of 21, 22 (Fig. 6). Apical and middle third part of root of 21 was resorbed, so extraction was planned. A near total calcification was present with the canal space of 22. The clinical and radiographic findings led to a diagnosis of pulp necrosis with chronic periapical abscess, necessitating endodontic therapy. So access to 22 was gained using same technique as in case 1 and biomechanical preparation was carried out with the combination of C- files and K- files up to size 45 determined after apical gauzing (Fig. 7). A calcium hydroxide (Prevest DenPro India) dressing was placed for duration of three weeks. Gaining access through calcified canal seemed to be a challenge since a near total calcification was present. Obturation was done by cold lateral condensation technique using gutta percha and AH Plus Sealer (Fig. 8).

DISCUSSION

Paterson & Mitchell® felt that a tooth with signs of pulpal obliteration because of trauma should be regarded as a potential focus for infection, so root canal treatment was merited on that basis. Complete radiographic obliteration does not necessarily mean the absence of the pulp or canal space,16 in the majority of the cases, a pulp canal space with pulp tissue is present. However, the localization and access of calcified root canals is a challenge in endodontic practice.17 These cases confirmed the previous findings that some form of patent canal usually persists in these type of cases.9,15 In both cases canals were almost totally calcified and only apical 1-2 mm of the canal patency was noticeable with periapical radiolucency. A wise decision was to gain an access & negotiate the entire canal length. In difficult-to-treat teeth, ultrasonics have proven to be useful for access preparation, not only for finding canals, but also for reducing the time and the predictability of the treatment.18,19 Microscopic visualization and ultrasonic instruments are a safe and effective combination to achieve optimal results. Two different types of ultrasonic (US) units are commonly used in dentistry: Magnetostrictive and Piezoelectric. Piezoelectric units are generally preferred in endodontics; they offer more cycles per second (40 kHz), generate less heat and their inserts work in linear, back and forth motion with a vibration amplitude that does not increase linearly with increasing generator power.20, 21 Ultrasonic tips for endodontic use are available in different lengths, diameters, angles and designs, with or without water ports. The visual access and superior control that ultrasonic cutting tips provide during access procedures make them a most convenient tool. Ultrasonics work well when breaking through the calcification that covers the canal orifice. A trough tip is a good choice for this task. For these applications, bigger tips with a limited diamond coated extension should be used during the initial phase of removing calcification, interferences, materials, and secondary dentin, as they offer maximum cutting efficiency and enhance control while working in the pulp chamber. The subsequent phase of finding canal orifices should be carried out with thinner and longer tips that facilitate working in deeper areas while maintaining clear vision.18, 19 Care should be exercised while searching for canal orifices, as aggressive cutting may cause an undesired modification of the anatomy of the pulp chamber.22 Although a wise clinician stops excavating dentin if a canal orifice cannot be found to avoid weakening the tooth structure. Root perforation can occur due to overzealous or inappropriate attempts to locate canals.

In case 1, a Start-X tip no. 3 was used to enter the root canal. The pulp chamber was filled with Glyde (Dentsply/Maillefer), an Ethylene-Diamine Tetra-Acetic Acid (EDTA) paste, to act as a lubricant and improve hard-tissue debridement during canal preparation. All canals were negotiated to working length, starting with a combination of size 08 C-File and K-Files (Dentsply/Maillefer). A reproducible glide path was established in all the root canals up to a size 10 K-File before the glide path was enlarged with PathFiles no. 1 (Dentsply/Maillefer), no. 2 and no.3. Subsequent root canal preparation was done with hand files. In such a case when the canal is located, a small K- file (#06, #08, #10) coated with the chelating agent should be introduced in the canal to determine the patency. The file should not be removed until some canal enlargement has occurred. It should be used in short up and down movements. Selective circumferential filing motion should be performed.22 The C-File used in this study demonstrated to be efficient for initial pathfinding; since it has the rigidity required to transverse restricted spaces and can be used with vertical watch-winding forces with low
incidence of buckle or fracture. In the cases herein described, low speed burs associated with ultrasonic tips were used to selectively remove the calcified dentin under the operating microscope and for canal negotiation and penetration. Cvek M et al found that the highest number of irretrievable instrument fractures occurred in totally obliterated root canals. 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 pulp 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.

CONCLUSION

Treat a tooth with calcified canal is a challenge. Ultrasonic technique plays an important role in management of these types of cases. If tooth with calcified canal is negotiated till working length and obturated; good prognosis can be expected.

Acknowledgement

Authors would like to thanks institution for the kind help and the post graduate students for their professional help and Mr. Aman for his material help.

References