

Calcific Metamorphosis

Naresh Gaddala¹, Chandrasekhar Veeramachaneni²

Department of Conservative Dentistry and Endodontics, Mamata Dental College, Khammam, Telangana-507002, India

Abstract: *Calcific metamorphosis (CM) is seen commonly in the dental pulp after traumatic tooth injuries and is recognized clinically as early as 3 months after injury. Opinion differs among practitioners as to whether to treat these cases upon early detection of CM or to observe them until symptoms or radiographic signs of pulpal necrosis are detected. In this case report, non surgical management of symptomatic completely obliterated maxillary central incisors was described.*

Keywords: Calcific metamorphosis, pulp canal obliteration, root canal treatment, trauma, DG-16 Explorer

1. Introduction

Calcific metamorphosis is defined as a pulpal response to trauma that is characterized by deposition of hard tissue within the root canal space [1]. It has also been referred to as pulp canal obliteration. Calcific metamorphosis occurs commonly in young adults because of trauma. It is evident usually in the anterior region of the mouth and can partially or totally obliterate the canal space radiographically [2]. 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. It is the calcification of the pulp chamber that results in the darker hue, the loss of translucency and the yellowish appearance of the crown of the tooth [3].

Calcific metamorphosis is characterized by anosteoid tissue that is produced by the odontoblasts at the periphery of the pulp space or can be produced by undifferentiated pulpal cells that undergo differentiation as a result of the traumatic injury. This results in a simultaneous deposition of a dentin-like tissue along the periphery of the pulp space (root canal walls) and within the pulp space proper (root canal). These tissues can eventually fuse with one another, producing the radiographic appearance of a root canal space that has become rapidly and completely calcified [4].

Pulp sensibility tests unreliable in case of teeth exhibiting calcific metamorphosis. There is a progressive decrease in the response to thermal and electrical pulp testing as pulp canal obliteration becomes more pronounced. Teeth undergoing pulp obliteration are generally asymptomatic. It has been reported that 52% of teeth were asymptomatic when first examined with a further 21% exhibiting mild symptoms on routine and clinical examination. [5]

The radiographic appearance of PCO is one of either partial or total obliteration of the pulp canal space with or without associated periapical pathosis. Complete radiographic obliteration of the pulp space does not necessarily mean the absence of the pulp canal space; in the majority of these cases, a pulp space with pulp tissue is present, but the sensitivity of conventional radiographs is too low to allow their image to be captured. [6] The following is a report of case where in non

surgical intervention was successfully carried out in patient suffering from calcific metamorphosis with periapical pathosis.

2. Case Report

A 23 year old male patient reported to our department with a chief complaint of pain in relation to his upper anterior teeth region. The patient gives a history of trauma 3 years back in upper anterior teeth. The patient was asymptomatic during this period started developing pain in relation to 11 over a duration of one week. The clinical examination revealed discolored tooth with sinus opening in relation to 11. A negative response was evaluated with both heat and electric pulp test for involved tooth, the normal response in adjacent teeth. The radiographic examination revealed completely obliterated pulp chamber and canal in 11 with periapical radiolucency [Fig.1]. On the basis of history and radiographic examination, it was evident that this was a case of calcific metamorphosis.

A non surgical endodontic intervention was initially planned for management. A standard access was done at the exact centre of palatal surface of crown buccolingually and incisogingivally. Bur penetration of 3-4mm at an angle of roughly 45° to long axis tooth with generally intersect with pulp chamber in an averaged sized tooth. However, in this case as pulp chamber were completely calcified after reaching a depth of 4mm, the bur was rotated to be a parallel to long axis of tooth as possible to prevent perforation. Penetration was proceeded down the lingual aspect of access preparation with a frequent exploration of orifice with DG-16 endodontic explorer. We are able to locate the orifice of canal using DG-16 explorer.

At this point a No.8 followed by No.10 k file was placed into the orifice to negotiate the canal. EDTA gel is used along with orifice shaper to enlarge the coronal portion. Working length was determined by 10 k file introducing till the apical portion. [Fig-2]. Biomechanical preparation done by crown down approach to improve tactile sensation and better apical penetration. 40 size master cone was selected and verified its fit by radiograph [Fig-3]. Obturation is done by lateral condensation technique. Post obturation radiograph is taken as shown in [Fig-4]. The patient was recalled monthly and in the

one year follow up so far he was asymptomatic with no pain on percussion.

3. Discussion

In a more recent study (Oginni et al. 2009) of 276 teeth diagnosed with PCO, it was recommended that root canal treatment should be initiated in teeth with tenderness to percussion, PAI scores 3 and a negative response to sensibility testing [5]. In the present case report, also we managed the calcific metamorphosis of upper maxillary central incisor with periapical abscess by routine endodontic treatment. Complete radiographic obliteration does not necessarily mean the absence of the pulp or canal space; in the majority of the cases, a pulp canal space with pulp tissue is present and in such case pulp may get necrosed and abscess may form later in future. Teeth with PCO requiring root canal treatment are challenging. The negotiation of small calcified canals is challenging (Dodds et al. 1985)[9]. Cvek et al. (1982) not surprisingly found that the highest number of irretrievable instrument fractures occurred in totally obliterated root canals[10]. Typically, small files are required for initial path finding; however, these files lack the rigidity required to transverse restricted spaces and can often buckle or 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. However, a variety of 'path finding' instruments are available with this objective in mind. These instruments have various designs, but the most common has a quadrangular cross section. Chelating agents are of limited value except as a lubricant or to assist instrumentation after the canal has been negotiated [6]. A 'crown down' approach has been recommended to improve tactile sensation and better apical penetration [6]. As a general rule, the calcification process as seen in pulpal obliteration occurs in a corono-apical direction soonce the initial canal has been captured, an instrument tends to progress more easily as it advances towards the canal terminus that has enhanced rigidity; however, the value of these instruments remains to be demonstrated [7]. In the present study, No.8 followed by No.10 k file was placed into the orifice to negotiate the canal. EDTA gel is used along with orifice shaper to enlarge the coronal portion[8]. Biomechanical preparation done by crown down approach to improve tactile sensation and better apical penetration. Obturation is done by lateral condensation technique. Prognosis of calcific metamorphosis cases was predictable and in this case also patient reported after 1 year was asymptomatic and without any tender on percussion.

4. Conclusion

Calcific metamorphosis cases are great challenge to the clinician its diagnosis and treatment procedures is utmost importance in providing best treatment. This article highlights the canal negotiation ,preparation and obturation of the canal by routine conventional endodontic treatment.

References

- [1] American Association of Endodontists. Glossary of Contemporary Terminology for Endodontics, ed 6. Chicago: AAE, 1998.
- [2] Andreasen F, Zhijie Y, Thomsen S, Andersen P. Occurrence of pulp canal obliteration after luxation injuries in the permanent dentition. *Endod Dent Traumatol* 1987;3:103-115.
- [3] Patterson S, Mitchell D. Calcific metamorphosis of the dental pulp. *Oral Surg Oral Med Oral Pathol* 1965;20:94-101.
- [4] Andreasen J, Andreasen F. Textbook and Color Atlas of Traumatic Injuries to Teeth, ed 3. Copenhagen: Munksgaard, 1994.
- [5] Oginni AO, Adekoya Sofowora CA, Kolawole KA . Evaluation of radiographs, clinical signs and symptoms associated with pulp canal obliteration: an aid to treatment decision. *Endodontics and Dental Traumatology* 2009, 25, 620-5.
- [6] Amir FA, Gutmann JL, Witherspoon DE. Calcific metamorphosis: a challenge in endodontic diagnosis and treatment. *Quintessence International*, 2001, 32, 447-55.
- [7] Allen MJ, Glickman GN, Griggs JA. Comparative analysis of endodontic pathfinders. *Journal of Endodontics*, 2007;33, 723-6.
- [8] Ngeow WC, Thong YL . Gaining access through a calcified pulp chamber: a clinical challenge. *International Endodontic Journal*, 1998; 31, 367-71.
- [9] Dodds R, Holcomb J, McVicker D.. Endodontic management of teeth with calcific metamorphosis. *Compendium of Continuing Education Dentistry*, 1985; 6, 515-20.
- [10] Cvek M, Granath L, Lundberg L (1982) Failures and healing in endodontically treated non vital anterior teeth with post traumatically reduced pulpal lumen. *Acta Odontologica Scandinavica* ;40, 223-8.

Figures

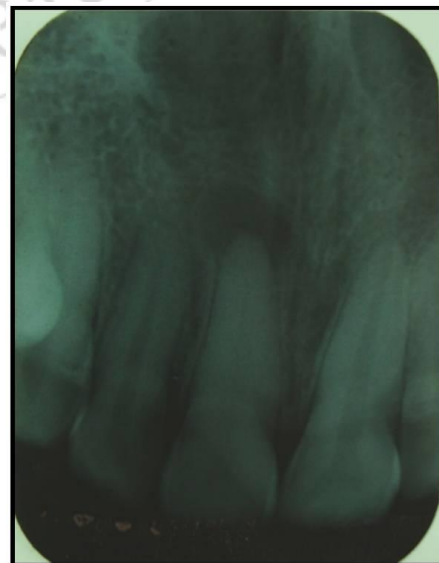


Figure 1: Pre-operative



Figure 2: Working length



Figure 4: Obturation



Figure 3: Master cone

