

Management of an Unusual Idiopathic Mid Root Canal Calcification- An Innovative Approach

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Abstract

The future of teeth with calcified canals appears much brighter today than ever before due to the advancements in diagnostic aids and instrumentation techniques. Prevalence of free pulp stones in the coronal pulp tissue is most commonly seen, but calcification in the mid root canal space is rare. This case report focuses an innovative approach, using both orthograde and retrograde obturation techniques in managing the mid root calcification with periapical pathology. Usage of ultrasonic instruments in this case have shown better prognosis in managing periapical pathology.

Introduction

Pulp stones are discrete calcified masses found in the dental pulp, exist freely in the pulp tissue or become attached to or embedded into the dentine.⁽¹⁾ Etiological factors that have been implicated in stone formation include pulp degeneration, inductive interactions between epithelium and pulp tissue, age, circulatory disturbances in pulp, orthodontic tooth movement, idiopathic factors and genetic predisposition i.e., dentine dysplasia, dentinogenesis imperfecta and in certain syndromes such as Van der woude syndrome.⁽²⁾ Their size may range from microscopic to large masses that obliterate almost the entire pulp chamber.⁽³⁾

Pulp stones, detected during routine radiographic examinations, are seen as single or multiple circular or ovoid radio opaque images. The prevalence of pulp stones ranges from 8% to 90%, and only lesions greater than 200 μ m are detectable.⁽⁴⁻⁸⁾

Teeth with pulp canal calcification in need of root canal treatment pose particular diagnostic and treatment challenges to the clinician. Cone Beam Computed Tomography (CBCT) may demonstrate root, coronal anatomy and detect calcifications, which may help to make an accurate diagnosis.⁽³⁾ Free pulp stones are found coronally within the pulp tissue and are most commonly seen on radiographs, but calcification in the mid root canal space is rare.⁽⁹⁾ Hence the present case report presents the successful management of an unusual idiopathic pulp calcification in the middle third of root canal in the central incisor i.e. 21 and periapical cyst with respect to 21 and 22.

Case Report

A 25 year old male patient reported to the Department of Conservative Dentistry and Endodontics, Kamineni Institute of Dental Sciences, Narketpally, with chief complaint of pain in the left upper front teeth region since one month. He gave history of dull, gnawing pain since one month with moderate intensity. His medical history was noncontributory. He revealed

history of trauma five years back and one year ago he visited a local dentist as he was getting continuous severe pain. He was advised root canal treatment for the same tooth. The patient discontinued the treatment after his first visit.

On clinical examination, it was observed that the maxillary left upper central incisor was discolored and was with temporary restoration on the palatal aspect of crown. The tooth was tender on percussion and had moderate pain on palpation. Pulp sensibility tests were performed using electric pulp tester (Parkell Inc. Edgewood, NY, USA) and thermal test using hot guttapercha elicited non-responsiveness irt 22. Intraoral periapical (IOPA) radiograph revealed an unusual rare calcification in the middle third of root canal of 21 and showed periapical radiolucency with definite borders irt 21 and 22 (Fig. 1). Patient was advised to take CBCT images irt 21 and 22 to determine the exact dimensions and position of the canal calcification and the dimensions of the periapical lesion. Axial view of CBCT image revealed that there is partial obliteration of canal space at the middle third of the root canal irt 21 and periapical radiolucency approximately 2 x 3 cm in its greatest dimensions (Fig. 2). Based on clinical radiographic findings it was diagnosed as chronic periapical cyst with mid root canal calcification irt 21.



Fig. 1: Preoperative radiograph showing mid root canal calcification irt 21 and periapical radiolucency



Fig. 2: Axial view of CBCT image showing partial obliteration of canal space irt 21

Conventional root canal treatment followed by periapical surgery was planned for 21 and 22. In the first visit patient was explained about the treatment plan and informed consent was taken. Under rubber dam isolation local anesthesia was given. Access was redefined irt 21, canal negotiation was done using no 15 K file but resistance was felt at a distance of 15mm from the incisal edge which is suggestive of pulp canal calcification (Fig. 3). Various methods were performed to remove the calcified mass using burs, chelating agents and ultrasonic tips which failed to remove the root canal calcification. Further attempts were not done in removing the calcified masses, as they may lead to complications like root perforation or root fracture. So, cleaning and shaping was performed till the calcified mass by using hand K files up to 80 ISO size K- file, irrigation was done using 5.25% sodium hypochlorite (NaOCl), 17% EDTA and 2% Chlorhexidine (CHX). Calcium hydroxide intra canal medicament was given, later it was obturated using lateral compaction technique. Conventional root canal therapy was performed irt 22 (Fig. 4).



Fig. 3: Working length determination irt21



Fig. 4: Post obturation X-ray

In the next visit periapical surgery was planned. Rectangular incision was given. Flap was reflected and granulation tissue was removed (Fig. 5). 3mm root end resection was done by using surgical length round bur no 703. Cleaning and shaping of the apical third of the canal was done from the resected end using ultrasonics and retrograde filling was done using Biodentine up to calcified mass of the root canal. Thus the canal was filled with gutta-percha in the coronal third and with biodentine in the apical third leaving behind the calcified mass as it is in the centre of the root canal (Fig. 6). Sutures were placed and patient was recalled after 1 week for suture removal. 3 months follow up showed good healing of the periapical lesion (Fig. 7).



Fig. 5: Flap Elevation



Fig. 6: Placing retrograde filling material



Fig. 7: 3 Months post-operative radiograph showing satisfactory healing

Discussion

Pulpal calcifications are calcified masses in dental pulps of healthy, diseased and even unerupted teeth.⁽¹⁰⁾ Pulp stones were classified according to the most prevalent types occurring in the population.⁽¹¹⁾

Type I. Single pulp stone present in pulp chamber

Type IA. Multiple pulp stone present in pulp chamber

Type II. Single pulp stone present in root canal

Type IIA. Multiple pulp stones present in root canal

Type IIB. Multiple pulp stones present in pulp chamber and root canal

Type III. Continuous type extending from pulp chamber to root canal

In the present case it is Type II pulp stone which is single pulp stone present in the middle third of the root canal. Paterson and Mitchell felt that a traumatized tooth with signs of pulpal calcification should be regarded as a potential focus for infection and that root canal treatment is the treatment of choice.⁽¹²⁾

Success of the root canal treatment is based on proper debridement, disinfection and obturation of the root canal system, the most important procedure is cleaning the root canal space of microbial contaminants and pulpal debris. However, this procedure may be difficult to achieve if the pulpal space is calcified.⁽¹³⁾ Rock and Grundy recommended root canal treatment in teeth undergoing pulpal obliteration based on two clinical parameters 1. Once the guidance afforded by the pulp space is lost, it is more difficult to prepare root canal space without perforation and 2. If pulp necrosis occurs the only possible access may be surgical intervention.⁽¹⁴⁾

The use of cone-beam computed tomography (CBCT) in dentistry has made it possible to obtain different planar views of a region of interest and to identify anatomic details without superimpositions. Therefore, these methods have greater specificity and accuracy in comparison to conventional radiographs and are indicated for preoperative planning. They have become essential in endodontic treatment because an

accurate image of root and coronary anatomy as well as of calcifications, increases treatment success.⁽³⁾

Various burs and ultrasonic tips have been designed for performing the deep troughing required to locate and enter calcified pulp chambers and canals. Irrespective of the extent of canal obliteration seen on radiograph; however, treatment was often complicated. Further attempts were not done to remove the calcified mass as an effort to locate the residual canal may remove large amounts of dentin and there is a risk of perforating or fracturing the root.^(15,16)

In the present case ultrasonic tips were used to prepare the apical cavity preparation to condense the root end filling material according to a study conducted by Wuchenich et al, they have compared the root-end cavities prepared with conventional hand pieces or ultrasonic tips in cadavers in a SEM study and found that ultrasonics tips made cleaner and deeper root-end cavity preparations, aiding retention of the root-end filling material and disinfection by removing infected dentin.⁽¹⁶⁾

In this case Biodentine with active biosilicate technology was used as root end filling material as it is composed of a highly purified tricalcium silicate powder that contains small proportions of dicalcium silicate, calcium carbonate and a radiopaquer. Septodont claims that Biodentine features as an endodontic repair material that are superior to MTA: Biodentin has better consistency, better handling and safety, and faster setting time which creates no need for a two-step obturation.⁽¹⁷⁾

Conclusion

The future of teeth with calcified canals appears much brighter today than ever before due to the advancements in diagnostic aids and instrumentation techniques. The clinician must understand that pulpal calcifications are signs of the pathosis, not the cause of such. This case was successfully treated with innovative technique of both orthograde and retrograde obturation and showed good prognosis after 3months follow up.

Conflict of Interest

We declared that there is no conflict of authors

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