



Conservative Management of a Large, Chronic Periapical Lesion in Relation to Maxillary Lateral Incisor: A Case Report

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Abstract

Anterior dental trauma is the most common injury pattern of traumatic injuries of dentoalveolar system. Treatment of traumatic injuries in anterior segment of oral cavity is of multidisciplinary nature. In the present case scenario where nonsurgical management should be the first choice of therapy for conservation of surrounding healthy dental tissues. Systematic reviews and meta-analyses give us idea on evidence based treatment approach for long term success of therapy.

The present case report is 18 months follow up of conservative and successful management of a large, chronic periapical lesion in relation to maxillary lateral incisor using routine endodontic therapy. This report gives tips which are to be followed during therapy which will be helpful in healing of the lesion and long term success.

Keywords: Trauma; Nonsurgical Endodontic Approach; Periapical Lesion; Calcium Hydroxide

Introduction

Injury to anterior segment of teeth especially at younger age is traumatic since it affects the quality of life by causing esthetic, functional, occlusal and psychosocial disturbances. Hence, these cases create challenge for clinician while rendering therapy. The incidence of injuries to maxillary anteriors is 37% as they are placed most anteriorly in the arch and protrusive eruptive pattern [1] among them 16% affects the maxillary laterals and mandibular central incisors. Most of the time traumatic injuries are associated with clinical crown fractures, root fractures, combination of crown and root fractures and tooth fracture associated with fracture of alveolar process. In these cases, if it is associated with pulpal damage during the incident, it will lead to moderate to severe inflammation, which may be associated with symptoms such as pain, tenderness, pain on palpation, swelling

etc. If the injury is not severe, these injuries may remain asymptomatic over period of time, slowly get necrosed and may flare up after sometime. These necrosed pulp tissues provide favorable environment for the growth of microorganism leading to biofilm formation of numerous microbial strains and release lots of antigens and toxins into root canal system. Such products usually leach out into surrounding periradicular tissues through apical foramina/lateral and accessory canals [2], progressively affecting periapical tissues leading to formation of periapical lesions in the form of granulomas, abscesses and periapical cysts. The incidence of periapical granuloma ranges between 9.3% to 87.1%, abscess between 28.7% to 70.7% and periapical cyst varies between 6% to 55% [3]. Chronic periapical lesions are generally diagnosed either during routine dental examination or in dental radiographs for discolored teeth or in case patient develops any symptoms like pain, discharge or discolouration.

Treatment of such periapical lesions performed either by conservative management by root canal therapy or by periapical surgery. Conservative endodontic therapy eliminates the possibility of complications of surgery. Surgical intervention is necessary for faster therapy and if non-surgical treatment fails to show any signs of healing.

The present case report describes the Conservative successful management of large periapical lesion by use of long- term calcium hydroxide as inter appointment intracanal medicament [4]. Calcium hydroxide is extensively used as an intra canal medicament in the field of endodontics with long history of success because of its alkalinity, effective antibacterial properties, its ability to encourage osseous repairs and promoting healing and it is economical to use [5].

Case Report

A 32-year-old male patient reported to Department of Conservative and Endodontics for routine checkup. At the time of recording dental history patient revealed that, he had intermittent palatal swelling and salty taste. Patient also gave a history of trauma in the childhood at the age of 10 years, for which he never visited dentist because the symptoms were mild and did not affect his daily routine. The medical history was non-contributory. Patient had visited a dentist for routine scaling in the past. Intra oral examination showed mild grayish discoloration with respect to maxillary right lateral incisor (Tooth #12). On palpation palatal region a depression is felt with loss of firmness in bone. Tooth failed to respond to thermal [heat and cold] and electric pulp testing [Digi test, Parkell electronics division. Farmingdale NY]. A periapical radiograph in relation to 12 revealed a large radiolucent lesion around the apex of tooth no. 12 with well-defined radiopaque border, measuring about 10 x 8 mm, suggestive of cystic lesion. Radiographically there was no signs of root fracture or resorption. Provisional diagnosis was made as periapical cyst/ chronic periapical abscess. Various treatment options including routine endodontic therapy, periapical surgery followed by non-vital bleaching was discussed and suggested to the patient. The patient consented for non-surgical procedure.

Access opening was done using endo Axxess bur (Kerr, Dental). Preflaring of the canal was done using Gates-Glidden drills up to size

3. Canal was dry upon access cavity preparation During the apical patency a straw colored fluid started discharging from the canal through the apex, suggestive of periapical cyst. After the apical patency, apical gauging and apical scouting. working length was determined. The working length was determined 1 mm short of the radiographic apex with #15 K-file (Initial apical file) [DENTSPLY Maillefer, Ballaigues, Switzerland], which was confirmed with apex locator. The canal was enlarged up to Master apical file size ISO size # 40, followed by step back technique up to size 60 K-File. During the preparation, the canal was irrigated copiously with 2.5% sodium hypochlorite (NaOCl) [Novo Dental Products Pvt.Ltd Mumbai India] and 17% EDTA [B.N Laboratories Mangalore India] and the final irrigation with saline. The canal was dried with sterile paper points [DENTSPLY, Maillefer Ballaigues Switzerland]. Injectable non setting calcium hydroxide [Calcicur Voco, Cuxhaven, Germany] was applied onto the canal walls and access cavity was sealed with zinc oxide eugenol temporary restoration [Dental products of Mumbai India].

Patient was recalled after a week; tooth remained asymptomatic, with canal still dry with no drainage of any fluid from the canal. Instrumentation was carried out 1mm beyond the apical foramen with ISO # 10K file, to facilitates the rupture of epithelial lining of cystic lesion and allow the fluid to drain through the access cavity thus promoting the healing process. Digital pressure was applied in the palatal

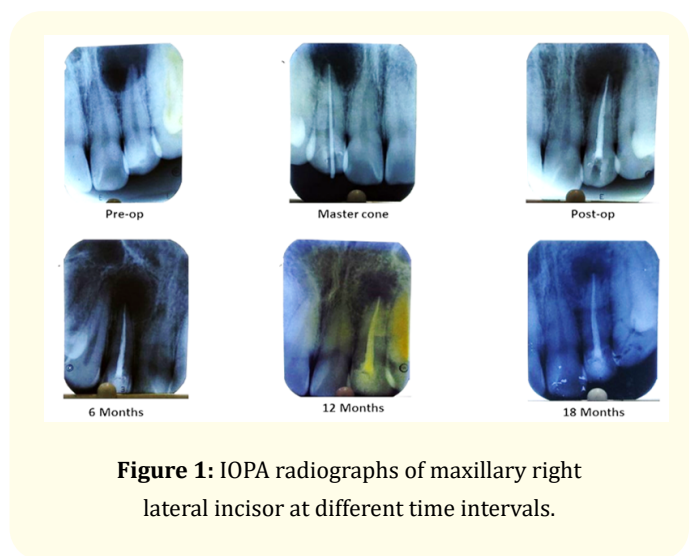


Figure 1: IOPA radiographs of maxillary right lateral incisor at different time intervals.

aspect to facilitate drainage. The same procedure was repeated for 3 appointments. Patient recalled after 1 month to evaluate. The canal was dry and drainage was ceased, The canal was reopened, calcium hydroxide was removed, canal was irrigated copiously with 2.5% hypochlorite, 17% EDTA and finally with saline. Canal was dried using sterile absorbant points and obturated with gutta percha [Dentsply Maillefer, Ballaigues Switzerland] using AH plus sealer [Dentsply, Detrey Konstanz Germany] using lateral compaction technique. The access cavity was restored with composite restoration with GIC as barrier. The patient was recalled at 6, 12 and 18 months interval (Figure 1). On clinical examination patient remained asymptomatic. Post-operative radiographs showed reduction in size of the lesion to 2 x 3 mm suggestive of healing of periapical lesion and regeneration of periapical bone (Figure 1).

Discussion

Traumatic dental injuries are more common between the age group of 2 - 5 years due to developing period of a child; it then rises again during the very active age ranges from 8 - 12 years because of bicycle, skateboard, playground and sports accidents [6]. The prevalence of injury is high among boys (10.7%) as compare to girls (9.3%) [7]. Only 3.37% of the cases of traumatized teeth undergo treatment. In the present case, patient had no acute symptoms throughout the 22 years of post-injury other than intermittent mild palatal swelling and mild discoloration of the coronal part of the tooth. Moderate injuries to the periodontium such as concussion and subluxation are usually associated with relatively minor symptoms and hence may go unnoticed by the patient [8]. Patients with these kind of injuries, who visit the dentists, years after a traumatic accidents, most of the time present with discolored teeth either opaque yellow or bluish grey in color; may be associated with radiolucent periapical lesion. This discoloration may be the result of obliteration of the pulp canal space filled with dark tertiary dentine due to pulpal cavity. Tooth will have less translucent appearance in case of calcific changes. Sometimes, there will be darker bluish grey appearance of the teeth because of pulpal vascular trauma, internal pulp cavity bleeding and destruction of RBCs and breakdown of the pulpal tissue into the dentin. Pulpal necrosis occurs only in 3% of teeth subjected to concussion [9].

Non-surgical treatment of periapical lesion shows 85% of success rate [10]. However, in the past, it was considered that large

periapical lesions would not respond to conventional root canal treatment alone and surgery was always required. However, in recent years due to improved investigation techniques and advance knowledge of clinician to understand the morphology and anatomy of root canal system and greater development of newer instrument techniques and materials, conventional endodontic treatment show higher success rates [11]. These conservative modalities of treatments are usually are less invasive and more comfortable for patient. In case of nonsurgical endodontic treatments, the key points to be remembered always are sufficient chemo-mechanical cleaning of the root canal system using copious NaOCl irrigation and use of inter appointment intra canal medicament. Care must be taken not to perforate the maxillary sinus lining, if the lesion is in close proximity to the maxillary sinus, during maxillary 1st molar root canal therapy, since it may lead to over instrumentation and pushing intracanal irrigants beyond apex can cause injury to the sinus lining [12]. Similarly during lower premolar therapy, over instrumentation can lead to pushing of irrigants and intracanal medicaments beyond the apex and cause paraesthesia of mental nerve, since apex of these teeth are in close proximity with mental foramen [13].

Thus, periapical lesions cannot be differentiated into cystic and non-cystic based solely on radiographic features. However, large cysts may be provisionally diagnosed in radiographs because of their size and sclerotic borders of the lesion. But the diagnosis have to be confirmed by non-invasive imaging technique such as Ultrasound real time imaging (also known as sonography) or block dissection during periapical surgery [14]. In the present case, the lesion had sclerotic border which looked like a cyst. These cyst like periapical lesions are prone to regress to smaller sizes and even complete healing after non-surgical therapy by proper canal treatments. Ruddle, *et al.* suggested to insert patency file into the 1 mm beyond the apical constriction initially, during apical scouting of the canal [4]. Apical gauging and tuning with ISO 0.02 tapered instruments is a technique directed towards confirming a uniform taper in the apical one-third of the root canal preparation. Apical patency, glide path and apical tuning are usually carried out with patency file that is small flexible K-file of size 06, 08 or 10 stainless steel ISO files which is moved passively through the apical foramen without widening it. This minimizes the risk of losing working

length, enhances irrigation and reduce the breakage of instrument [15,16]. The patency should be performed with an instrument that binds minor foramen on the point where the apical constriction is supposedly located [17]. Bhaskar [18] has proposed to over instrumentation of the canal by 0.5 - 1 mm beyond the apical foramen into the periapical region, which causes transient inflammation and break in the continuity of epithelial lining of the cyst that enhances the resolution of the lesion. Bender [19] has commented on Bhaskar hypothesis that prevention of the apical area to the center of the radiolucency (lesion) would establish drainage and relieve the pressure. When the drainage ceases, there would be proliferation of fibroblasts in the area leading to deposition of collagen. The deposited collagen would compress the capillary network in to the area of lesion leading to starvation of epithelial cells. These cells undergo degeneration of finally engulfed by macrophages. Shah [20] stated that instrumentation beyond the apex could activate quiescent epithelial cells in the area leading to their proliferation and cyst formation and suggested the follow up period should be at least 2 years. Over instrumentation should always be done with smaller sized files such as K-file #8 or #10 to avoid additional trauma to the periapical region.

Herman first introduced calcium hydroxide in 1920. The antimicrobial activity of Calcium hydroxide is related to release of hydroxyl ions in an aqueous environment. Hydroxyl ions are highly oxidant free radicals that show extreme reactivity resulting in the damage of bacterial cytoplasmic membrane, protein denaturation and damage of bacterial DNA [21]. The leaching of calcium and hydroxyl ions to the surrounding inflamed tissues due to high alkaline pH of 11 - 13. This causes initial degenerative response followed by rapid mineralization and ossification process. The alkalinity of calcium hydroxide also neutralizes the lactic acid from osteoclasts and prevents dissolution of the mineralized portion of teeth. Calcium hydroxide is proven to assist periradicular healing and facilitates osseous repair. Unfortunately, the complete [22] elimination of bacteria is impossible with instrumentation alone, thus irrigation and intracanal medication is necessary to kill the microorganisms, neutralize their toxins and by-products and eliminate the residual tissues, smear layer and other debris from canal system as well. Calcium hydroxide plays pivotal role in disinfecting the canal hence in the present case $\text{Ca}(\text{OH})_2$ was chosen as inter appointment medicament.

Clinical signs such as pain, swelling, sinus tract and radiographic signs such as change in density within the lesion, trabecular reformation were checked during follow up visits by conventional post-op IOPA radiographs to evaluate the healing, which is economical to evaluate the healing quite satisfactorily (Figure 1) [23,24].

Conclusion

The present case of a large periapical lesion which showed the signs of healing with routine non-surgical root canal therapy. Calcium hydroxide, as an intracanal medicament has a great value in endodontics in dealing with chronic conditions where microbes are highly resistant to antimicrobials. Coronal preflaring, apical gauging and apical scouting will help to instrument the apical 3rd of the canal to reduce microbial load. Going beyond the apical constriction will help to perforate cystic lining which will help in healing of the lesion.

Thus, nonsurgical endodontic therapy is recommended in the management of even large periapical lesions. This conservative therapy should be attempted as the first line of therapy in all the cases before the surgical approach is attempted.

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