Surgical or Conservative Endodontic Treatment: A Presentation of Two Cases and 12-months Follow-up
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ABSTRACT

Traumatic injuries usually involve the anterior teeth of children and young patients. Periapical lesions are the most common findings due to this injuries. Calcium hydroxide has the potential to maintain a sterile root canal and stimulate healing of periapical pathology. At two cases, the necrotic pulp exudate was removed and a calcium hydroxide paste dressing material was placed inside the root canals up to the apices. The paste waste changed every three weeks. Periapical healing was observed at control visits without surgery and continued at the 12-months review.

Keywords: Endodontic surgery, endodontic treatment, root canal therapy

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INTRODUCTION

Traumatic injuries of teeth are a frequent occurrence and usually involve the anterior teeth of young patients (1). Depending on the severity of the trauma, dental pulp may lose its vitality and the pulp cavity and canals become repositories for a necrotic pulp tissue (2,3). This degenerating tissue produces periapical irritation through the apical foramina and usually chronic apical lesions develops (3). If the tooth is firm and has sound periodontal tissue support, conventional endodontic treatment should be carried out (4,5).

Residual bacteria and their by-products negatively affect the repair of the periradicular apparatus (6). Calcium hydroxide (Ca(OH)$_2$) has a high pH (approximately 12.5–12.8) and its main actions are achieved through the ionic dissociation of Ca$^{2+}$ and OH$^-\text{ ions}$ and their effect on vital tissues, the induction of hard-tissue deposition and the antibacterial properties. The lethal effects of Ca(OH)$_2$ on bacterial cells are probably due to protein denaturation and damage to DNA and cytoplasmic membranes. It has a wide range of antimicrobial activity against common endodontic pathogens (7).

This paper describes the management of chronic periapical infections due to trauma involving anterior permanent teeth in young patients with conservative endodontic methods and 12 months- follow-up.

CASE 1

A healthy 16-year-old male patient came to our clinic 12-month after having fallen and suffering a traumatic injury to the maxillary central incisors. A written informed consent form was signed for treatment and further publication of the case. Clinical and radiologic examination revealed complicated crown fracture and a large lesion in the periapical region of teeth 21 and sensitivity on vertical percussion (Fig 1). Intraoral examination revealed a minor
firm swelling of the vestibule above the teeth. Electric pulp test and cavity test exhibited negative results.

Under local anesthesia, initial investigation of the root canal system was performed with a size 10 K-file (Dentsply, Maillefer) and working lengths verified. Extirpation, intracanal drainage and instrumentation was performed by Flexo-File (Dentsply, Maillefer, Switzerland) methods. #15-40, using step-back technique, accompanying with copious irrigation with 2.5% sodium hypochlorite solution and sterile normal saline between instruments. Root canal was dried with sterile paper points and calcium hydroxide (Ca(OH)$_2$) paste to achieve antibacterial effect in the root canal. Ca(OH)$_2$ dressing was used in teeth every three weeks. After three sessions, root canal treatment was completed using Gutta-Percha (SPI Dental Mfg, Inc, Korea) and AH-plus sealer (Dentsply, Weybridge, UK) and the tooth had been permanently restored with composite resin systems (Single Bond Universal / Filtek Supreme-3M ESPE, USA) (Fig 2).

At 12-months follow up, the affected tooth were evaluated clinically, it was found that the tooth were asymptomatic and clinical apperance was acceptable. Radiologic evaluation revealed completely resolution of the periapical lesion (Fig 4).

**CASE 2**

A healthy 16-year-old female patient referred to our clinic with a swollen upper lip and severe pain. Further enquiry showed that the patient had an accidental fall of bicycle 10-months ago that caused trauma of her tooth 11. A written informed consent form was signed for treatment and further publication of the case. Clinical and radiologic examination revealed complicated crown fracture and a large lesion in the periapical region of teeth 11 and sensitivity on vertical percussion. Her tooth was discoloured and there was no reaction to vitality tests (Fig 3).
Similar to first patient’s treatment protocol, conservative root canal treatment was planned. Under local anesthesia, purulent intracanal drainage and biomechanical preparation was performed, accompanying with copious irrigation with 2.5% sodium hypochlorite solution and sterile normal saline between instruments. Root canal was dried with sterile paper points and calcium hydroxide (Ca(OH)$_2$) paste to achieve antibacterial effect in the root canal. For the two months, the dressing material was changed every three weeks. After the patient’s symptoms was relieved, root canal treatment was completed using Gutta-Percha and AH-plus sealer and the tooth had been permanently restored with composite resin systems.

At 6-, 12- months follow up, the affected tooth were evaluated clinically, it was found that the tooth was asymptomatic. Periapical healing was observed 6-month after treatment (Fig 5) and continued at the 12-months follow up (Fig 6). The patients was reminded about the necessary of oral hygiene procedures and recalled for a control visit 6 months later.

**DISCUSSION**

Periapical pathology is the most common sequelae of pulpal necrosis due to traumatic injury (1). Pulpal necrosis is a frequent sequela of trauma, and if microbial infection occurs, this will result in the development of a periapical lesion (8). Trauma to permanent teeth may result in complications for many months or even years after the accident (9,10).

Conservative endodontic treatment is usually less invasive than surgery and has a less traumatic postoperative course. There is less likelihood of incurring damage to adjacent vital structures such as nerves, adjacent teeth and anatomical structures (11,12). While deciding on the management of periapical lesions; diagnosis of the lesion, proximity of the periapical lesion to adjacent vital teeth, encroachment on anatomical structures, patient cooperation, age of the patient, obstructions in the root canal system must be considered. (10).
Mechanical instrumentation not always completely removes debris from root canal and periapical tissue (12, 13, 14). Organic and inorganic debris left in the root canal system could act as a bacterial substrate (15). In infected root canals, intracanal medication has been advocated for eliminate any remaining bacteria after canal instrumentation, reduce inflammation of periapical tissues and pulp remnants, render canal contents inert and neutralize tissue debris; act as a barrier against leakage from the temporary filling and help to dry persistently wet canals (16).

Longstanding infection and necrosis of the pulp causing a large periapical radiolucency may be deemed refactory to the conventional treatment because of the high probability that the lesion is a cyst (9). In the present case because of large size of the lesion, radiographic appearance suggesting lesion being cystic and long standing nature of the infection surgical invention was done. Radiographs taken 6-, 12-, 24- months, after treatment suggested periapical healing appeared to be occurring. Radiographic signs, such as density change within the lesion and trabecular reformation, confirmed healing, particularly when associated with the clinical finding that the teeth were asymptomatic and the soft tissues were healthy.

The influence of Ca(OH)$_2$ on periapical healing could be attributed to both its antibacterial effects and mineralising effects. Micro-organisms coming in direct contact with Ca(OH)$_2$ are possibly destroyed by its high alkalinity (usually pH 12 to 13) (5,17, 18). Literature recommends the therapy with Ca(OH)$_2$ in chronic periapical lesions as the intracanal dressing material of choice because of its reputed healing of periapical inflammation (19,20,22). Sjögren et al. (21) found that the use of Ca(OH)$_2$ as a dressing for 1 week efficiently eliminates bacteria in the root canals. It has also been reported that treatment with Ca(OH)$_2$ resulted in a high frequency of periapical healing.
Weiger et al. (22) reported that one-visit root canal treatment created favourable environmental conditions for periapical repair similar to the two-visit therapy when Ca(OH)$_2$ was used as antimicrobial dressing. The ability of Ca(OH)$_2$ to dissolve necrotic material was reported by Hasselgren et al. (23). Türkün and Cengiz (24) also reported that Ca(OH)$_2$ was an effective solvent for necrotic tissue as a paste and pretreatment of root canals with Ca(OH)$_2$ paste increased the effectiveness of 0.5% NaOCl irrigation, except in the coronal third of the root canal.

In the present case, nonsurgical conservative therapy was to periapical tissues have rich blood supply, lymphatic drainage and abundant undifferentiated mesenchymal cells and therefore good potential for healing (25). Because of this, all inflammatory periapical lesions should be initially treated with conservative nonsurgical procedures especially young patients. Surgical intervention is recommended if infection has not been controlled with conservative
REFERENCES


Two Cases of Large Periapical Lesion

Fig. 1- Preoperative periapical radiograph of Case 1

Fig. 2- Radiograph after completion of root canal treatment of Case 1 after three session calcium hydroxide dressing
Fig. 3 - Preoperative periapical radiograph of Case 2

Fig. 4 - 6 months control radiograph showing healing of the apical lesion of Case 2. Note a remarkable decrease of the lesion radiolucency
Two Cases of Large Periapical Lesion

Fig. 5- Periapical radiograph 12 months after treatment of Case 1

Fig. 6- Periapical radiograph 12 months after treatment of Case 2