CASE REPORT

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

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ABSTRACT

Most traumatic dental injuries among children and young adults involve the anterior teeth, and periapical pathologies are the most common findings in these injuries. Calcium hydroxide ($Ca[OH]_2$) has the potential to maintain a sterile root canal and stimulate the healing of periapical pathology. This study describes the conservative endodontic management of chronic periapical infections due to trauma involving the anterior permanent teeth of two 16-year-old patients (male 1 and female 1) and the results at a 12-month follow-up. Conservative nonsurgical therapy was planned for both patients. Necrotic pulp exudates were removed, and the root canals were dressed with $Ca(OH)_2$ paste up to the apices. The paste was changed every 3 weeks. Periapical healing was observed on control visits without surgery and continued in the 12-month review.

Keywords: Endodontic surgery, endodontic treatment, root canal therapy

INTRODUCTION

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

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

This study describes the conservative endodontic management of chronic periapical infections due to trauma involving the anterior permanent teeth of two young adults and the results at a 12-month follow-up.

CASE 1

A healthy 16-year-old male patient with a history of fall 12 months before presenting to our clinic suffered a traumatic injury to the maxillary central incisors. Written informed consent to participate and for further publication of the case was obtained. Clinical and radiographic examination revealed a complicated crown fracture, large periapical lesion involving tooth 21, and sensitivity to vertical percussion (Fig. 1). Intraoral examination revealed a minor firm swelling of the vestibule above the tooth. Vitality tests exhibited negative results.

Under local anaesthesia, coronal access of the root canal system was performed and the working length was determined using a size 15 K-file (Dentsply Maillefer, Ballaigues, Switzerland). Extirpation, intracanal drainage, and mechanical instrumentation were performed by endodontic files using a step-back technique,

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accompanied with copious irrigation with 2.5% sodium hypochlorite (NaOCl) and sterile normal saline. The root canal was dried with sterile paper points and dressed with $Ca(OH)_2$ paste to achieve an antibacterial effect in the root canal. The $Ca(OH)_2$ dressing material was changed every 3 weeks. After three sessions, the root canal treatment was completed using gutta-percha (SPI Dental Mfg, Inc., Inchon, Korea) and AH-plus sealer (Dentsply, Weybridge, UK), and the tooth was permanently restored using adhesive systems and composite resin (Single Bond Universal/Filtek Supreme—3M ESPE, St. Paul, MN, USA) (Fig. 2).

At 12-month follow-up, the affected tooth was clinically evaluated and was found to be asymptomatic. The clinical appearance was acceptable. A radiographic evaluation revealed complete resolution of the periapical lesion (Fig. 3).

CASE 2

A healthy 16-year-old female patient with a history of fall 10 months before being referred to our clinic presented with a swollen upper lip and was in severe pain. The fall had resulted in a traumatic injury to tooth 11. Written informed consent to participate and for further publication of the case was obtained. Clinical and radiographic examination revealed a complicated crown fracture, large periapical lesion involving tooth 11, and sensitivity to vertical percussion. Her tooth was discoloured, and there was no reaction to vitality tests (Fig. 4).

Similar to the first patient's treatment protocol, a conservative root canal treatment was planned for this patient. Under local anaesthesia, intracanal drainage and mechanical instrumentation were performed, accompanied with copious irrigation with 2.5% NaOCl and sterile normal saline between instruments. The root canal was dried with sterile paper points and dressed with $Ca(OH)_2$ paste to achieve an antibacterial effect in the root canal. For 2 months, the dressing material was changed 3 times. After the patient's symptoms were relieved, the root canal treatment was completed using gutta-percha and AH-plus sealer, and the tooth was permanently restored using adhesive systems and composite resin.

Fig. 1: Preoperative periapical radiograph of case 1.

Fig. 2: Periapical radiograph shows completion of root canal treatment.

Fig. 3: Periapical radiograph 12-month after treatment showing healing of the apical lesion of case 1.

Fig. 4: Preoperative periapical radiograph of case 2.

At 6- and 12-month follow-up, the affected tooth was clinically evaluated and was found to be asymptomatic. Periapical healing was observed 6 months after treatment (Fig. 5) and continued at 12-month follow-up (Fig. 6).

The necessity of oral hygiene procedures was emphasized to the patients, and a control visit was scheduled for 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 in the event of microbial infection, it will result in the development of a periapical lesion (8). Trauma to permanent teeth may result in complications that last for many months or even years after the accident (9, 10).

The 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). When 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, and obstructions in the root canal system should be considered (10).

Mechanical instrumentation does not always remove debris from the root canal and periapical tissue completely (9, 12–14). Residual organic and inorganic products in the root canal system could act as a bacterial substrate (15). In infected root canals, intracanal medication has been advocated to eliminate any remaining bacteria after canal instrumentation, reduce inflammation of periapical tissues and pulp remnants, render canal contents inert, and neutralize tissue debris. In addition, it acts as a barrier against leakage from the temporary filling and helps to dry persistently wet canals (16).

Longstanding infection and necrosis of the pulp causing large periapical radiolucency may be deemed refractory to the conventional treatment due to the high probability that the lesion is a cyst (9). In the present

Fig. 5: Periapical radiograph at 6-month control. Note a remarkable decrease of the lesion radiolucency.

Fig. 6: Periapical radiograph 12-month after treatment of case 2.

cases, because of the large size lesions, a radiographic examination was performed, suggesting that the lesions were chronic and cystic. Radiographs taken at 6 and 12 months after treatment suggested that periapical healing occurred. 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 and mineralizing effects. Microorganisms directly exposed to $Ca(OH)_2$ are possibly destroyed due to their high alkalinity (usually pH 12–13) (5, 17, 18). The literature recommends $Ca(OH)_2$ as the intracanal dressing material of choice in the management of chronic periapical lesions because of its reputed healing of periapical inflammation (19, 20, 21). Sjögren *et al* (22) reported that the use of $Ca(OH)_2$ as a dressing for 1 week efficiently eliminates bacteria in the root canals and results in a high frequency of periapical healing.

Weiger *et al* (21) reported that one-visit root canal treatment created favorable environmental conditions for periapical repair, similar to the two-visit therapy when $Ca(OH)_2$ was used as an antimicrobial dressing. According to Hasselgren *et al* (23), $Ca(OH)_2$ has the ability to dissolve necrotic material. In addition, Türkün and Cengiz (24) reported that $Ca(OH)_2$ paste was an effective solvent for necrotic tissue, and pre-treatment 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 study, conservative nonsurgical therapy was used to treat periapical tissues, which have a rich blood supply, lymphatic drainage, and abundant undifferentiated mesenchymal cells and therefore have good potential for healing (25). The findings of this study suggest that conservative nonsurgical procedures should be the first choice of treatment for inflammatory periapical lesions and surgical intervention should be recommended only if the infection cannot be controlled with conservative measures.

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