ABSTRACT

Introduction- The aim of this study is to report the management of large periapical lesion using triple antibiotic paste as an alternative intra-canal medicament in non-surgical endodontic treatment.

Case report- an 11 year old male patient with large periapical lesion in mandibular anterior region, treated using conservative non-surgical endodontic treatment. Calcium hydroxide-iodoform paste (Vitapex™) was used as an intracanal medicament, which did not lead to resolution of symptoms. Hence, triple antibiotic paste was used as an alternative intracanal medicament for 2 weeks. Obturation was completed with Nanohybrid composite as final restoration. Progressive healing was observed at subsequent follow up examinations, with almost complete resolution of the periapical lesion at 18 months.

Conclusion- Endodontic cases resistant to routine intracanal medicaments should be treated with alternative medicaments which act against a wider spectrum of microorganisms, before opting for surgical procedures, especially while treating paediatric patients.

Keywords- Antibiotics, Calcium Hydroxide, Healing, Periapical Diseases, Root Canal Medicaments.

INTRODUCTION

Pulp necrosis resulting from infection of the root canals, initiates an inflammatory response in the periapical region due to ingress of the toxic by-products of microorganisms. Failure to eradicate the microbial load from the necrotic root canals lead to the development of periapical lesions that increase in size by a variety of mechanisms [1].

In the past, large periapical lesions were managed by root canal treatment of involved teeth followed by surgical excision. However, awareness of the complex root canal morphology and development of newer techniques and
intracanal medicaments has led to the paradigm shift of treating such lesions conservatively [2]. Calcium hydroxide (Ca(OH)₂), commonly used as an intracanal medicament, however, is ineffective against all members of the endodontic microbiota [3]. Use of a combination of antibiotics - a mixture of ciprofloxacin, metronidazole and minocycline is reported to be very effective in healing of large cyst-like periapical lesions [4,5].

This case report describes successful management of a large periapical lesion resistant to Ca(OH)₂, treated with triple antibiotic paste (TAP) containing ciprofloxacin/cefaclor/metronidazole as an alternative intracanal medicament with 18 months follow up.

CASE REPORT

An 11 year old male patient with non-contributory medical and dental history reported to the department of Pedodontics and Preventive Dentistry with the chief complaint of mild spontaneous pain in mandibular anterior region since two days. History revealed blunt trauma to chin by banging against the bed 2 years ago. Intraoral examination revealed an Ellis Class IV fracture in relation to mandibular right central incisor and grade 1 mobility (Fig. 1). There was no displacement noticed in the anterior teeth. The adjacent soft tissue were clinically normal with no redness or swelling in the affected area with marginal gingivitis of mandibular anterior region. Mandibular right central incisor, right lateral incisor and left central incisor were sensitive to percussion and palpation and failed to respond to thermal or electrical pulp sensibility testing, compared to adjacent normal teeth.

Preoperative radiograph, revealed a well-defined large periapical radiolucency involving mandibular right central incisor, right lateral incisor and left central incisor, measuring approximately 14x15mm (Fig. 2). A software named AutoCAD 2017 version 2.0 (Autodesk, Calofornia, USA) was used for measurements by digitalizing the scanned standardized radiographic images taken using Endo-ray film holder and Fixott-Everett Lead grid. Based on clinical and radiographic features, nonsurgical endodontic treatment was planned in all three teeth with possible need for complementary surgical intervention at a later stage, if required.

Access cavity was prepared after rubber dam isolation under local anaesthesia with 2% lignocaine with 1: 20,000 adrenaline. Root canal preparation was done using a step-back technique until an apical preparation size #30 was achieved. During the instrumentation, normal saline and 2.5% sodium hypochlorite was used to irrigate the canals copiously with a 25-gauge needle after each instrument action.

Vitapex (NEO Dental Chemical Products Co., LTD. Tokyo, Japan) was placed into the canals with a Lentulo spiral instrument. The access cavity was sealed with a temporary filling material (Cavit).

Two weeks later, the teeth were symptomatic with exudate through the root canals. Triple antibiotic mixture containing ciprofloxacin (Cifran 500 mg, Ranbaxy Laboratories Ltd., India), cefaclor (Distaclor 375 mg, Pharmalink Pharmaceuticals Pvt. Ltd., India) and metronidazole (Metrogyl 400 mg, J.B. Chemicals and Pharmaceuticals Ltd., India) was freshly prepared. Macrogol and propylene glycol (vehicle) and drug mixture (1:1:1) were thoroughly mixed to form TAP containing 100 μg/ml of each
drug [4]. The canals were irrigated with sterile normal saline and the paste was condensed using sterile cotton pellets on the orifices of root canals and pulpal floor and the coronal access was sealed with glass ionomer cement as an interim restoration.

The patient was asymptomatic when re-examined after two weeks. In the next operative appointment, i.e. one month from the start of treatment, teeth were re-entered and triple antibiotic paste was removed using irrigating solutions and the teeth were obturated with gutta-percha (Dentsply Maillefer, Switzerland) and resin based sealer (Resino Seal) using lateral condensation technique. The final restoration was a Nanohybrid composite using sandwich technique with glass ionomer cement as base. Post-operative periapical radiograph revealed a decrease in the size of the radiolucency with progressive healing at 3 months follow-up visit (Figs. 3a & 3b). Radiographic examination after a follow-up of 18 months revealed almost complete resolution of the periapical lesion (Fig. 3c).

**DISCUSSION**

Periapical cyst has been reported to occur at an incidence rate of 6-55% within periapical lesions. Two distinct classes of radicular cyst exists i.e. true apical cyst and bay cyst, with the incidence of true apical cyst being <10%. It is difficult to differentially diagnose radiographically a bay cyst from a true cyst or granuloma. Thus, it is judicious to favour a conservative approach in treatment planning [1]. Complete and partial healing of periapical lesions following nonsurgical therapy has been reported in 94.4% cases [6].

Possible damage to adjacent vital teeth, damage to anatomical structures in the vicinity of the lesion, pain and discomfort associated with surgical procedures can be eliminated by non-surgical methods. Also, patient cooperation is an important factor when using a surgical approach in managing periapical lesions.

Chemo-mechanical preparation along with disinfection with intra-canal medicaments is necessary in anatomically complex teeth like the mandibular central incisors, with 45% displaying second canal [2]. The ability to diffuse into dentinal tubules is a desired characteristic of an antibacterial agent. Oily vehicles are non-water-soluble substances leading to lowest solubility and diffusion of the paste within the tissues affecting the ionic dissociation and conductivity of Ca(OH)$_2$ solutions [7]. Vitapex had significantly smaller zones of inhibition in an agar diffusion comparison of the antimicrobial effect of calcium hydroxide at five different concentrations [8]. Moreover, Haapasalo et al. showed in an in-vitro experiment that dentin powder had inhibitory effect on all endodontic medicaments tested, consequently, decreasing the ability to eliminate the bacteria [9]. Considering the limited effectiveness of Ca(OH)$_2$, local application of antibiotics may be a more effective mode for delivery in endodontics.

Therefore, as Vitapex™ failed to resolve the symptoms, TAP was introduced into the root canal as an intracanal medicament. This concept of ‘Lesion Sterilization and Tissue Repair (LSTR)’ was developed by the Cariology Research Unit of the Niigata University, School of Dentistry, which employs the use of a combination of antibiotics (metronidazole, ciprofloxacin, and minocycline). Propylene glycol was used as a vehicle carrying the drug, since it
has efficient penetration into the dentin [10]. Cefaclor with similar antibiotic effectiveness, was used to prevent discoloration induced by minocycline [4]. Lengthy application was avoided to prevent development of resistant bacterial strains, although some have reported its use for one to three months [11].

The periapical lesion in the above case report showed an estimated repair rate of 4.5 mm² after 1 month. The rate of repair was calculated by dividing the size differential between the initial and follow-up visits by the number of elapsed months. The calculated rate was in accordance to the average rate of repair of 4 mm² after 1 month as reported by Fernandes et al. [12]. The rate of repair is directly related to age, with the highest rate in patients 19 years of age or younger (58.8%) [13].

As reported by Orstavik, approximately half of the lesions heal completely in one year and the majority (86%) heal within two years post-treatment. Radiographic signs of definite, but incomplete, healing were apparent at one year post-treatment in 89% of lesions that subsequently fully healed indicating that observation of healing on a radiograph is a strong predictor of total healing [14]. Radiographic signs such as density change within the lesion, trabecular reformation and lamina dura formation confirmed healing in the present case, particularly when associated with the clinical finding that the tooth was asymptomatic and the surrounding soft tissue was healthy.

**CONCLUSION**

Patient co-operation, fear and anxiety and damage to developing permanent teeth are important factors to be considered when using surgical approach in paediatric patients, thus conservative approach should be considered before opting for invasive surgical procedures.

**Conflict of interest:** The authors declare that they have no conflict of interest.

**References**


Figure 1. Preoperative intraoral examination showing Ellis Class IV fracture in 41.
Figure 2. Preoperative radiograph demonstrating large periapical lesion measuring 14x15mm associated with osseous extension involving apices of teeth 41, 42 and 31.

Figure 3. (a) Post-operative radiograph demonstrating a decrease in the size of the periapical radiolucency to 12 x 13mm in diameter. (b) Radiograph after 3 months demonstrating a decrease in size of the periapical radiolucency to 8 x 9mm. (c) Radiograph after follow-up of 18 months, showing almost complete resolution of the periapical lesion.