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Management of Periapical Cysts- A Review

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ABSTRACT

The development and progression of periapical lesions is associated with the presence of microorganisms in the root canal system. There are surgical and nonsurgical methods to treat such cases. A nonsurgical method can be done especially in cases where lesions are in close proximity to important anatomical landmarks. The success of the nonsurgical endodontic treatment method is based on adequate cleaning, shaping, asepsis and filling of the root canal. Various methods can be used in the nonsurgical treatment: Decompression technique, Aspiration-Irrigation technique, Method using calcium hydroxide, Lesion Sterilization and repair therapy and the Apexum procedure. A periodic follow-up examination monitoring the healing of periapical lesions is essential.

Keywords: Cyst, decompression, healing, periapical lesion, granuloma

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INTRODUCTION

Dental caries, dental surgical procedures, and trauma to the teeth can cause infection of the dental pulp. Subsequent total pulpal necrosis commonly occurs, followed by the formation of a periapical lesion (1). More than 90% of periapical lesions are endodontic in origin. The lesions originating from infected root-canal spaces can be identified as dental granulomas, radicular cysts, or abscesses (2,3). The cysts are mostly periapical and involve one or more teeth with non-vital pulp. It is usually greater than 200 mm² in size and is characterized radiographically by a circumscribed, well-defined, radiolucent area bound by a thin radiopaque line. It produces a straw-colored fluid upon aspiration or as drainage through an accessed root-canal treatment (4).

Treatment options for periapical lesions include non-surgical root-canal treatment, apical surgery, and extraction. Non-surgical root-canal treatment must be initially considered to control large periapical lesions. When such treatment does not successfully resolve the periapical pathology, other treatment options, such as curettage, apical resection, marsupialization, and tube decompression can be considered (5). A high percentage of 94.4 of complete and partial healing of periapical lesions following nonsurgical therapy (6) have also been reported.

Surgical excision is when there is complete removal of the cyst along with the epithelial lining. When large cysts are treated in this manner there is the risk of devitalising many teeth and after resolution of the lesion there is often a residual defect left in the alveolus (7).

A more conservative approach suggested by most endodontists is that many cysts can be treated successfully by non-surgical means (8). Success rates upto 85% have been reported after endodontic treatment of teeth with periapical lesions (9). After the elimination of the causative factors the granuloma heals spontaneously.

Treatment:

There are different types of treatment methods for non surgical treatment of periapical lesions.

- 1) Cystic lining degeneration with minimal over-instrumentation. Bhaskar (1972)⁽¹⁰⁾ suggested that when instruments are extended 1 mm beyond the apical foramen, an inflammatory reaction develops that destroys the cyst lining and converts the lesion into a granuloma. On the elimination of causative factors the granuloma heals spontaneously. Bender⁽¹¹⁾ added that by penetrating of the apical area to the centre of the radiolucency resolution of the cyst may occur by establishment of drainage and by relieving pressure. Although this seems to be an effective method Shah⁽¹²⁾ suggests the possibility of added trauma by the minimal over-instrumentation that can enhance epithelial proliferation and cystic expansion but not resolution and stressed on the need to follow up for a period of two years. Seltzer⁽¹³⁾ suggested that over-instrumentation promoted drainage of the cystic fluid, which then caused degeneration of the epithelial cells by strangulation because of fibroblastic and collagen proliferation that squeezed the capillary supply to the cystic lining. The over-instrumentation technique requires follow up for a period of two years. The over instrumentation technique is based on the assumption that the periapical lesion could be a cyst.

- 2) Osseinduction with Calcium hydroxide

Calcium hydroxide is widely used in endodontic treatment because of its bactericidal effects. It is thought to create favorable conditions for the repair of periapical tissues and stimulates the formation of hard tissue (14).

The placement of calcium hydroxide into the periapical cyst is considered as an alternative to over-instrumentation (15,16). Placing the root canal paste beyond the apex is not indicated according to contemporary endodontic principles. However, it can be accidentally extruded during filling procedures. The exact mechanism of action of calcium hydroxide is speculative. Ghose et al⁽¹⁷⁾ has proposed that direct contact between the calcium hydroxide and the periapical tissue was beneficial for osseoinductive reasons. It is suggested that if the calcium hydroxide is confined to the root canal, it is possible that the inflammation

created by the diffusion of the calcium hydroxide through the apical foramen may be sufficient to cause break-up of the cystic epithelial lining, thereby allowing a connective tissue invagination into the lesion leading to ultimate healing (16). Also Souza et al. (1989) suggested that the action of calcium hydroxide beyond the apex may be fourfold: (i) with an anti-inflammatory activity (ii) cause neutralization of acid products (iii) activate alkaline phosphatase (iv) have an antibacterial action. Some studies have suggested that long-term exposure of root dentin to intracanal calcium hydroxide leads to a decrease in resistance of teeth to fracture (18).

3) Decompression: Aspiration & Irrigation

Decompression and marsupialization are terms that are often used interchangeably. Decompression refers to the surgical exposure of a cyst wall and insertion of a tube or other type of drain to decompress the lesion during healing. Decompression is a conservative treatment option that permits a progressive reduction in lesion size and may eliminate the necessity of surgical enucleation. The purpose of decompression is to disrupt the integrity of the lesion wall thereby reducing the internal osmotic pressure, and permit osseous regeneration(19).The drain can be "I" shaped pieces of rubber dam, polyethylene tube along with a stent, hollow tubes, polyvinyl tubing, suction catheter or radiopaque latex tubing. There is no standard protocol as to the length of time necessary to leave the drain as it can vary between two days to five years because it may be different for different kinds, sizes or locations of lesions (20). The decompression technique is not preferred in cases of large dental granulomas or any solid cellular lesion due to the absence of fluid filled cavity to decompress (21).

4) Aspiration and irrigation technique

Hoen et al, suggested a method of aspiration of the cystic fluid from the periapical lesion by a buccal palatal approach. A disadvantage of this method is the creation of buccal and palatal wounds that may cause discomfort to the patient (22).

To overcome this disadvantage, a simple technique of aspiration through the root canal has been described. In this method, aspiration of the cystic fluid is done through the root canal by passing the aspirating needle through the apical foramen. However, contraindications of aspiration-irrigation or aspiration through the root canal techniques include when adjacent tissue spaces or sinus cavities are involved, when there is no fluid aspiration from the lesion, or in infected periapical lesions (23).

5) Apexum procedure

Apexum procedure does not only to remove the cause (bacteria) thereby allowing the host to heal at its own pace, but also the device enters the periapical lesion far beyond the apical foramen, a process expected by many operators to result in a flare-up or severe symptoms (24,25). The Apexum procedure makes use of two sequential rotary devices, the Apexum NiTi Ablator and Apexum PGA Ablator designed to extend beyond the apex and mince the periapical tissues on rotation in a low-speed handpiece, followed by washing out the minced tissue (26). Further studies regarding this procedure are in progress.

6) Lesion Sterilization and Repair Therapy:

Lesion sterilization and tissue repair (27) makes use of a combination of antibacterial drugs for disinfection of oral infectious lesions, including dentinal, pulpal and periradicular lesions. Once the lesions are disinfected repair of damaged tissues can be expected(28). A combination of antibiotics decreases the likelihood of the development of resistant bacterial strains. The combination that seems to be most promising consists of drugs like metronidazole, ciprofloxacin, LSTR therapy and minocycline (29,30).

Sato et al (31) on investigation of this drug in vitro found it to be very effective in the sterilization of carious lesions, necrotic pulps, and infected root dentin of deciduous teeth. The commercially available drugs are in powdered form and mixed in a ratio of 1:3:3(3Mix) and mixed either with macrogol-propylene glycol (3 Mix-MP) or a canal sealer (3 Mix-sealer)(28). A 1:1:1 ratio of the drug combination has also been used (32). Care should be taken to check if the patients are sensitive to chemicals or antibiotics though the volume of drug used in this therapy is small(33). Tooth discoloration induced by minocycline is the disadvantage of the triple antibiotic paste. Cefaclor and fosfomycin have been proposed to be used as possible alternatives for

minocycline, in terms of their antibiotic effectiveness, but further clinical studies are needed to demonstrate their efficacy in the root canal (34).

CONCLUSION

Nonsurgical management of periapical lesions have shown a high success rate. A nonsurgical approach should be considered as the first line of treatment before resorting to surgery. The decompression and aspiration–irrigation techniques can be used when drainage of cystic fluid from the canals is required. By these techniques the hydrostatic pressure within the periapical lesions are decreased. When no drainage of fluid from the canals is required then,, calcium hydroxide or the triple antibiotic paste prove to be beneficial. Regular follow-up examinations are important and various assessment tools can be used to monitor the healing of periapical lesions. The treatment can be from a surgical approach for cases refractory to nonsurgical treatment, in obstructed or nonnegotiable canals and for cases where long-term monitoring of periapical lesions is not possible.

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