IEJ
Iranian Endodontic Journal

Management of a Large Periapical Lesion Using Decompression: A Case Report with Three-year Follow-up

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ARTICLE INFO

Article Type: **Case Report**

Received: 08 May 2021
Revised: 26 May 2021
Accepted: 17 Jun 2021
Doi: *10.22037/iej.v16i3.33750*

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ABSTRACT

Large radicular lesions should be treated initially by orthograde root canal therapy. When the signs and symptoms of the infection (*e.g.* persistent purulent drainage) do not resolve after this treatment, then surgical approaches should be considered. In the cases of large radicular cysts, total enucleation of the cyst can endanger adjacent structures and teeth. Therefore, decompression or marsupialization techniques are recommended in order to decrease the size of the lesion. In this case report, a 55-year-old woman with previously initiated therapy was referred to endodontic department for management of a sinus tract associated with tooth #7. Root canal treatment was performed and intracanal irrigant (5.25% sodium hypochlorite) activated using passive ultrasonic application, various intracanal medicament (calcium hydroxide, double antibiotic paste) was used in multiple sessions, but intracanal purulent drainage was not resolved. After this, decompression was performed using needle cap to maintain the opening of the cyst and remained for three months. During this period the cavity was kept clean and rinsed by the patient with 0.2% chlorhexidine mouthwash. After three-year follow-up, radiographic examination revealed substantial osseous repair of the defect and clinical signs and symptoms were absent.

Keywords: Antibacterial Agent; Antibiotic; Decompression; Periapical Lesion, Root Canal Treatment

Introduction

Periapical cysts, also known as radicular cyst, are the most common odontogenic cystic lesions of inflammatory origin and characterized by the presence of a cavity lined by epithelial cells [1]. The anterior region of the maxilla (especially lateral incisors) is the most common involved area [2]. Dental caries or trauma are causative factors for pulpal necrosis. If left untreated, the infection progresses and results in apical periodontitis [3]. This inflammation can affect the epithelial residues (cell rests of Malassez) in the periodontal ligament and increase the cell proliferation which lines the periapical lesion [4]. Based on the spatial relation between the cyst and the tooth, they can be classified as true or pocket cysts. A pocket cyst is in direct contact with root canal system *via* apical foramen where as in a true cyst the communication between the cystic cavity and root canal system is diminished. It is assumed that due to this diminished interrelation, true cysts are less likely to resolve after root canal treatment conventional [5]. Surgical techniques might be necessary for the healing process of these lesions however they have drawbacks such as post-operative pain, swelling, patient discomfort and endangering anatomic structures. Thus, the American Association of Endodontists suggested that apical surgery should be considered only in cases that cannot be treated otherwise [6]. Various surgical interventions have been used for management of periapical lesions that resist conventional root canal therapy and cystic lesions that are exudative and impeding completion of endodontic treatment. Enucleating is generally adapted for odontogenic cysts, however in large cysts it may endanger adjacent structures and also in patients with impaired health a more conservative approach is desirable. Decompression is a minor surgical approach that is mostly followed by enucleation. In this method, a small opening is created in cystic cavity wall and is maintained to relieve the pressure persistently by a decompressing device (rubber dam, metal tube or polyethylene tube) [7]. In a long term study it was determined that decompression

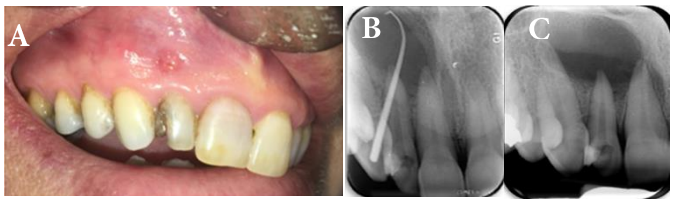

Figure 1. *A)* The sinus tract is seen near the lateral tooth; *B)* Tracing the sinus tract with gutta-percha revealed the lesion was associated with tooth #7; *C)* Periapical radiograph showing a round radiolucent lesion extending from the mesial aspect of tooth #6 to the distal aspect of tooth #8

technique is an effective approach and reduces lesion area by a mean of 79.3%. However, in aggressive cystic lesions, after decompression a definitive surgical enucleation was recommended [8].

This case report presents management of a large periapical lesion by various non-surgical methods and finally surgical approach.

Case Presentation

A healthy 55-year-old female with non-contributory medical history was referred to endodontic department for evaluation and treatment of the maxillary right lateral incisor (tooth#7). Intra-oral examination showed a sinus tract, which was traced with gutta-percha #30 (Meta Biomed, Seoul, Korea) and found to be associated with tooth #7 (Figure 1A and 1B). Root canal treatment of tooth #7 was initiated by the previous dentist and the tooth had temporary restoration. The tooth did not respond to percussion and pulpal sensibility tests while tenderness was present on palpation. The adjacent central incisor and canine (teeth #6 and #8) were responsive to pulpal sensibility tests. Periodontal examination showed pocket depth and mobility within the normal range. In periapical radiographs of the area a round radiolucent lesion was seen (Figure 1C). Cone-beam computed tomography (CBCT) revealed a well-defined large periapical radiolucency with dimensions of 16×14.32×17.62 millimeters, extending from tooth #6 to tooth #8. It appeared unilocular, with narrow cortical borders, extending from the mid-root area up to floor of the nasal cavity. No root displacement or resorption was seen but cortical expansion and perforation of the buccal cortical plate was obvious (Figure 2). The pulp and periapical diagnosis of tooth #7 was pulp necrosis accompanied by chronic apical abscess.

According to clinical and radiographic examinations, root canal treatment of tooth #7 was decided. The following subsequent steps were performed in first session: Local anesthesia (Infiltration with 1 cartridge of 2% lidocaine with 1:80000 epinephrine (Persocaine, Darou Pakhsh, Iran), removing temporary restoration, isolation with rubber dam, cleaning and shaping using Wizard navigator rotary file (Medin, Czech Republic) up to file #w5 (#30/0.06),

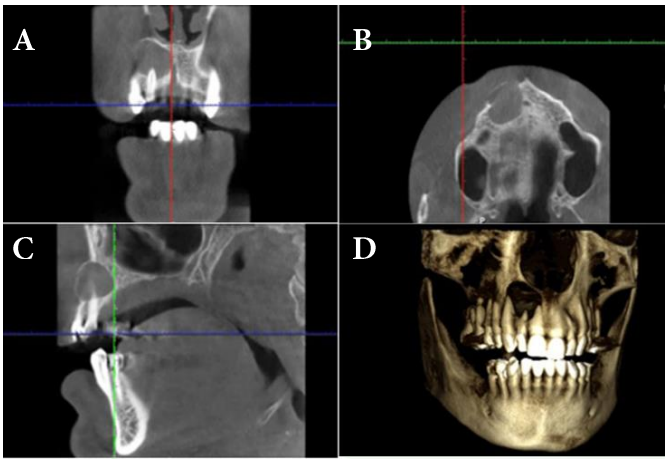

Figure 2. *A)* Coronal view of CBCT revealed a well-defined, large, unilocular, periapical radiolucency with narrow cortical borders; *B)* Axial view revealed buccal cortical plate perforation; *C)* Cortical expansion and perforation were obvious in sagittal view, but no perforation was observed neither in the floor of the nasal bone nor in the palatal cortical bone; *D)* CBCT volumetric rendering showed buccal cortical plate perforation, no root displacement or resorption was present

lubrication and irrigation with 5.25% NaOCl and passive ultrasonic irrigation (PUI) (Varios 970, NSK, Japan) with the power set to level 6, irrigation with normal saline, intracanal calcium hydroxide (Golchadent, Iran) placement mixed with 2% chlorhexidine 2% (Shahr Darou, Iran) and finally temporary restoration (reinforced zinc oxide eugenol, Golchadent, Iran). Although the sinus tract was diminished, exudative discharge from the root canal was still seen in the second session and the treatment sequence was repeated at 2-week interval, though unsuccessful. Ten days later, in the third treatment session, exudative discharge persisted and double antibiotic paste (DAP) consisting 500 mg ciprofloxacin and 500 mg metronidazole (Rouzdarou, Tehran, Iran) was used as intracanal medicament by mixing 1000 mg equivalent of the antibiotic powders in normal saline [9]. In the fourth session, the canal was still flooded with exudate and the medicament was washed out, thus DAP intracanal medicament placement was repeated. Treatment options, including tooth extraction and implant replacement after periapical lesion healing and root end surgery (with cyst removal) and decompression therapy were explained to the patient. The last choice was decided in consultation with her. Informed consent was obtained from the patient.

This surgical intervention (decompression) took place in the fifth session. After the patient was given a local anesthetic (1 cartridge of 2% lidocaine with 1:80000 epinephrine (Persocaine, Darou Pakhsh, Iran), a small opening was established in the buccal gingiva through a simple full thickness vertical incision. Limited surgical access prevented the collection of a biopsy sample from the wall of the lesion. The contents of the lesion were aspirated as serosanguinous purulent fluid, and the cavity was then copiously

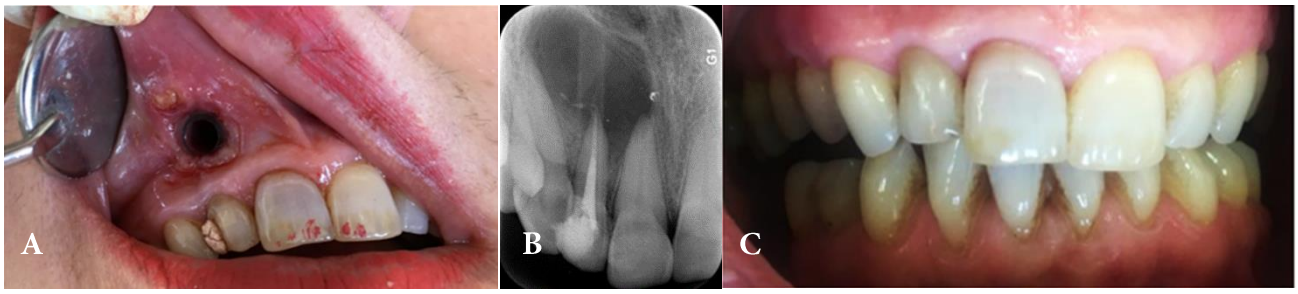

Figure 3. *A*) In order to maintain and secure the opening of the cavity for decompression of the intraosseous lesion, a needle cap was placed; *B*) Root canal obturation was performed in two sessions. The apical part of the canal was sealed with MTA apical plug and backfilled at the subsequent session using lateral compaction technique (gutta-percha+Adseal sealer); *C*) Final restoration was placed using bonded composite resin

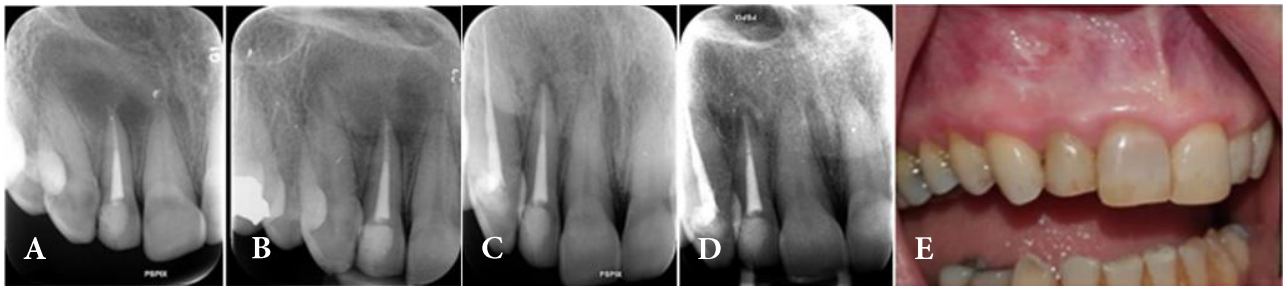

Figure 4. Follow up radiograph with *A)* 3-, *B)* 6-, *C)* 12- and *D)* 36-months period revealing gradual osseous repair of the defect; *D)* A small remaining periapical radiolucency, suggests scar tissue formation; *E)* 3-year follow up photograph, healing of the soft tissue is observed with scar tissue formation at the site of cavity opening

irrigated with normal saline solution. A trimmed-short piece of nasogastric (NG) tube was gently inserted to the cavity. The incision line was then sutured forming a collar around the evolved margin of the tube (Figure 3A). Patient was instructed to irrigate the lesion with a syringe *via* the opening tube daily and use antiseptic mouthwash (0.2% Chlorhexidine; Shahr Darou, Iran). She was recalled to follow ups at one week intervals. The sutures were removed one week after the surgery in the sixth session and we were able to obturate the root canal as there was no signs of pus discharge from the root canal. MTA apical plug using Retro MTA (BioMTA, Seoul, Korea) was administered in the apical portion of the root canal and lateral compaction technique using gutta-percha (Meta Biomed, Seoul, Korea) and resin-based sealer (Adseal, Meta Biomed, Seoul, Korea) was used for obturation in the subsequent session after complete setting of the MTA in Figure 3B and permanent bonded composite restoration was placed (Figure 3C). For adjustment of the tube as it was forced out because of cystic cavity resolution a needle cap was selected after the removal of the NG tube. It also facilitated persistent drainage and further reduction of the lesion size. The needle cap was removed after three months. After three-years follow up, radiographic examination revealed substantial osseous repair of the defect and clinical examinations showed no sensitivity to percussion or palpation, and the soft tissue was in healthy condition (Figure 4).

Discussion

Radicular cysts are the most common type of maxillofacial cysts and comprise about 52-68% of all the cysts affecting the jaw [10]. It is often necessary to evaluate histopathologic sections of biopsy specimen to accurately identify periapical cysts from granulomas. However, it is not feasible to obtain a representative biopsy sample in some conservative surgical approaches. Simon *et al.* demonstrated that CBCT is over 76% effective in identifying cysts from granulomas compared to histopathologic evaluation [11]. In the present case, according to CBCT interpretation based on the radiologic characteristics of a cyst (location, periphery, shape, internal structure, effects on surrounding structure, and perforation of the cortical plate), the lesion favored a periapical cyst. Moreover, the successful treatment outcome of endodontic treatment followed by decompression surgery favored diagnosis of a periapical true cyst. Periapical true cysts are lined thoroughly with epithelium and resolution of this type requires surgical intervention. Conversely, a periapical pseudocyst, also known as periapical pocket cyst, is a cavity lined with epithelium that has access to the root canal, thus resolution may occur after conventional root canal treatment, similar to periapical granulomas treatment approach [5].

It is imperative to note that the initial treatment step in periapical lesions is non-surgical approach [12]. Chemical and

mechanical cleaning of root canals reduces the bacterial load. Various irrigants and intracanal medicaments are introduced in endodontics to eliminate microorganisms from the root canal system. Sodium hypochlorite is the most effective and widely used irrigating solution [13]. To further facilitate the disinfection, physical agitation of the irrigants has been proposed by PUI [14, 15]. There is evidence that after chemomechanical preparation of the root canal system, viable microorganisms can still survive [16]. In attempt to complete disinfection, intracanal medicaments are indicated. Calcium hydroxide is the most popular intracanal medicament that has effects of anti-inflammatory action, neutralization of acid products, activation of the alkaline phosphatase and antibacterial action [17]. In cases of persistent drainage despite calcium hydroxide placement, antibiotic administration is recommended. Systemic administration of antibiotics is effective as an adjunct in endodontic surgeries, though there are several drawbacks of this administration method, comprising potential side effects, development of antibacterial resistance and reduced delivery to the low circulation sites [18]. Therefore, systemic antibiotics should only be used as adjuvant therapies in cases with evidence of systemic involvement (fever, malaise, cellulitis and/or lymphadenopathies) following adequate endodontic treatment [19]. In the present case we did not prescribe systemic antibiotic for the patient due to absence of systemic signs and symptoms. The use of double antibiotic paste (DAP) as an intracanal medicament was proposed by Iwaya *et al.* [20] for endodontic regenerative process. Several case reports have indicated that the use of intracanal antibiotic paste stopped the intracanal drainage, while multiple sessions of calcium hydroxide therapy did not resolve the symptoms [9, 21, 22]. There is evidence that DAP is more effective than calcium hydroxide against *E. faecalis* and *P. gingivalis* [23, 24]. A recent study has revealed that DAP consisting 20 mg/mL of ciprofloxacin and metronidazole was able to completely eliminate *E. faecalis* inside dentinal tubules [25]. Also it has been proven that this combination can be useful in treatment of calcium hydroxide resistant infections [26]. Thus, in the present case after two sessions of calcium hydroxide therapy, DAP intracanal medicament was used. Surgical intervention was necessary as there was persistent drainage in the canal. Marsupialization technique (Partsch operation) can be administered in large periapical lesions [27]. When these large windows are established, it may be difficult for patient to clean the area and healing process tends to be more slowly than comparable lesions that are treated by other surgical means. Enucleation was not considered; also it has the advantage of completion of treatment in one session, there were several drawbacks of this treatment including the need to perform root canal treatment and apicoectomy of all affected teeth other than the implicated tooth [#6 and #8], extraction of the teeth and damage to the adjacent anatomical structures. Decompression surgical approach (modified Partsch's method) was preferred to reduce the size of initial lesion and preserve adjacent anatomic structures, specifically nasal floor, also the shrinkage allowed the adjacent teeth to be preserved. A disadvantage of this approach is that it requires multiple follow up sessions and a good patient cooperation [28]. Fortunately, there was no need for subsequent enucleation surgery as a substantial decrease in the radiolucent area was apparent after six months of decompression and resolution of the lesion was complete after 12 months.

In order to secure the opening of the bony window, a trimmed nasogastric (NG) tube was sutured to the surrounding mucosa. But as the cyst shrank over time, the tube tended to be forced out. Some authors suggested to use ligation wire to maintain the opening [29]. In this case we decided to use a sterile needle cap, because at one side it has a larger diameter and this prevents dislocation of the needle cap.

Conclusion

The first step in management of periapical lesions is conventional root canal treatment. Surgical approaches for treatment of periapical cysts comprises of enucleation for smaller legions, marsupialization and decompression for larger cysts. Marsupialization and decompression usually need to be followed by enucleation; however, they can be sufficient in some cases.

Conflict of Interest: 'None declared'.

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Please cite this paper as: Niavarzi S, Noori F, Aminsobhani M, Meraji N. Management of a Large Periapical Lesion Using Decompression: A Case Report with Three-year Follow-up. Iran Endod J. 2021;16(3): 205-9. *Doi: 10.22037/iej.v16i3.33750.*