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CASE REPORT

Management of Large Periapical Cystic Lesion by Aspiration and Nonsurgical Endodontic Therapy using Calcium Hydroxide Paste

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ABSTRACT

Aim: To report a case of conservative nonsurgical management of periapical lesions.

Background: Small periapical lesions of endodontic origin usually heal by conventional endodontic therapy alone. Larger periapical lesions presumed to be cystic may require additional treatment protocols to aid in regression. Conservative nonsurgical management of such lesions eliminates the possible complications of surgery and has wider patient compliance and acceptance.

Case description: A periapical cystic lesion associated with maxillary central incisor and lateral incisor was treated conservatively using buccal aspiration decompression followed by conventional endodontic therapy employing calcium hydroxide iodoform paste as intracanal medicament is reported.

Clinical significance: The treatment was successful as evidenced by relief of symptoms and radiographic evaluation.

Conclusion: Large periapical cyst-like lesions can resolve by nonsurgical endodontic therapy employing calcium hydroxide intracanal interappointment medicament.

Keywords: Periapical lesions, Calcium hydroxide, Aspiration, Decompression.

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BACKGROUND

More than 90% of periapical lesions can be broadly categorized into granulomas, radicular cysts and abscesses.[1,2] Eversole[3] has described few criteria for clinical diagnosis of periapical cystic lesions which include (a) the periapical lesion is involved with one or more nonvital teeth, (b) the lesion is greater than 200 mm^2 in size, (c) the lesion is seen radiographically as a circumscribed, well-defined radiolucent area bound by a thin radiopaque line and (d) it produces a straw-colored fluid upon aspiration or as drainage through an accessed root canal system.

It is widely accepted to treat inflammatory periapical lesions by nonsurgical method.[4] If conventional endodontic therapy fails surgical procedures may be required. [5] Studies have reported a success rate up to 85% for nonsurgical endodontic therapy in management of periapical lesions.[6-8] Murphy et al[9] reported a high percentage of 94.4% of complete and partial healing of periapical lesions following nonsurgical endodontic therapy.

Aspiration of the cystic content of the periapical lesion through the buccal palatal approach has been suggested by Hoen et al.[10] A conservative modification of this aspiration technique along with conventional nonsurgical endodontic therapy employing intracanal interappointment dressing is attempted in the management of a large cyst-like periapical lesion with good results as evidenced clinically and radiographically.

CASE REPORT

A 22-year-old female reported to the clinic with a complaint of severe pain and swelling in relation to the upper anterior teeth since 4 days. The patient complained her upper front teeth were hurting on touch since 10 days. The patient gave a history of trauma to the anterior teeth when the patient was about 10 years of age, which was not attended. The teeth showed discoloration and decay since 4 years.

On clinical examination, no extraoral swelling was observed. Intraorally, a fluctuant swelling in the labial vestibule in relation to upper left central incisor and lateral incisor (21, 22—Federation Dentaire Internationale

Notation). 21, 22 were tender on palpation and percussion. 21 showed grade II mobility and 22 showed grade I mobility. Periodontal probing depth was within normal limits. Thermal and electrical pulp testings were negative in 21, 22. Intraoral periapical radiograph (IOPA) of 21, 22 region was made, which revealed a large periradicular radiolucency about 9 to 10 mm in diameter in relation to the apex of 21 and 22 (Fig. 2A).

The various treatment options including periapical surgery and prognosis were discussed. The patient preferred to attempt nonsurgical procedure.

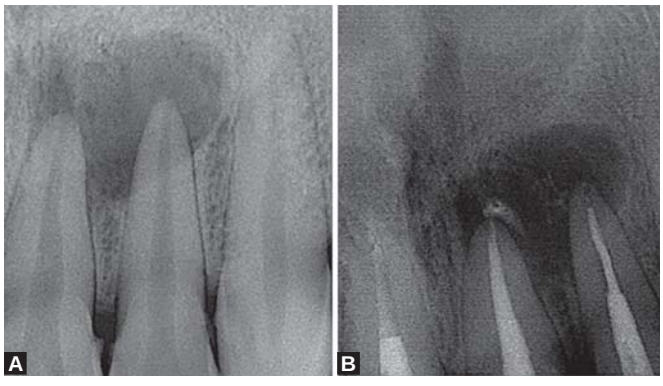
Under mucosal anesthesia, a 24-gauge needle attached to a 2 ml syringe was inserted into the center of the lesion through the labial surface. The needle encountered no resistance on insertion suggestive of bony defect. On confirming the needle position, the needle syringe assembly was stabilized using digital force and slow aspiration carried out. The aspiration initially yielded approximately 1 ml of pus followed by approximately 1.5 ml of blood tinged fluid (Figs 1A and B). No digital compression of the swelling or vestibule was done during aspiration. The aspirated fluid was sent for histopathological examination. The report confirmed the diagnosis as infected radicular cyst.

Endodontic therapy was immediately initiated in 21 and 22. On gaining canal patency, the working length was determined using apex locator (Root ZX, J Morita Corp,Tokyo, Japan). The pus and exudate was allowed to drain through the canals. The canal was enlarged to ISO #40 using conventional step back technique using K – Flexofile (Dentsply Maillefer, Switzerland). A total of 3% sodium hypochlorite was used as the main irrigant between files and the final irrigation was done with normal saline. The cleansed canals were visually observed for drainage and when no further drainage was observed an interim dressing was provided at the access with zinc oxide eugenol (DPI, Mumbai, India). The patient was recalled after a day.

On recall, the patient reported relief of pain. The dressing was removed and the canals were observed for any drainage. The canals were reinstrumented and dried using absorbent points. The canals were filled with calcium hydroxide paste containing iodoform and barium sulfate (Calform—RC, Ammdent, Mohali, India) employing passive injection and packing with a finger plugger (Mani Inc, Japan). The access was sealed with zinc oxide eugenol cement. An IOPA was made to evaluate the density of the fill and to rule out any overextension (Fig. 2B). The patient was recalled after 4 weeks.

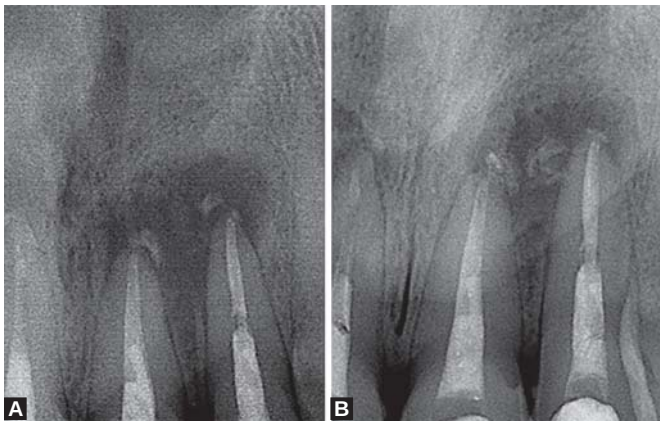
On the 4th week recall the patient reported total relief of symptoms and disappearance of the swelling. An IOPA evaluation was done. The radiograph revealed radiographic signs of lesion size reduction (Fig. 3A). The calcium hydroxide was flushed out of the canals and repacked with fresh paste. The access was sealed provisionally. The patient was recalled after 4 weeks. The process of medicament change was repeated once every 4 weeks for 4 months with radiographic evaluation every 2 months (Fig. 3B).

At the 4th month recall an IOPA was made to assess healing. The radiograph showed definitive evidence of periradicular healing (Fig. 4A). The medicament from the



Figs 2A and B: (A) Preoperative radiograph showing the large cystic lesion, (B) radiograph after placement of calcium hydroxide to check the density of fill

Figs 1A and B: (A) Aspirating the pus and exudate, (B) aspirated pus



Figs 3A and B: (A) Fourth week recall interappointment. *Note:* The reduction in size of the lesion, (B) 8th week recall interappointment—lesion regressed

canals was ultrasonically flushed out and the dried canal was obturated employing conventional lateral condensation technique using guttapercha points (Dentsply Maillefer, Switzerland). A postobturation IOPA was made. Radiographic evidence of trabecular pattern at the area where the periradicular lesion was present earlier was also noted (Fig. 4B). This finding is suggestive of healing periradicular lesion and could be clinically correlated to successful outcome of nonsurgical conventional endodontic therapy. The patient was recalled after 3 months. The lesion showed total resolution as evidenced radiographically. At 18 month recall, the patient was totally asymptomatic and IOPA revealed total resolution of the lesion and normal periapical architecture (Fig. 4C).

DISCUSSION

Nair et al[11] reported 6 to 55% incidence rate of periapical cyst within periapical lesions. It is widely believed that as the size of the periapical lesion (radiolucency) increases more is the chance of the lesion being a cystic one. Studies by Natkin et al[12] have shown that even large lesions can be periapical granulomas. Histopathological examination is the only method of definitive diagnosis of cysts.

Radicular cysts are the most common odontogenic cystic lesions of inflammatory origin. Radicular cysts arise from cell rests of Malassez in the periodontal ligament. Pulpal necrosis associated with nonvital teeth elicits an inflammatory response which stimulates the proliferation of the epithelial rests in the periapical region leading to formation of radicular cysts. Radiographically, a radicular cyst appears as a round or oval well-defined radiolucency with radiopaque border associated with the apex or occasional on the lateral surface of a tooth root.

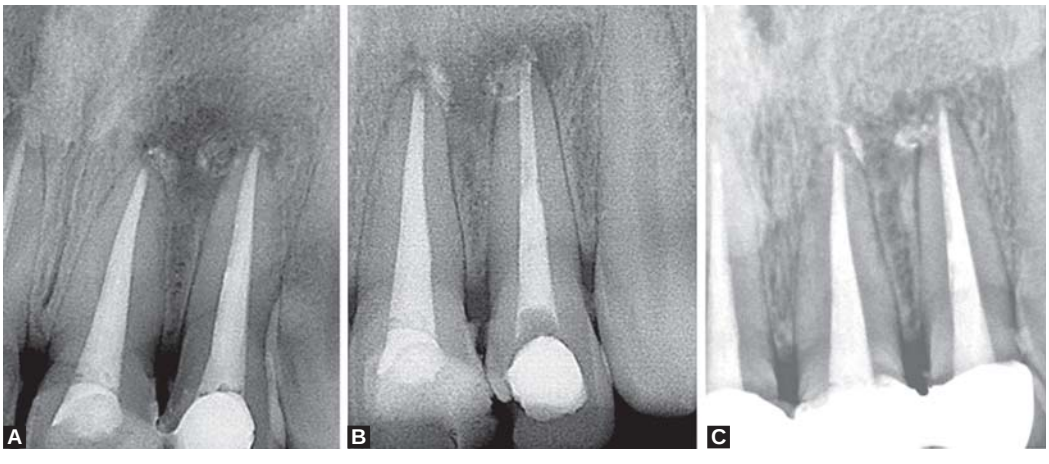
A radicular cysts *per se* is sterile but can get secondarily infected. The treatment of such cysts can be nonsurgical management or surgical methods, such as marsupialization or enucleation. It is accepted that the management should be kept as conservative as possible.

Nonsurgical management of periapical lesions is preferred in comparison to surgical methods and should be considered in all cases. Possible damage to adjacent vital teeth, damage to anatomic structures in the vicinity of the lesion, pain and discomfort associated with surgical procedures can be eliminated by nonsurgical methods. Patient acceptance and apprehension toward the surgical procedure, age and medical conditions which limits surgical procedures are also factors which favor nonsurgical approach. Surgical procedures should be considered only when conventional methods fail. In case of large periapical lesions, conventional endodontic therapy alone may not be sufficient. Associated procedures such as aspiration, decompression, nonsurgical aspiration and irrigation may be required.

Periradicular lesions are usually endodontic in origin. Bacteria and bacterial by-products within the root canal and its ramifications bring out the inflammatory response in the periradicular tissue. Proper cleansing and disinfection of the root canal system will effectively reduce the microbial cause of cyst-like periapical lesions or inflammatory apical true cysts. In these cases, the lesions might regress by the mechanism of apoptosis in a manner similar to the resolution of inflammatory apical pocket cysts.[13]

Decompression allows for continuous drainage from the periapical lesion. This eliminates the conditions that are favorable for expansion of periapical pathosis and healing by osseous regeneration.[14]

Bhaskar[15] has proposed to over instrument the canal by 1 mm beyond the apical foramen into the periapical region in case a periapical lesion is evident in a radiograph. This has been suggested to cause transient inflammation and break in the continuity of the epithelial lining of the cyst and thereby resolution of the lesion. Bender[16] has



Figs 4A to C: (A) Fourth month recall interappointment: Lesion disappeared, (B) postobturation radiograph, (C) 18-month recall—postobturation

commented on Bhaskar hypothesis that penetration of the apical area to the center of the radiolucency (lesion) would establish drainage and relieve the pressure. When the drainage ceases, there would be proliferation of fibroblast in the area leading to deposition of collagen. Thus, deposited collagen would compress the capillary network into the area of lesion leading to starving of the epithelial cells. The epithelial cells undergo degeneration and are finally engulfed by macrophages. Shah[8] stated that instrumentation beyond the apex could activate quiescent epithelial cells in the area leading to their proliferation and cyst formation and suggested follow-up period of at least 2 years.

The conventional decompression technique is by placement of a drain into the lesion and consequentially irrigating the lesion through the drain lumen and maintaining the drain for considerable period of time.[17] There is no definitive period indicated for maintenance of the drain in the lesion. It can vary from 2 days to years.[18] It is a simple procedure which minimizes the damage to adjacent anatomical structures and is well-tolerated by the patient. The disadvantages of this technique include need for patient compliance, inflammation of the alveolar mucosa, infection at the site of insertion, displacement and submergence of the drain tube.[14,19] Decompression by drain should be carried out only if there is a fluid-filled cavity and not for cellular lesions such as granulomas.

Another method suggested is active nonsurgical decompression technique which involves use of a vacuum system connected to a needle which is inserted into the root canal to create a negative pressure thereby achieving decompression of the lesion. As the entire procedure is carried out through the root canal, there is no complication associated with surgery as well as less discomfort to the patient.[14]

Hoen et al[10] has reported aspiration of the cystic content using a needle inserted into the lesion. A slightly large bore needle is inserted into the periradicular lesion through the buccal mucosa to aspirate the cystic fluid. Another needle can be inserted to irrigate the bony lesion with saline. A new needle is then inserted from the buccal mucosa and passed out through the palatal surface to create a pathway for the fluid to escape. This gentle irrigation cleanses the defect and initiates bleeding within the cavity, which can initiate healing of the cystic lesion. Creation of buccal and palatal wounds can cause discomfort and pain to the patient.[20] Aspiration-irrigation techniques have been also attempted through the root canals using aspirating needles thereby eliminating the need for creation of buccal or palatal wounds.

In this case, the drainage was conservatively achieved by aspiration from the buccal surface. This has resulted in relief of pressure within the lesion and thereby, the symptoms associated with accumulation of fluid within a confined space. In addition, the maintenance of patency of the canal allowed for drainage of minor fluid left behind which was not aspirated through the needle. This particular method is conservative and patient discomfort is considerably reduced in comparison to conventional surgical decompression.

Bacteria present within the root canal system of nonvital teeth play an important role in development and maintenance of periapical lesions.[21-23] Intracanal medicaments help to disinfect bacteria-contaminated canal.[23] Calcium hydroxide is a routinely used intracanal medicament in endodontics. It is used as an interappointment dressing for management of periapical lesion [24-26] by nonsurgical methods. Calcium hydroxide is proven to assist periradicular healing by virtue of its antibacterial properties and also by its biological action facilitating osseous repair[26] and bone formation. The antibacterial activity of calcium hydroxide is attributed to its high pH, damaging effect on bacterial cell wall and proteins, and also neutralizes bacterial endotoxins.[27]

CLINICAL SIGNIFICANCE

Large periapical cyst-like lesions can resolve by nonsurgical endodontic therapy employing calcium hydroxide intracanal interappointment medicament. Nonsurgical endodontic therapy along with aspiration-assisted decompression can be useful in the management of large cyst-like periapical lesions and should be attempted as the first approach in all cases with cyst-like lesions. Surgical approach is only needed if conservative approach fails.

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