

Nonsurgical Management of a Periapical Cyst: A Case Report

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ABSTRACT

Large periapical lesions, regardless of whether they are granulomas, abscesses or cysts, are primarily caused by root canal infection. Thus the treatment protocol should be elimination of etiological factors in the root canal system rather than their product, apical true cyst. A 10 year old female patient reported to the Department of Pedodontics and Preventive Dentistry, Dr R Ahmed Dental College & Hospital, Kolkata, with the chief complaint of pain and swelling in relation to upper front fractured teeth. Clinical and radiological findings were suggestive of periapical radicular cyst. Non-surgical endodontic therapy was performed using 1% sodium hypochlorite solution irrigant and Calcium hydroxide intra canal medicament. A 12 months follow-up radiographic examination revealed progressive involution of periapical radiolucency without any clinical symptoms. Periapical cysts respond favorably to non-surgical endodontic treatment and should be considered as primary treatment modality.

Key Words: Periapical lesions, Apical Cyst, Apoptosis, Nonsurgical Endodontic Therapy, Calcium Hydroxide, Endotoxins.

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Introduction

Periapical cysts are entitled to inflammatory jaw cysts at the apices of teeth with infected or necrotic pulps.¹ A periapical (radicular) cyst is the most common odontogenic cyst. The incidence of cysts within periapical lesions varies between 6 and 55%.²

There is clinical evidence that with the increase in size of periapical lesions, the association of the radicular cysts increase.³ These cystic lesions can undergo asymptomatic evolution and reach large dimensions, clinically leading to cortical plate expansion during which the alveolar process have

a paper like texture on palpation and the mucosa may exhibit bluish discoloration. In general they are either diagnosed during routine radiographic examination or following acute pain and diagnosis is confirmatory only after surgical biopsy of these lesions.⁴⁻⁵

During the past few years there has been gradual change in the attitude to surgical treatment of periapical lesions. Some authors support the fact that, with the endodontic infection elimination, the immune system is able to promote repair and lesion might recede by the mechanism of apoptosis similar to the resolution of inflammatory

apical pocket cysts without any need surgical intervention to remove cyst epithelium.⁶ Caliskan MK reported 73.8% success in nonsurgical management of large cyst-like periapical lesions using calcium hydroxide medicament.⁷

The present case report describes the non surgical endodontic treatment of a periapical cyst, it can be considered an efficient and feasible alternative that can recover the esthetics and function, instituting positive attitude towards dental treatment in a growing child.

Case Report

A 10 year old female patient was referred to the Department of Pedodontics & Preventive Dentistry, with the chief complaint of pain and swelling in relation to upper front fractured teeth. History revealed trauma 18 months back due to fall for which no treatment was sought and swelling in palatal region from approximately 1 year with gradual increase in size. History of childhood immunization was well complied and medical history was non contributory.



Fig. 1: Pre operative diffuse palatal swelling.

On routine clinical examination, a diffuse palatal swelling extended from the right central incisor to the distal aspect of first premolar in upper right quadrant (Figure 1). Palpation of the anterior palatal region revealed fluctuation, while at places egg-shell crackling could be elicited with no significant pain, which indicated a loss of integrity

of palatal bone. Buccally there was no associated swelling and no sinus tract seen.

Hard tissue examination revealed an Ellis Class II fracture in relation to 11 and 21 and 11,12,13,21,22 were tender to percussion. Vitality Tests were carried out (thermal & EPT) which elicited a negative response in relation to 11,12,13,21,22. There was no mobility associated or displacement noticed in anterior teeth.

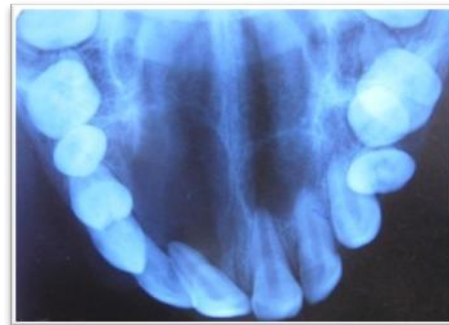


Fig. 2: Pre operative radiograph showing a large periapical cyst involving maxillary anteriors.

Radiographic examinations were conducted, a standard occlusal radiograph (Figure 2) of the maxilla revealed a large well defined periapical radiolucency involving maxillary anteriors and an open apex in relation to 11, 13 & 21. Clinical and radiological findings were suggestive of periapical radicular cyst. The patient and accompanying parent was informed about the diagnosis and treatment options. They opted for nonsurgical endodontic treatment and informed consent was taken. Thus endodontic treatment was planned with possible need for complementary surgical intervention at later stage.

The access cavity was prepared in relation to 11,12,13,21,22. (Figure 3 & Figure 4) A clear, straw-colored fluid exuded from the canals, the root canal were instrumented and copious irrigation done with sterile normal saline to clear out exudates. A cytological examination of sample collected verified presence of cholesterol crystals compatible with radicular cyst. Instrumentation about 2mm beyond the apical foramen was carried

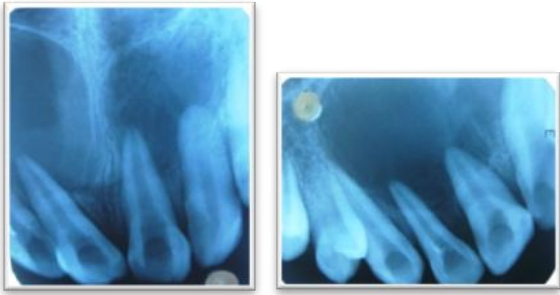


Fig. 3 & 4: Inter appointment radiographs showing access opening done.



Fig. 5: Radiograph showing overinstrumentation performed.

out (Figure 5) and root canal preparation was done using a step-back technique. During the instrumentation, normal saline was used to irrigate the canals copiously with a 27-gauge endodontic needle after each instrument action. Drainage was performed until discharge through the canal ceased with final irrigation of 1% sodium hypochlorite solution. The access cavity was sealed with temporary restoration after drainage. This procedure was carried out twice on a weekly interval. No intracanal medicament was applied in the canal until cessation of active drainage. When the drainage ceased completely, calcium hydroxide dressing was given. The root canal dressing was renewed 6 times in duration of 6 months; as demonstrated in (Figure 6 & 7), a progressive involution of periapical radiolucency occurred.

Further clinical examination revealed immature apex persisted with 21; subsequently a MTA apexification was performed. All the teeth were then obturated with gutta percha and zinc oxide

eugenol sealer using lateral condensation technique. Patient remained asymptomatic during post operative recalls. Six and twelve months post treatment radiographic follow up revealed complete resolution of periapical radiolucency. (Figure 8)

Discussion

An apical cyst (pocket and true) is believed to form from proliferation of quiescent epithelial cell rests of Malassez in apical periodontitis lesions.¹ Hence periapical cyst should be regarded as apical periodontitis with cyst formation. Hyperplasia is a self-limiting process and is reversible if the causative stimulus is eliminated. Moreover, according to the World Health Organization (WHO), an apical cyst (pocket or true) is classified as an inflammatory and not a neoplastic lesion.⁸ The large cyst-like apical periodontitis lesions have been demonstrated to regress to smaller sizes and even complete healing after non-surgical endodontic therapy⁷ because of a decrease in

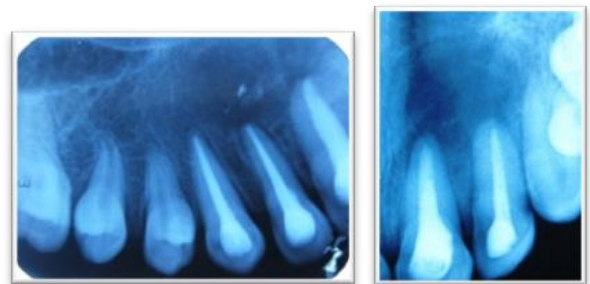


Fig. 6 & 7: 4 month follow up showing progressive involution of periapical lesion.

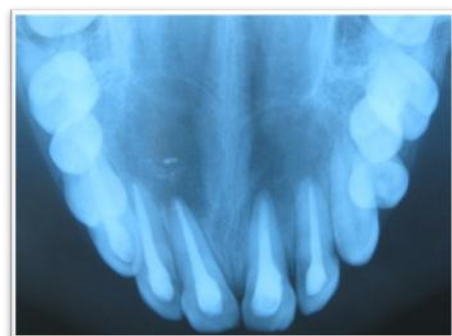


Fig. 8: Six-month follow up, resolution of periapical radiolucency is evident.

periapical inflammation. Once periapical inflammation is decreased, there will be a reduction in inflammatory mediators, pro inflammatory cytokines, with growth factors released by innate and adaptive immune cells and the epithelial cells of a cyst's lining epithelium will die of apoptosis.⁴



Fig. 9: post operative resolution of palatal swelling.

Bhaskar SN, has suggested that in a case of periapical lesion evident in a radiograph the root canal instrumentation should be done 1 mm beyond the apical foramen.⁹ It results in transitory inflammation and ulceration of the epithelial lining leading to resolution of the cyst.⁹ Bender in his commentary on Bhaskar's hypothesis reinforced that root canal instrument penetration of the apical area to the center of the radiolucency establishes drainage and thereby relieves pressure. Subsequently as the drainage stops, fibroblasts proliferate and deposit collagen, which causes compression of the capillary network, and thus the epithelial cells are starved and undergo degeneration, and are engulfed by the macrophages.¹⁰ In support to this assumption, in the present case, instrumentation was done beyond the apical foramen and cyst resolution was observed.

Complete debridement and irrigation of the root canal was done using 1% NaOCl, followed by the application of a calcium hydroxide intracanal medicament. *C albicans* is often present in resistant and secondary endodontic infections as well as in

peri-radicular lesions. 1% NaOCl has shown bactericidal effect against *C albicans* and *E faecalis*.¹¹

Calcium hydroxide is a material of choice in endodontic treatment because of its high alkalinity and bactericidal effects,¹² including neutralizing bacterial endotoxins.¹³ The length of time that Ca(OH)₂ is left in the root canal can affect its effectiveness depending up on diffusion of the hydroxyl ions at sufficient concentrations in to the dentine, it is suggested that the minimum time should be 2-3 weeks.¹² Ghose et al. has suggested beneficial osseoinductive actions of calcium hydroxide medicament when in close contact with the periapical tissue.¹⁴ The diffusion of the calcium hydroxide through the apical foramen causes inflammatory action sufficient to break the cystic epithelial lining, followed by connective tissue invagination with ultimate healing.¹⁴ Moreover Souza et al, suggested the fourfold action of calcium hydroxide beyond the apex: anti-inflammatory activity; neutralization of acid products; activation of the alkaline phosphatase; antibacterial action.⁷

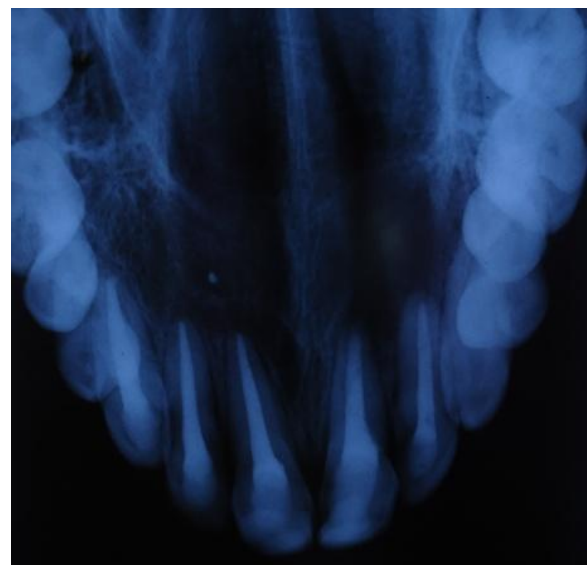


Fig. 10: Twelve month follow up.

As apical true cysts are the product and not the cause of apical periodontitis lesions. Therefore apical true cyst could delay but not prevent

periapical wound healing after nonsurgical root canal therapy,⁴ in contrast to surgical modality wherein healing is faster. Fibrovascular granulation tissue can only slowly grow into the periapical wound as activated macrophages gradually remove damaged periapical tissues.¹⁵ Surgical management would have involved removal of diseased periapical tissue, and possibly apicectomy. In children a surgical procedure would normally be unpleasant and more traumatic than conventional endodontic treatment. Moreover apicectomy would certainly reduce the available length of an immature tooth.¹⁶ This complication would be averted by adopting a conservative procedure that would allow the root canal and apices to heal and attain a mature configuration.

Conclusion

As apical periodontitis lesions, irrespective of whether they are abscesses, granulomas or cysts, are primarily caused by root canal infection. A treatment protocol may be used that will eliminate their etiology in the root canal system rather than their product, apical true cyst. Therefore the aim of non-surgical endodontic therapy is the elimination and prevention of infection from the root canal with regression of inflammatory apical true cysts. Nevertheless, clinicians must acknowledge the fact that the cysts can persist with post-treatment apical periodontitis, and consider the surgical option, particularly when earlier attempts at orthograde retreatment have not resulted in healing.

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