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## Original Hypothesis

# To Cut or not to Cut: Can Large Periapical Cysts be Treated by Endodontic Treatment only?

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## Abstract

**Introduction:** The periapical cyst originates from the epithelium in a granuloma and is frequently associated with an inflammatory response to a necrotic pulp. This condition is clinically asymptomatic but can result in a slow-growth, bone resorption and swelling in the affected region.

**The hypothesis:** Some authors support that if the endodontic infection is eliminated, the immune system is able to promote lesion repair, while others believe that surgical intervention is invariably necessary to remove cyst epithelium. This hypothesis indicates that large periapical cysts may be treated by only nonsurgical endodontic treatment.

**Evaluation of the hypothesis:** Radicular cysts exist in two structurally distinct classes namely, those containing cavities completely enclosed in epithelial lining (periapical true cysts) and those containing epithelium-lined cavities that are open to the root canals (periapical pocket cysts). From a clinical point of view a periapical pocket cyst may heal after conventional root canal therapy whereas an apical true cyst is less likely to be resolved without surgical intervention. During the endodontic therapy of teeth associated with periapical cysts, root canal instrumentation could be done slightly beyond the apical foramen. This will produce a transitory acute inflammation and destruction of the protective epithelial layer of the cyst, converting it into a granulated tissue, which has better resolution. Instrumentation beyond the apical foramen could be carried out because it would help in cyst resolution through the relief of the intra-cystic pressure.

**Key words:** Periapical cyst; Therapy; Surgery.

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## Introduction

The periapical cyst originates from the epithelium in a granuloma and is frequently associated with an inflammatory response to a necrotic pulp. This condition is clinically asymptomatic but can result in a slow-growth, bone resorption and swelling in the affected region. Radiographically, the classic description of the lesion is a round or oval, well-circumscribed, radiolucent image involving the apex of the necrotic tooth [1, 2].

## The hypothesis

Although it has been demonstrated that this pathologic entity can represent 40 to 50% of all apical lesions, it is not yet well-established in the literature whether its treatment should be surgical or non-surgical [1, 2]. Some authors support that if the endodontic infection is eliminated, the immune system is able to promote lesion repair, while others believe that surgical intervention is invariably necessary to remove cyst epithelium [1-5].

This hypothesis indicates that large periapical cysts can be treated solely by non-surgical endodontic treatment. The following is an example of this procedure.

A 20 year-old male patient was referred to our clinic (Baqiyatallah dental clinic, Tehran, Iran) for endodontic treatment of the right maxillary lateral incisor. Intraoral clinical examination revealed that the lateral incisor had become necrotic following trauma. The buccal mucosa presented normal color and appearance. There was however, slight swelling in the periapical

area above the root apex which was compressible. The radiographic examination showed the presence of a periapical lesion of approximately 2 cm in diameter and the tooth had an open apex. Pulpal necrosis was confirmed by test cavity access preparation without anesthesia. After access preparation and canal negotiation straw-colored clear fluid drained through the radicular canal. A sample of this fluid was collected for cytological examination (reported to be cystic fluid compatible with radicular cyst). The canal was instrumented at 1 mm from the apical foramen according to the crown-down technique. The canal was irrigated with dilute sodium hypochlorite. The canal could not be dried due to draining cystic fluid. Considering the clinical diagnosis of a radicular cyst and confirmation of cytology, the patient was scheduled for surgery.



**Figure 1.** Radiograph showing a periradicular cyst associated with an upper right lateral incisor with an open apex.

The canal was obturated and over-filled with gutta percha for easy location during surgery in the next day (figure 1). The access cavity was sealed with temporary cement.

However, the patient failed to refer the next day. The patient referred after 3 months. When questioned why he did not refer for surgery he stated that it was because he was asymptomatic.

A periapical radiograph was taken which showed bony consolidation of the lesion and compression of the extruded gutta percha to the periphery of the defect. The access cavity was restored and no other treatment was rendered. The patient has been symptom-free without clinical or radiographic findings now 18 years post-operatively (figure 2).



**Figure 2.** Radiograph taken 3 months after endodontic therapy showing bony consolidation compressing the extruded gutta percha to the periphery of the defect.

## Evaluation of the hypothesis

Pulpal infection originates and perpetuates periapical pathologic alterations (from various causes). In addition, in the absence of aggressive agents, the immune system has mechanisms to promote the repair of tissues and structures affected by pathologic processes [1-3]. Therefore, the elimination of harmful agents from the root canal system creates a favorable environment for repair of a cystic lesion [3, 5]. Several authors have shown that the large size of a periapical lesion does not mandate its surgical removal, and that even cyst-like periapical lesions heal following a conservative endodontic therapy [2, 3, 6, 7]. Surgery may have direct procedural consequences that make nonsurgical endodontic treatment preferable when feasible in cases of periapical cysts. Among the events that might be associated to periapical surgical interventions are loss of bone support, possibility of damaging nerves, denervating teeth adjacent to the lesion, possibility of damaging anatomic structures, such as the mental foramen, inferior alveolar nerve and/ or artery, nasal cavity and the maxillary sinus, production of anatomic defects or scars, postoperative pain or discomfort, and refusal to undergo surgical procedures (especially in pediatric patients) [4, 5, 8]. Some studies have reported that periapical cysts are refractory to non-surgical endodontic therapy [7,8]. Nevertheless, the fact that these findings are associated to other etiological factors, such as extraradicular infection, presence of foreign bodies and cholesterol crystals,

has also been discussed in the literature [8]. Correct planning of the intervention in cases of periapical cyst is of paramount importance for a successful therapy.

During the past few decades several authors have perpetuated the notion that nearly half of all periapical lesions are radicular cysts. A few studies, based on meticulous serial sectioning of periapical lesions retrieved in whole, have shown that the actual incidence of radicular cyst is only about 15% of all periapical lesions. Equally significant was the discovery in 1980 and recent confirmation that radicular cysts exist in two structurally distinct classes namely, those containing cavities completely enclosed in epithelial lining (periapical true cysts) and those containing epithelium-lined cavities that are open to the root canals (periapical pocket cysts). From a clinical point of view a periapical pocket cyst may heal after conventional root canal therapy whereas an apical true cyst is less likely to be resolved without surgical intervention [8].

Caliskan observed healing of large lesions in 73.8% of cases [9]. His study of 42 patients suggests that the size of a periapical lesion is not a major determining factor in the decision to perform conventional root canal treatment or surgical removal of the lesion. Even large cyst-like periapical lesions containing cholesterol crystals can heal following nonsurgical root canal treatment [9]. The foremost step is to establish a differential diagnosis between periapical cyst and periapical granuloma. Several studies have shown the difficulty to radiographically distinguish these pathological entities [8-10]. Biochemical pro-

cedures have also been described for differential diagnosis [4]. In the case reported in this article, cytology was used. In view of the fact that healing may occur in a large number after endodontic therapy it seems prudent to fill the canal and to "wait and see".

Bhaskar suggested that, during the endodontic therapy of teeth associated with periapical cysts, root canal instrumentation must be done slightly beyond the apical foramen [1]. According to him, this will produce a transitory acute inflammation and destruction of the protective epithelial layer of the cyst, converting it into a granulated tissue, which has better chance for resolution. Although there is no scientific-based evidence to support this assumption, in the case hereby presented, instrumentation beyond the apical foramen was carried out because it would help in cyst resolution through the relief of the intra-cystic pressure [2].

The criteria used to establish the most adequate moment for obturation of the root canal are based on absence of spontaneous pain, sensitivity to percussion, exudate and edema, and the beginning of radiographic regression of the lesion. Regarding the time required for considering the therapy successful, a two-year period has been considered a reasonable interval [2]. In the case described in this paper, the patient was evaluated biannually and then every 12 months up to 18 years with no recurrence.

## List of abbreviations

There is no abbreviation.

## Conflicts of interests

The author declares that he has no competing interest. MM has editorial involvement with the Dental Hypotheses.

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## Authors' contributions

- *Main idea:* by MM.
- *Literature search:* by MM.
- *Data collection:* by MM.
- *Data interpretation:* by MM.
- *Manuscript preparation:* by MM.
- *Funds Collection:* N/A

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