Post- treatment endodontic disease-Clinical challenge: Part I

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Abstract:

Endodontic management is based on sound biological rationale, which is exclusion of microorganisms from the root canal system. Endodontic re-treatments are indicated when signs and symptoms of infection are still present or re-appear. In the majority of endodontic treatment “failures”, the radiolucency present, be it stable or reduced in size, is an indication of apical periodontitis. Research has shown that periapical pathological lesions consistent with apical periodontitis are caused by foreign bodies present in the periapical region. Evidence suggests that most frequently the microorganisms are harbored in the root canal system. This article aims at understanding the etiology, diagnosis, treatment options and limitations of endodontic retreatment when compared with periapical surgeries.

Key words: Endodontic retreatment, endodontic failure, periapical pathology

Introduction:

The main aim of endodontic therapy is to prevent and cure endodontic disease. To achieve this goal, endodontic management is based on sound biological rationale, which is exclusion of microorganisms from the root canal system.  

The outcome of endodontic treatment is based upon numerous conditions. Endodontic re-treatments are indicated when signs and symptoms of infection are still present or re-appear. One of the main reasons for variability of outcomes of endodontic treatment is inconsistent definition of success. The definition of success is very individualistic and varies from one clinician to other. It depends whether we consider the combined clinical and radiographic normalcy as success or clinical normalcy with reduced radiolucency as a successful treatment. Similarly, the patient’s presumption to success or failure also varies. For the patients, treatment is successful only when he/she is able to use that tooth as normally as possible, therefore, on the follow up appointments if the tooth does not respond as expected or doesn’t follow the criteria for “success”, they are normally referred to as “treatment failures” and this term has a negative connotation attached to it. Therefore, the term “failure” does not promote effective communication with the patient. In the majority of endodontic treatment “failures”, the radiolucency present, be it stable or reduced in size, is an indication of apical periodontitis. This is the same disease for which the root canal treatment was initially done, so a separate name suggests that it is a different entity, where as in fact, it isn’t.

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Therefore to promote effective communication between the patient and the clinician, the terms “healing and diseased” can be used.

When on follow up appointment there are no clinical signs, symptoms or radiolucency, the tooth and apical tissue can be classified as “healed” and when radiolucency has persisted without change or has increased, the term “diseased” can be used. To adjust to the fact that healing of the lesion can take years, reduced radiolucency can be interpreted as a suggestion of “progressive healing”.

In summary, use of terms “healing and disease” to report the outcome of endodontic treatment is advisable, as this will minimize ambiguity, facilitate communication, and take care of ethical and legislative requirements. The disease associated with radiolucency in relation to endodontically treated teeth is apical periodontitis\[1,2\]. However, as this disease has persisted despite endodontic treatment, reoccurred after having healed at first, or emerged during the follow up period, it is inappropriate to characterize it as persistent, recurring or emerged apical periodontitis. For simplicity and ease of communication, we can refer to such cases as “Post treatment endodontic disease”.

Etiology:

Research has shown that periapical pathological lesions consistent with apical periodontitis are caused by foreign bodies present in the periapical region. Evidence suggests that most frequently the microorganisms are harbored in the root canals system, when they have survived the treatment, invaded the filled root canal space or harbored in the periapical region.

Treatment – Benefits and risks:

Post treatment disease, like any other disease processes can be resolved only if etiological factors are eliminated. To achieve this goal without extracting the tooth, we have to either do a retreatment or apical surgery for the tooth. The treatment options for the concerned tooth should be weighed accordingly. In general a treatment is beneficial to the patient only if it is conducive to his welfare, health or both.\[4\] When considering treatment options for the patient the effect of the option on both the factors should be kept in mind. Retreatment or apical surgery differs significantly in their ability to address the site where the microorganisms are harbored. The following considerations are pertinent:

1. For root canal infections: Re-treatment is better option as it excludes the microorganisms from the root canal. Surgery on the other hand, has a limited capacity to curtail root canal infections, therefore offers less benefit.

2. For extra-radicular infections: Surgical intervention renders the area infection free by totally removing the infected site, whereas retreatment isolates the canal from the extra-radicular microorganisms. Surgery therefore offers a better chance to curtail extra-radicular microorganisms.

To summarize, root canal infections are more common than exclusive extra-radicular infections, therefore it is appropriate to consider that generally the benefit of retreatment (the procedure that best curtails root canal infections) outweigh that of apical surgery. When symptoms support the diagnosis of extra-radicular infection, the benefits of apical surgery outweigh those of retreatment. In either case, both the procedures can be carried out in conjunction, to exclude the micro-organisms from all possible sites, so the treatment outcome is better than that of either of the procedures alone\[2\]. However, in teeth where the root canal is easily accessible, apical surgery should be avoided to prevent its adherent risks\[1,2\].

Limitations of both treatments:

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Both retreatment and apical surgery require considerable manipulation and should be considered invasive procedures associated with inherent risk and each has its own limitations. For retreatment, the inherent risk depends on the type of restoration that is present, the type of root canal filling or other obstacles that have to be eliminated. At the most, the patient is at risk of losing the tooth because of fracture or perforation[5]. Following clinical conditions may be treated as risks associated conditions:

1. **Post and core restorations:** Removal of posts is also a clinically challenging situation since removal of the post is proportional to its retention in the canal. Retention is dependent upon the size, type & cementing material.

2. **Root canal obstacles:** Attempts to remove insoluble materials from the canals such as broken instruments or cements like zinc polycarboxylate can lead to perforations.

For apical surgeries, the limitations may appear as; (a) Close proximity to a sensitive anatomical structure, in relation to the roots. (b) Proximity to major nerves: Close association of the roots to the nerves can lead to their damage or numbness. Most of the times, the damage is transient but can be permanent. Close association of sinus, especially the maxillary sinus, can get involved or the patients can result in sinusitis after the treatment. (c) Certain areas like lingual surface of lower arch and distal surface of maxillary arch are not easily accessible. It is impossible to conclude which option overweighs the other. This assessment can only be made by taking into account the characteristics of the individual tooth. Another factor to be considered is the postoperative sequelae of pain & swelling. According to Kavist and Reit[5] apical surgery resulted in pain and swelling in 90% of the cases and retreatment produced only 26% of such reactions.

**Case Selection:**

Retreatment and apical surgery are usually performed to treat existing disease, presenting with definitive radiographic changes and possibly clinical signs and symptoms. However, even in the absence of disease, retreatment may be indicated to prevent the potential emergence of disease in the future[5].

**Treatment of existing disease:**

As explained above, whenever post-treatment disease is diagnosed and treatment (tooth retention) is preferred over extraction, both orthograde re-treatment and apical surgery should be considered. Since, retreatment appears to offer a greater benefit of better ability to eliminate the disease’s etiology (root canal infection) with minimal invasion, lesser risk (significantly less postoperative discomfort)[6] and less chance of injuring anatomic structures, it should be generally considered the principle treatment of choice, however, it is not always feasible. At times, retreatment can be more time consuming and costly than surgery, particularly when an extensive restoration must be replaced. Also, the ability to materialize the full benefit of re-treatment may be restricted by a variety of clinical factors[7-9]. Moreover, clinician’s capability to perform retreatment and surgery varies considerably.

To summarize, retreatment is generally selected because of its greater benefit and lesser risk in comparison with apical surgeries. Therefore, the case selection strategy suggested above is based on considerations that either preclude retreatment altogether, or restrict it in a way that may decrease the potential benefits and
increase the risks; the resulting modified benefit-risk balance may no longer outweigh that of apical surgery\[^{2,8}\]. These considerations focus on the patient, tooth in question, clinician’s abilities and previous treatment attempts\[^{10}\].

**Conclusion:**

Endodontic retreatment and apical surgery are more frequently associated with procedural complications than the initial treatment. Effective communication is required before treatment is started, to avoid frustration, discontent, and possible litigation. Appropriate communication should include explanation of the benefits, risks, potential restrictive factors, and the long term outcome. The patient can then be in a position to select and authorize retreatment or apical surgery, as well as the subsequent restorative procedures. Even when the patient is referred to a specialist, communication of these factors is still essential as it allows the patient to consider the option of referral and consultation with the specialist. Furthermore, the patient will approach the specialist having more realistic expectations.

The referral should be in writing, and include all pertinent information about the patient, case history, previous radiographs, and outline of the restorative and prosthetic treatment plan, particularly for the tooth in question. Emergency procedures performed by the referring clinician should be outlined. Mid-treatment referrals, particularly aborted re-treatment attempts should be avoided, because they are frequently associated with complications.

**References:**


