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A dilemma: Diagnosis and treatment planning of combined endo-period lesions

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Abstract

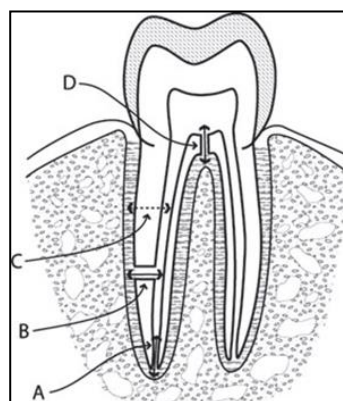
Combined endodontic periodontal lesions are localized, circumscribed areas of bacterial infection originated from either dental pulp or periodontal tissues surrounding the involved teeth. Cross seeding of bacteria can occur in either direction through communication pathways such as apical foramen, lateral canals etc. This lesion provides many diagnostic challenges to clinicians, particularly when they occur concurrently. Once both the pulp and the periodontal tissues have become involved, the diagnosis and management of the situation may become more complex and require extra considerations. The purpose of paper was to highlight the common difficulties encountered in making the diagnosis of such lesions and suggest sequences step by step to achieve the goals of correct diagnosis and treatment planning.

Keywords: Endo-perio lesions, diagnosis, treatment planning

Introduction

The relationship between periodontal and pulpal disease was first described by Simring and Goldberg in 1964. Since then the term "endo-perio lesion" has been used to describe lesions due to inflammatory products found in varying degrees in both the periodontal and pulpal tissues.

The effect of endodontic infection on progression of periodontal disease has been studied in many clinical retrospective^[1-5] and experimental studies⁶⁻⁸ and it has been regarded as a local modifying risk factor for periodontitis progression. Avenues of communication between periodontal and endodontic tissues such as main and accessory canal, dentinal tubules and iatrogenic defects have been suggested to play role in progression of endodontic infection producing periodontal breakdown^[9, 10]. [Figure 1] Similarity of bacterial flora and cross-seeding of bacteria from periodontal space to pulp space and vice versa has also been reported by many microbiologic studies^[11-13].



Schematic representation of some of the possible communication pathways between the dental pulp and the periodontal ligament.

- A – Apical foramen
- B – Lateral canal
- C – Dentinal tubule
- D – Accessory canal

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Fig 1

Periodontal Manifestation Due To Endodontic Infection

Some endodontic diseases may have manifestations that affect the periodontal tissues. In particular, a chronic apical abscess may appear to be associated with a periodontal pocket. The draining sinus may exit the mucosa in any location, either close to or at some distance from the abscess. In some cases, the draining sinus may be located immediately adjacent to, or alongside, the gingival sulcus and this can have the appearance of a deep, narrow periodontal pocket [14]. In other cases, the draining sinus may be tracking through the periodontal ligament itself, although this would seem unlikely to occur in a tooth with a healthy periodontal ligament [14]. The furcation region of multi-rooted teeth may have a radiolucency if there are accessory canals draining into the furcation. The diagnosis of these cases should be based on the status of both the root canal system and the periodontal tissues (e.g., a pulpless, infected root canal system with a chronic apical abscess as a result of caries).

Despite of evidence of communication pathways present between periodontal and pulpal tissues, only a weak explanation exists about how pulpal pathology acts as a cause of periodontal attachment loss. The present understanding on the effect of endodontic infection on periodontal status is mainly based on retrospective studies where the numbers of variables evaluated are limited with reliability not as high to accept or reject any hypothesis. Moreover the experimental studies also lacked similarity to clinical conditions and were conducted in extreme conditions. There is still a need to find out whether the untreated non vital tooth indeed has influence on periodontal tissues or not clinically.

Endodontic Infection Caused By Periodontal Conditions

Periodontal diseases may lead to changes in the state of the pulp tissue in several ways. Pulp inflammation (pulpitis) and secondary dentine formation has been reported as being associated with periodontal diseases [15, 16], as has internal resorption. These pulp changes were reported to only occur when the periodontal pockets extended deep enough to involve lateral canals or dentinal tubules associated with exposed root dentine or root caries [15, 16]. Complete pulp necrosis did not occur unless the periodontal pocket extended all the way to the main apical foramen and the foramen had been invaded by plaque. Once complete pulp necrosis occurs, infection of the root canal system is to be expected with the subsequent development of apical periodontitis since bacteria from the periodontal pocket may invade the necrotic pulp tissue once the pulp has lost its ability to resist such bacterial invasion. Root planing is an operative procedure of the tooth that may cause pulp inflammation of varying degrees, depending the amount of cementum removed, whether the exposed dentine is protected by a smear. Typically, patients with reversible pulpitis report sensitivity of the root-planed tooth to cold stimuli, and occasionally sensitivity to hot stimuli. The pain induced by the stimulus usually only lasts for a few seconds after the stimulus has been removed, and then resolves within one to two weeks.

Complete elimination of micro-organisms from infected root canal is very challenging and complicated task [2]. Despite complete disinfection of the root canal system during endodontic treatment, bacteria from the periodontal lesion may re-invade the root canal system [5].

Classification of Endodontic-Periodontal Diseases

Several classifications of the so-called “endo-perio lesion” have been suggested in the dental literature but most of these

are not entirely satisfactory.

The most conventional classification used for endodontic periodontal lesions was given by Simon *et al.* (1972) [17], separating lesions involving both periodontal and pulpal tissues into the following groups:

- Primary endodontic lesions
- Primary endodontic lesions with secondary periodontal Involvement
- Primary periodontal lesions
- Primary periodontal lesions with secondary endodontic involvement
- True combined lesions

Another commonly used classification was first suggested in a textbook chapter by Torabinejad and Trope¹⁸ and was based on the origin of the periodontal pocket, as follows:

- Periodontal pocket of endodontic origin;
- Periodontal pocket of periodontal origin;
- Combined endodontic-periodontal lesion;
- separate endodontic and periodontal lesions without communication
- Endodontic and periodontal lesions with communication.

However in 2009, PV Abott and JC Salgado¹⁹ proposed that those teeth that have both endodontic and periodontal diseases occurring at the same time should be called “concurrent diseases” rather than “combined endo-perio lesions”. Hence, they proposed the following classification.

- Concurrent endodontic and periodontal diseases Without communication
- Concurrent endodontic and periodontal diseases with communication

Clinical Diagnostic Procedures [Table 1]

Visual examination

A thorough visual examination of the lips, cheeks, oral mucosa, tongue, palate and muscles should be carried out. The alveolar mucosa and the attached gingiva are examined for the presence of inflammation, ulcerations or sinus tracts. Frequently, the presence of a sinus tract is associated with a necrotic pulp.

Palpation

Palpation is performed by applying firm digital pressure to the mucosa covering the roots and apices. With the index finger the mucosa is pressed against the underlying cortical bone. This will detect the presence of periradicular abnormalities or hot zones that produce painful response to digital pressure [20].

Percussion

Although this test does not disclose the condition of the pulp, it indicates the presence of a periradicular inflammation. An abnormal positive response indicates inflammation of the periodontal ligament that may be either from pulpal or periodontal origin. The sensitivity of the proprioceptive fibers in an inflamed periodontal ligament will help identify the location of the pain. This test should be performed gently, especially in highly sensitive teeth.

Mobility

Tooth mobility is directly proportional to the integrity of the attachment apparatus or to the extent of inflammation in the periodontal ligament. Hypermobility is quite common in cases of primary endodontic involvement and should not be

confused with true mobility caused by periodontal destruction. In cases of primary endodontic pathology, the mobility resolves within a week of initiating endodontic therapy.

Radiographs

Interpretation of discrete periapical or lateral lesions and discrete periodontal lesions is of clinical importance in suggesting the cause of the lesion and the proper diagnostic procedures to follow to confirm the cause [21, 22]. Often, the initial phases of periradicular bone resorption from endodontic origin are confined only to cancellous bone. Therefore, it cannot be detected unless the cortical bone is also affected. However, when there is radiographic evidence that bone loss extends from the level of crestal bone to or near the apex of the tooth, the radiograph is of little value in determining the cause [23, 24].

Fistula tracking

Endodontic or periodontal disease may sometimes develop a fistulous sinus track. Inflammatory exudates may often travel through tissues and structures of minor resistance and open anywhere on the oral mucosa or facial skin. Intraorally, the opening is usually visible on the attached buccal gingiva or in the vestibule. Fistula tracking is done by inserting a semirigid radiopaque material into the sinus track until resistance is met. Commonly used materials include gutta-percha cones or pre-softened silver cones. A radiograph is then taken, which reveals the course of the sinus tract and the origin of the inflammatory process [25].

Pulp testing

The most commonly used pulp vitality tests are cold test, electric test, blood flow tests and cavity test. The presence or absence of vital tissue in a tooth with a single canal can be determined with confidence with the current pulp testing procedures. The same degree of confidence cannot be ascribed to positive pulp test responses in a tooth with multiple canals [20].

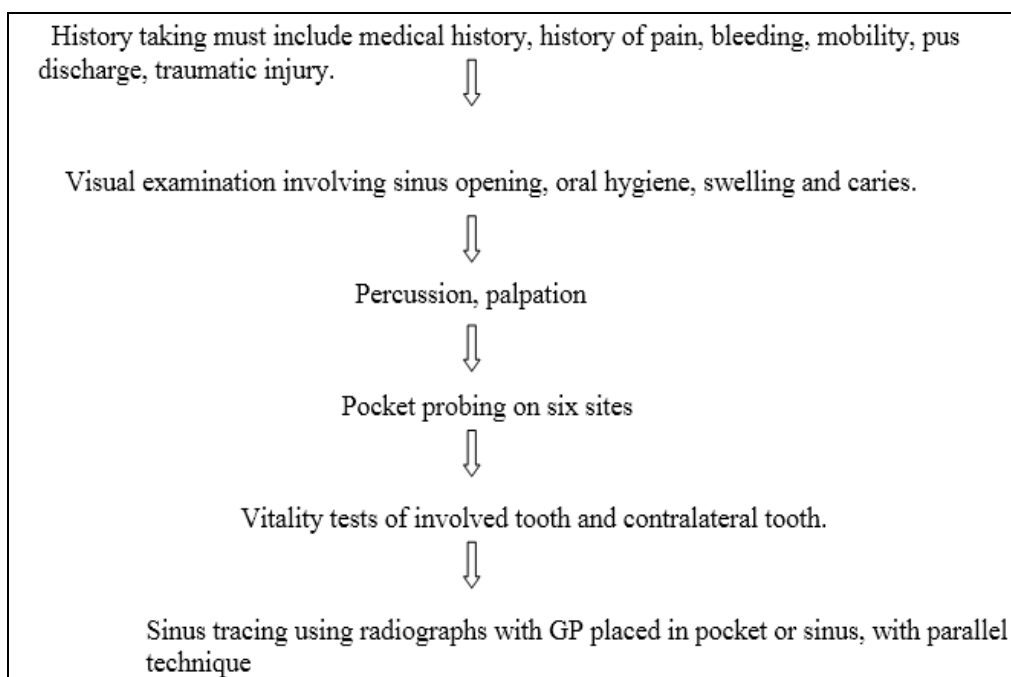
Periodontal Probing

When a patient presents with a localized swelling that involves the gingival sulcus, it may be difficult to determine whether the swelling is due to a periodontal abscess or an abscess of endodontic origin²⁶. The tooth must be nonvital. The swelling is usually on the labial side of the tooth but may occasionally be on the lingual side. As the sulcus is probed, there is usually normal sulcus depth all the way around the tooth until the area of the swelling is probed. At the edge of the swelling the probe drops significantly to a level near the apex of the tooth and the probing depth remains the full width of the swelling. At the opposite edge of the swelling, probing is once again within normal limits. The width of the detached gingiva can be as broad as the entire buccal or lingual surface of the tooth. This swelling can be characterized as having "blown-out" [21] the entire attachment on that side. Endodontic treatment only is indicated. As the result of endodontic management of the swelling, complete periodontal reattachment occurs within 1 week in most cases.

Differential Diagnosis [Table 1]

Typical findings	Pulpal lesion	Periodontal lesion	Combined lesion
Disease localized to one tooth	yes	no	yes
extensive caries	yes	no	yes
Pulp vitality test	no	yes	no
Pocket probing	no	yes	yes
Crestal bone loss evident on radiographs	no	yes	yes
Periapically – the presence of radiolucency	yes	no	yes
Tenderness to percussion	No unless acute apical periodontitis is present	No unless acute periodontal abscess is present	No unless acute apical Periodontitis is present

Sequence to Achieve Correct Diagnosis



Important Considerations While Treating Endo-Perio Lesions

Periodontal diseases that appear to be causing pulp changes should initially be managed conventionally by thorough subgingival root planing, by removal of any local causative factors and with oral hygiene instruction. This should be followed by review and reassessment of the healing response. Some cases will require further root planing or surgical management to gain better access to the root surface for plaque and calculus removal. If the pulp symptoms continue, then endodontic examination, diagnosis and management will be indicated.

On the other hand, it is a known fact that root canal infection significantly affects periodontal healing. Pocket depth reduction is significantly lesser in the presence of canal infection [2, 3]. There is more marginal epithelium over cemental defects if the canals are infected. Removal of cementum will expose dentinal tubules, which means that if there are bacteria in the canal, it could promote inflammatory resorption. It may also expose periodontal tissues to toxic medicaments if used in canal. This is not so critical in areas with recession. In such cases, early initiation of endodontic treatment ensures that the cementum layer is kept intact until root canal infection is eliminated. Because there would be no exposed dentine on the root surface, there is reduced chance of root resorption and improved periodontal healing.

Treatment Considerations for Concurrent Endodontic and Periodontal Diseases

Treatment of teeth with concurrent endodontic and periodontal diseases must address both of the concurrent problems. However, some debate exists within the dental literature as to which problem should be treated first [27]. The answer to this question partly relies on the diagnosis for each particular case since any acute problems (such as pain or swelling) must be treated first in order to comfort and stabilize the patient [27]. Hence, if the patient presents with an acute apical abscess, then endodontic treatment should be commenced immediately. However, if the patient presents with an acute periodontal abscess, then periodontal treatment should be commenced immediately. Once the initial treatment has been provided, the disease that was causing the acute problem will essentially return to a chronic state until further treatment results in complete healing – such further treatment should follow the guidelines listed below. However, most patients with concurrent endodontic and periodontal diseases do not have any symptoms since these conditions are typically chronic in nature. In such cases, the following treatment guidelines should be followed.

Treatment protocol according to Abbott¹⁹ is as follows:

Initial management

- Remove existing restorations and caries
- Chemo mechanically prepare canals
- Medicate canals (depends on symptoms)

Follow-up management

- Change intracanal dressing after 3–4 weeks
- Provide initial periodontal treatment
- Review healing after 3 months
- Reassess need for further periodontal treatment

If more periodontal treatment (e.g., surgery) is required,

- Change intracanal medication again

If healing response is favourable,

- Complete root canal filling

Longer-term management

- Defer root filling until after
- Need for periodontal surgery assessed
- Surgery completed with satisfactory outcome

Conclusions

So, it can be concluded that it is extremely important to know how to differentiate the origins of the endodontic-periodontal lesions, to achieve the correct diagnosis and adequate treatment planning, resulting in greater chances of obtaining the success in the treatment of the endodontic-periodontal lesions.

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