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Review Article

PERIODONTAL-ENDODONTIC OR ENDODONTIC-PERIODONTAL LESIONS???

(A DIAGNOSTIC DILEMMA)

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ABSTRACT

Diagnosis and prognosis of the teeth involving endodontic–periodontal lesions are a challenge to the clinician exhibiting varied pathogenesis which ranges from quite simple to relatively complex one. Etiologic factors such as bacteria, fungi and viruses as well as various contributing factors such as trauma, root resorption, perforations and dental malformations play an important role in the development and progression of such lesions and knowledge of these disease processes is essential in coming to the correct diagnosis. The long term prognosis of these lesions is determined by correct primary diagnosis and careful interdisciplinary treatment of the pulpal disease, followed by periodontal treatment if necessary.

Keywords: Endodontic-Periodontal lesions, Interdisciplinary, Periodontal, Pulpal

INTRODUCTION

The tooth surrounded by its supporting structures influences each other during health, function and disease and should be viewed as one biologic unit¹. The periodontium and pulp have embryonic, anatomic and functional interrelationship. The pulp originates from the dental papilla and the periodontal ligament derives from the dental follicle, separated by Hertwig's root sheath. As the tooth matures, communications are created between them by dentinal tubules, accessory canals and the apical foramina thus creating an embryological and anatomical relationship, which remain throughout life not only in health, but also in disease².

Effect of periodontal lesion on pulp

The periodontal-endodontic lesion is a condition characterized by the association of periodontal and pulpal disease in the same dental element. In a periodontal lesion, plaque and calculus are the initiating factors leading to the production of endotoxins and inflammatory mediators, leading to the destruction of gingival connective tissue, periodontal ligament and alveolar bone. Periodontal disease causes cumulative damaging effect on the pulp tissue, only if bacterial plaque involves the main apical foramina, compromising the vascular

supply³. The presence of an intact cementum layer is important for the protection of the pulp from pathogenic agents and rigorous scaling and root-planning for the treatment of periodontal disease leads to bacterial invasion (mainly periodontal bacteria) of the tubules, thereby increasing the likelihood of cumulative damage to the pulp^{4,5,6}. The effect of periodontal disease on dental pulp was first described by **Turner and Drew in 1919**⁷.

Effect of endodontic lesion on the periodontium

In an endodontic lesion, caries or any direct exposure to the oral cavity of dentine or pulp results in bacterial accumulation which travel through the anatomical pathways leading to a periapical lesion which may perforate the cortical bone close to the apex, elevate the periosteum and overlying soft tissues and drain into the gingival sulcus⁴, and form pockets. The downgrowth of epithelium along the tract also results in a periodontal pocket in which this secondary periodontal disease may complicate the lesions⁸.

The fundamental difference between endodontic and periodontal lesions is their respective origin and the subsequent direction of their progression and their relationship was first described by **Simring and Goldberg in 1964**^{9,10}. Since then the term '**PERIO-ENDO LESION**' has been used

to describe lesions due to inflammatory products found in varying degrees in both the periodontium and the pulpal tissues¹⁰. The success of both periodontal and endodontic therapy depends on the elimination of both disease processes, whether they exist separately or as a combined lesion.

Pathways of Communication

The various pathways of communication between the pulp and the periodontium may be classified as follows:¹¹ (Figure 1 & 2)^{12,13}

- I) **DEVELOPMENTAL**
 - Apical Foramen
 - Lateral or Accessory Canals
 - Dentinal Tubules
 - Developmental or Lingual Grooves
 - Tooth / Root Anomalies
- II) **PATHOLOGICAL**
 - Empty spaces created by destroyed Sharpey’s fibres
 - Root fractures following trauma
 - Idiopathic Resorption (Internal or External)
 - Cemental Agenesis or Hypoplasia
- III) **IATROGENIC**
 - Exposure of dentinal tubules following root planing
 - Accidental lateral perforations during endodontic treatment

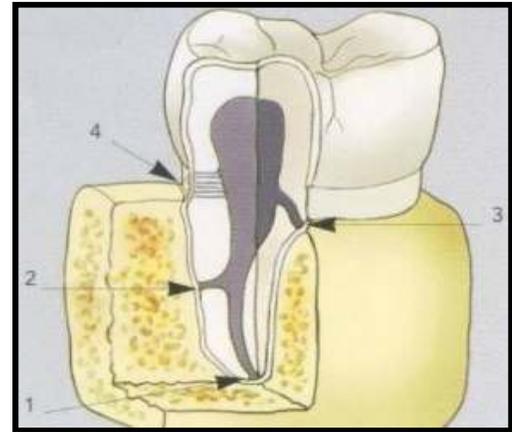


Figure 1: Pathways of communication

- 1. Apical foramen
 - 2. Accessory canal
 - 3. Lateral canal
 - 4. Dentinal tubules
- (From Didilescu A, Iliescu R, Rusu D et al. Current concepts on the Relationship between Pulpal and Periodontal Diseases. TMJ 2008;58:99-103.)

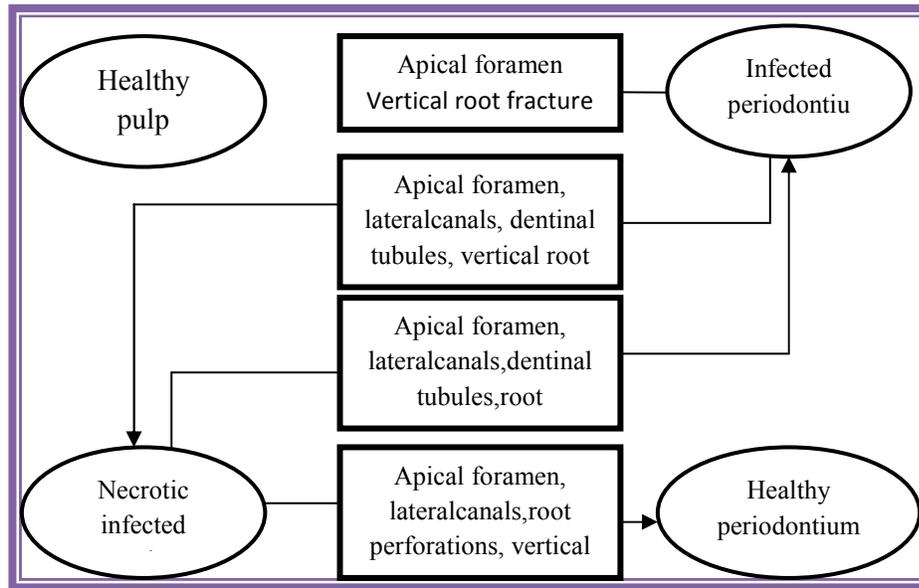


Figure 2: Mode of transfer of bacteria from pulp to the periodontium and vice-versa (From Zehnder M, Gold SI, Hasselgren G. Pathologic interactions in pulpal and periodontal tissues. J Clin Periodontol 2002; 29: 663–671.)

Classification

Simon et al¹⁴ have classified the lesions based on the primary source of infection, as follows: (Figure 3A-E)¹⁵

- 1. Primary endodontic lesions (Figure 3A)
- 2. Primary endodontic lesions with secondary periodontal involvement (Figure 3B) [Endo-Perio]
- 3. Primary periodontal lesions (Figure 3C)
- 4. Primary periodontal lesions with secondary endodontic involvement (Figure 3D) [Perio-Endo]

- 5. True combined lesions (Figure 3E)

In addition, **Belk and Gutmann**¹² proposed a sixth group of lesions - concomitant pulpal and periodontal lesions. The **International Workshop for the Classification of Periodontal Diseases and Conditions** adopted in 1999 added a category of periodontitis associated with endodontic lesions and a subcategory of combined perio-endo lesions¹⁶.



Figure 3: Simon's classification for endo-perio lesions

A. Primary endodontic lesion B. Primary endo secondary perio lesion C. Primary periodontal lesion D. Primary perio secondary endo lesion E. True combined lesion

(From Schacher B, Haueisen H, Ratka-Krüger P. The chicken or the egg? Periodontal-endodontic lesions. Perio 2007;4:15-21)

Diagnosis

Diagnosis of primary endodontic disease and primary periodontal disease usually present no difficulty. In primary periodontal disease, the pulp is vital and responsive to testing. There is frequent accumulation of plaque and calculus and the pockets are wider whereas in primary endodontic disease, the

pulp is infected and non-vital and such lesions usually heal following root canal treatment. It is the other lesions which can arrive at an accurate diagnosis by careful history taking, examination and the use of special tests which in turn aid in deciding an appropriate treatment plan. (Table 1)^{10,17}

Table 1: Various diagnostic procedures that can be used to identify perio-endo lesions^{1,6}

Visual examination
Palpation
Percussion
Mobility <ul style="list-style-type: none"> • Loss of periodontal support • Fractured roots • Recent trauma • Periradicular abscess
Radiographs <ul style="list-style-type: none"> • Periradicular bone resorption of endodontic origin - not effective • Bone loss due to periodontal disease – effective
Pulp vitality testing (Cold test, Electric test, Blood flow tests, Cavity test) <ul style="list-style-type: none"> • Abnormal response – Degenerative changes • No response – Pulp necrosis • Moderate transient response – Normal vital pulp • Quick painful response – Reversible pulpitis • Lingering painful response – Irreversible pulpitis
Pocket probing <ul style="list-style-type: none"> • Probing depth • Clinical attachment level • Sinus tracking
Fistula tracking <ul style="list-style-type: none"> • Semi rigid radio-opaque material (gutta-percha)
Cracked tooth testing

Treatment

For the treatment of endo-perio or perio-endo lesions to be successful, the pathogenesis, the clinical and radiographic manifestations of endodontic and periodontal lesions must be

well understood¹⁸. Treatment and prognosis of primarily endodontic and primarily periodontal disease is very straightforward. For primary endodontic lesions, conventional endodontic therapy alone will resolve the lesion. The most

significant sign that an endodontic problem is present is that the patient does not have periodontal disease in other areas of the mouth. Such lesions require endodontic therapy and are characterized by a rapid healing process with an excellent prognosis¹⁹.

Primary periodontal lesions are treated by non surgical therapy followed by removal of contributing factors (poor restorations and any developmental grooves). Periodontal surgery is performed after the completion of hygiene phase therapy and consists of procedures that attempt to treat periodontal pockets and promote regeneration. The prognosis of periodontal lesions is poorer than endodontic lesions and is dependent on the apical extensions of the lesion¹.

Prognosis of combined forms of lesions is more difficult to predict with an endodontic therapy being more predictable and if carried out before periodontal procedures has a positive effect on periodontal healing as well as on the symptomatic relief of the patient as far as eating and oral hygiene measures are considered. In cases of combined disease, the prognosis of combined diseases relies on the severity and extent of the periodontal lesion and the efficacy of periodontal therapy²⁰.

Three distinct types of lesions fall under the category of combined lesions. In the **first** the affected tooth has two separate lesions, one endodontic and usually periapical and one periodontal with no communication between each other. The **second** type contains those teeth with a single lesion that involves both endodontic and periodontal pathosis. The **third** type involves teeth with periodontal and endodontic lesions that were once separate but now communicate¹⁹.

Separate and unrelated lesions

In such lesions first it must be determined whether the periodontal condition is treatable and if possible then endodontic therapy is performed first, followed by the periodontal therapy¹⁹. The periodontal treatment should be deferred until the root canal system is free of bacteria since the presence of bacteria in the root canal system will affect the outcome of the periodontal treatment in several ways²¹.

Single lesion with both endodontic and periodontic components

The involved tooth has a single lesion radiographically and probes just like a deep periodontal pocket. The patient does have a periodontal condition involving other teeth and there is likely an etiology for the endodontic condition which may be due to the progression of the periodontal lesion. In such cases, which therapy to be instituted first is controversial and they present with doubtful prognosis¹⁹.

Periodontal and endodontic lesions that have merged

In this the patient has periodontal diseases in other areas and the pocket depth may have caused the pulp to become affected, periodontal therapy may have caused pulpal injury or a large restoration or caries may be present. A lesion may begin as a separate entity but may have merged at the time of presentation. If endodontic treatment only is performed the periapical lesion will heal to the site where the periodontal lesion begins and if periodontal therapy alone is performed, only the crestal bone may heal. Thus, the treated lesion will not heal to its full potential due to continuous irritation and inflammation from the untreated segment¹⁹.

When a clinician cannot make a definitive diagnosis, it is advisable to initiate endodontic therapy and hope for repair. Treatment results should ideally be evaluated in 2–3 months and only then periodontal treatment should be initiated. This sequence of treatment allows sufficient time for initial tissue healing and better assessment of the periodontal condition along with reducing the potential risk of introducing bacteria and their byproducts during the initial phase of healing¹.

Hiatt and Amen²² claimed that persistent periodontal disease may clear up only after definitive periodontal therapy is followed by successful endodontic treatment. Most authors agree that both forms of therapy are essential for successful healing of combined lesions. However, the problem arises over which lesion came first and which caused or perpetuated the clinical problem. It is generally agreed that pulpal disease could initiate or perpetuate periodontal disease, the opposite theory is controversial as majority of the combined clinical cases are associated with deep carious lesions involving the pulp. It has been seen that periodontal disease that remained after unsuccessful endodontic therapy cleared up after successful endodontic therapy. Several authors have also shown the remission of severe periodontal bone loss after endodontic therapy alone. **Simring and Goldberg**²³ postulated that endodontic therapy is indicated in the treatment of terminal periodontal disease that does not respond to periodontal therapy. In perio-endo lesions, endodontic treatment is more predictable, but the success of endodontic therapy is dependent on the completion of periodontal therapy and the complete treatment of both aspects is essential for successful long-term results¹.

CONCLUSION

Endodontic-Periodontal lesions often present a diagnostic and treatment dilemma as both have some common symptoms and either disease may mimic the other clinically or radiographically. A differential diagnosis of periodontal disease and pulpal disease is essential to formulate a definitive treatment plan. A thorough knowledge of the causative factors, pathways of communication, common clinical signs and symptoms and treatment modalities will enable the clinician to achieve successful results. Despite the available literature regarding these lesions, it is at times very difficult for the clinician to distinguish the primary origin as the patient usually presents a clinical picture at a stage where both the components exist. In such situations, whether the lesion is to be diagnosed as **Perio-endo** or **Endo-perio** is still debatable and therefore the dilemma continues.....

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