

Endo-Perio Lesion: An Overview

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Abstract: Endodontics is the study of pulp and periapical tissue disorder. Many facets of the supporting mechanisms are addressed in periodontal rehabilitation, including the prevention and recovery of gingival sulcus lesions. The removal of all disease mechanisms, whether they occur independently or as a combination lesion, is critical to the effectiveness of endodontic therapy and periodontal therapy. For several years, the link between endodontic and periodontal disorder has been a source of debate. The aim of this article is to provide a concise overview of various aspects of endo-perio lesions.

Keywords: Endo-perio lesions, classification, diagnosis, treatment

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I. Introduction

The periodontium and pulp are intimately connected, with embryonic, anatomic, and functional interconnections. Simring and Goldberg were the first to explain the connection between periodontal and pulpal disease in 1964. ⁽¹⁾

The term EPL (Endo-Perio Lesion) was first used in the American Association of Endodontics' Glossary of Endodontic Terms in 1998, and it was quickly followed by the American Academy of Periodontology, which identified the lesion as a localized infection that originated in periodontal or pulp tissue. Polymicrobial anaerobic infections are found in both endodontic and periodontal lesions. The endodontic system and periodontium are also inflamed in different degrees, resulting in combined EPL disorder. ⁽²⁾

Pulpal and periodontal complications are thought to be responsible for half of all tooth deaths. They pose difficulties for the clinician in terms of diagnosing and prognosing the affected teeth. It is important to make an accurate diagnosis such that the proper medication can be administered. ⁽³⁾

PULPAL-PERIODONTAL COMMUNICATIONS

The close connection between the endodontic system and the periodontium has long been thought to be the cause of combined EPL. The exchange of infectious elements from the pulp to the periodontium and vice versa is aided by a number of pathways. ⁽²⁾ These could be as follows:

1. Pathways of developmental origin (anatomical pathways)
 - Apical foramen, accessory canals/lateral canals
 - Congenital absence of cementum exposing dentinal tubules
 - Developmental grooves
2. Pathways of pathological origin
 - Spaces on root surface created by insertion of Sharpey's fibers
 - Root fracture following trauma
 - Idiopathic root resorption (internal and external)
 - Loss of cementum due to external irritants
3. Pathways of iatrogenic origin
 - Exposure of dentinal tubules while performing SRP (scaling and root planing)
 - Lateral root perforation during endodontic procedures
 - Root fractures during endodontic procedures ⁽⁴⁾

Following can serve as **potential predisposing factors**:

- Mal-alignment of a tooth
- Presence of a multirooted tooth in a position usually occupied by a single rooted tooth, or additional roots, separate or fused in multirooted teeth.

- Presence of additional canals and changes in root structure in single and multirooted teeth.
- Cervical enamel projections into the furcation of multirooted teeth.
- Large lateral (accessory) canals in coronal and middle sections of roots. ^(5,10)

ETIOLOGY

Various etiological factors are-

1. Live pathogens

- **Bacteria:** In both endodontic and periodontal disease, bacteria play a significant role. Rupf et al. looked at the profiles of periodontal infections in teeth with pulpal and periodontal diseases. *Actinobacillus actinomycetemcomitans*, *Tannerella forsythensis*, *Fusobacterium nucleatum*, *Porphyromonas gingivalis*, *Prevotella intermedia*, and *Treponema denticola* were all detected using specific PCR methods. These bacteria were discovered in all endodontic samples, as well as in teeth with chronic apical periodontitis and chronic periodontitis. They concluded that periodontal pathogens often follow endodontic infections and that endodontic-periodontal interactions are common.

- **Fungi:** *Candida albicans* made up the bulk of the fungi found. As a result of poor asepsis during the operative treatment process, fungi can obtain entry to the root canal from the oral cavity. The prevalence of fungi in the root canals is linked to the presence of fungi in the saliva.

- **Viruses:** Herpes simplex, human cytomegalovirus, and Epstein-Barr virus (EBV) were found in periodontal tissues of patients with periodontal disease. The presence of viruses in the dental pulp was first recorded in an AIDS patient in endodontics. In addition, DNA from the HIV virus has been found in periradicular lesions. The HIV virus, on the other hand, has not been shown to cause pulpal diseases specifically.

2. Extrinsic and Intrinsic agents

- Foreign bodies
- Cholesterol
- Russell bodies
- Rushton hyaline bodies
- Charcot-Leyden crystals
- Epithelial rests of Malassez

3. Contributing Factors

- **Inadequate endodontic therapy** – This is often linked to periradicular inflammation. Endodontic treatment that isn't up to par can lead to canal re-infection, which can lead to treatment failure.

- **Inadequate reconstruction** – Coronal leakage is a common source of endodontic procedure failure. Defective restorations with sufficient root fillings had a higher loss rate than teeth with insufficient root fillings and adequate restorations, according to Ray and Trope (1995).

- **Resorption** – The degradation of dentine, cementum, and/or bone as a result of a pathological operation. It can originate in the periodontium and affect the tooth's exterior surfaces first, or it can start in the pulp space and affect the internal dentin surfaces first (internal resorption).

- **Root perforation** – Which occurs as the root canal networks communicate with the periradicular tissues or the oral cavity, lowering the treatment prognosis. ⁽⁷⁾

- **Vertical root fracture**

- **Developmental malformations**⁽⁵⁾

CLASSIFICATION OF ENDO-PERIO LESIONS

Endodontic-Periodontal lesions have various classifications:

1. Classification by Simon et al: -

- a) Primary endodontic lesions,
- b) Primary endodontic lesions with secondary periodontal involvement,
- c) Primary periodontal lesions,
- d) Primary periodontal lesions with secondary endodontic involvement,

- e) True combined lesions.
- 2. Classification by Grossman based on therapy protocol (1991)
 - a) Teeth that require endodontic therapy alone.
 - b) Teeth that require periodontal therapy alone.
 - c) Teeth that require endodontic as well as periodontal therapy.
- 3. Classification by Torabinejad and Trope in 1996 based on the origin of the periodontal pocket:
 - a) Endodontic origin,
 - b) Periodontal origin,
 - c) Combined endo-perio lesion,
 - d) Separate endodontic and periodontal lesions,
 - e) Lesions with communication,
 - f) Lesions with no communication.
- 4. Classification recommended by the world workshop for classification of periodontal diseases (1999), Periodontitis Associated with Endodontic Disease:
 - a) endodontic-periodontal lesion,
 - b) periodontal-endodontic lesion,
 - c) combined lesion.
- 5. In 2014,7 Al-Fouzan suggested a new endodontic-periodontal interrelationship classification, based on the primary disease and its secondary effect.
 - 1) Retrograde periodontal disease
 - A. Primary endodontic lesion with drainage through the periodontal ligament
 - B. Primary endodontic lesion with secondary periodontal involvement
 - 2) Primary periodontal lesion
 - 3) Primary periodontal lesion with secondary endodontic involvement
 - 4) Combined endodontic-periodontal lesion
 - 5) Iatrogenic periodontal lesion
 - A. Root perforations
 - B. Coronal leakage
 - C. Dental injuries or trauma
 - D. Chemicals used in dentistry
 - E. Vertical root fractures. ^(5,8)

DIAGNOSIS

Endo-perio lesions pose difficulties for physicians in terms of diagnosis and prognosis of the affected teeth. Correct diagnosis solves half of the problem. The proper taking of a patient's records is a critical step toward ensuring that the condition is treated effectively. A thorough clinical review, accompanied by tests such as radiographs, pulp vitality testing, pocket probing, fistula tracking, and fractured tooth testing, can also be used to make a correct diagnosis, as seen in Table 1. ^(2,3,4)

TREATMENT AND PROGNOSIS OF ENDO-PERIO LESIONS

The endo-perio lesion is a condition in which endodontic inflammation and periodontal injury coexist. Beforestarting some advanced restorative work to treat a perio-endo lesion, extracting of the tooth should be considered as a possibility. Radiographs can assist in disclosing care instructions. ⁽⁵⁾

1. **Primary endodontic disease:** Root canal surgery normally heals primary endodontic disorders. The involvement of microorganisms within the root canal system affects the result of endodontic care. If the care is done well, with an emphasis on infection prevention, a good prognosis may be expected. If the infected pulp has been extracted and the root canals well drained, shaped, and obturated, the sinus tract reaching into the gingival sulcus or furcation region disappears at an early stage. Orthograde endodontic therapy has been recommended instead of surgical endodontic therapy in the case of a tooth with a significant periapical lesion. The use of intracanal medicaments including calcium hydroxide has been shown to be very effective in healing of a large periapical lesion.

2. **Primary periodontal diseases:** Only periodontal therapy can be used to treat primary periodontal disease. The prognosis in this situation is determined by the nature of the periodontal condition, the

Test	Primary endodontic lesion	Primary periodontal lesion	Primary endodontic secondary periodontal	Primary periodontal secondary endodontic	True combined lesions
Visual	Presence of decay/ incorrect restorations/ erosion/ abrasion	Inflammation/ recession of gingiva Presence of plaque/ calculus Intact teeth	Plaque/ calculus at the gingival margin Root perforation/ fracture	Plaque/ calculus And swelling around multiple teeth Puss + exudate	Periodontitis around single or multiple teeth Puss + exudate
Pain	Sharp	Usually dull ache	Usually sharp	Usually dull ache	Usually dull ache, sharp only in acute condition
Palpation	Not conclusive	Pain on palpation	Pain on palpation	Pain on palpation	Pain on palpation
Percussion	Normally tender	Tender on percussion	Tender on percussion	Tender on percussion	Tender on percussion
Mobility	Present only in fractured or traumatized teeth	Localized/ generalized mobility	Localized mobility	Generalized mobility	Generalized Higher grade mobility on involved tooth
Pulp vitality	Lingering or no response	Positive	Negative	Positive	Usually negative
Pocket probing	Solitary narrow pocket	Multiple wide and deep pockets	Solitary wide pocket	Multiple wide and deep pockets	Typical conic periodontal type of probing
Sinus tracing	Radiograph with gutta-percha points to apex / furcation	At lateral aspect of the root	Mainly at the apex/ furcation area	At lateral aspect of the root	Difficult to trace
X-rays	Periapical radiolucency	Vertical bone loss Wider bone loss coronally	Wide based apical radiolucency	Angular bone loss in multiple teeth	Similar to a vertically fractured tooth
Cracked tooth testing	Painful when chewing	No symptoms	Painful when chewing	No symptoms	Painful when chewing

TABLE 1. Diagnostic procedures used to identify endo-perio lesions

effectiveness of periodontal treatment, and the patient's response; however, primary periodontal lesions have a less promising prognosis than primary endodontic lesions. In the first step, hygiene phase therapy can be used to treat primary periodontal lesions. Poor restorations and developmental grooves involved in the lesion must be eliminated as a result. If periodontal surgery is needed after the hygiene process, it should be done after the hygiene phase is completed.

3. **Primary endodontic with secondary periodontal lesions:** Primary periodontal lesions should be treated with hygiene process treatment in the first place, much as primary endodontic lesions. Bad restorations and developmental grooves involved in the lesion must be eliminated as a result. If periodontal surgery is needed after the hygiene process, it should be done after the hygiene phase is completed. Iatrogenic trauma, such as root perforation or fracture during root canal treatment or the placing of pins or posts, may result in primary endodontic lesions with secondary periodontal involvement. It has long been understood that the treatment's effectiveness is largely dependent on the immediate sealing of the perforation and proper infection management. To seal root perforations, many materials have been proposed, including mineral trioxide aggregate, reinforced zinc oxide eugenol cement, and glass ionomer cements.

4. **Primary periodontal disease with secondary endodontic involvement and true combined endodontic- periodontal diseases:** It require both endodontic and periodontal regenerative procedures. Combined lesions can be classified into three types, first, tooth with two separate lesions, one endodontic usually periapical and one periodontal with no communication, second, teeth with a single lesion that involves both endodontic and periodontal pathoses and third, teeth with endodontic and periodontal lesions that were once separate but now communicate. True- combined lesions should be treated initially as primary endodontic lesions with secondary periodontal involvement. When periodontal lesions are persistent and extensive, the prognosis for true combined lesions is always low, even hopeless. The effectiveness of periodontal therapy plays a major role in the prognosis of mixed diseases. Root amputation, hemisection, or bicuspidization may be able to alter the root structures enough to preserve a portion of the root structure. Increased bony support, which can be accomplished by bone grafting and guided tissue regeneration, can also increase the prognosis of an injured tooth (GTR).^(3,8)

II. Conclusion

The periodontal role focuses on the periodontium's preservation or regeneration. The cleaning and shaping of the root canal space, accompanied by its three-dimensional obturation, is done to restore or preserve the apical periodontium to a biologically suitable condition in root canal therapy. Both contributing lesions must be managed for periodontic-endodontic lesions to be effective. Endodontic and periodontal therapy may be needed for lesions with multiple etiologies. Endodontic treatment should come first. The dentist's professional expertise and knowledge must be of the utmost caliber in order to choose the treatment that will result in recovery with the proper intervention.

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