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Review Article

ENDO-PERIO INTERRELATIONSHIP- AN OVERVIEW

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ABSTRACT

The human periodontium and dental pulp cavity are closely connected by their proximity and by the presence of apical and lateral radicular foramina, which permit the passage of pathogens between these two distinct anatomical areas. The interrelationship of these structures influences each other during health, function and disease. Although there are many factors that contribute to the development and progression of endodontic and periodontal diseases, the primary cause of both diseases is the presence of bacterial infections with complex microbial flora. Etiologic factors such as bacteria, fungi, and viruses as well as other various contributing factors such as trauma, root resorptions, perforations, and dental malformations also play an important role in the development and progression of such lesions. Although disease transmission from the pulp to the periodontal tissue is possible, the influence of periodontal disease on pulpal status remains controversial. The differential diagnosis of endodontic and periodontal diseases can sometimes be difficult but it is of vital importance to make a correct diagnosis so that the appropriate treatment can be provided. Endodontic-periodontal lesions present challenges to the clinician as far as diagnosis and prognosis of the involved teeth are concerned.

INTRODUCTION

The pulp-periodontal interrelationship is one in which "there are so many paths of communication that one is tempted to put aside the notion of two distinct anatomical structures and consider them as a single continuous system". This relationship between periodontal and pulpal disease was first described by "Simring and Goldberg**"** in 1964. The interrelationship of these structures influences each other during health, function and disease. This is evident from the fact that Pulpo-Periodontal pathoses are responsible for more than 50% of tooth mortality (Bender, 1982). The periodontium and pulp have embryonic, anatomic and functional inter-relationship. In the embryological development of the tooth, the dental follicle, which is the precursor of the periodontium, is in close relationship with the dental papilla from where comes the pulp. As the roots are mapped out by Hertwig's root sheath, and dentine and cementum are deposited, direct anatomical communication between the pulp and periodontium becomes limited to the apical foramina and lateral accessory canals, which remain throughout the life (Mandel *et al*., 1993). Once the tooth has erupted however, removal of cementum by root planing and scaling introduces a further perio/pulpal pathway of communication through exposed dentinal tubules. The other means of communication are Periodontal ligament (sharpey'sfibres), Alveolar bone, Palatogingival groove, Fractures and perforations and Common vasculolymphatic drainage pathways (*Simon 1984*).

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Etiology

Although there are many factors that contribute to the development and progression of endodontic and periodontal diseases, the primary cause of both diseases is the presence of bacterial infections with complex microbial flora. Kobayashi *et al*., (1990) reported that the predominant obligate anaerobes common to both regions are Streptococcus, Peptostreptococcus, Eubacterium, Bacteroides and Fusobacterium.Other than these microbial findings, similarities in the composition of cellular infiltrates also suggest the existence of communication between the pulp and the periodontal tissues (Bergenholtz, 1978). These findings infer that cross-contamination between the pulp and periodontal tissues is possible Although disease transmission from the pulp to the periodontal tissue is possible, the influence of periodontal disease on pulpal status remains controversial (Bergenholtz & Lindhe, 1978).

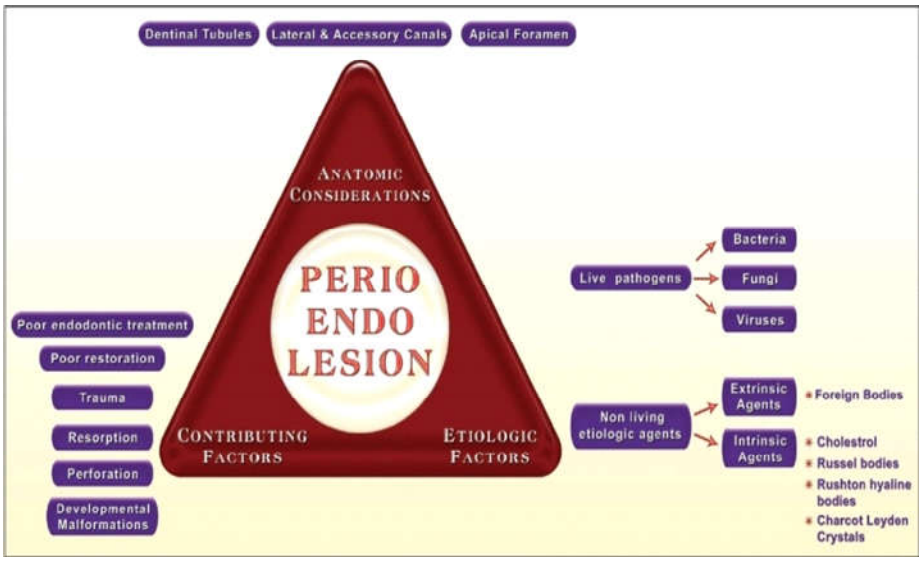

Figure 1. Etiology of endo-perio lesions

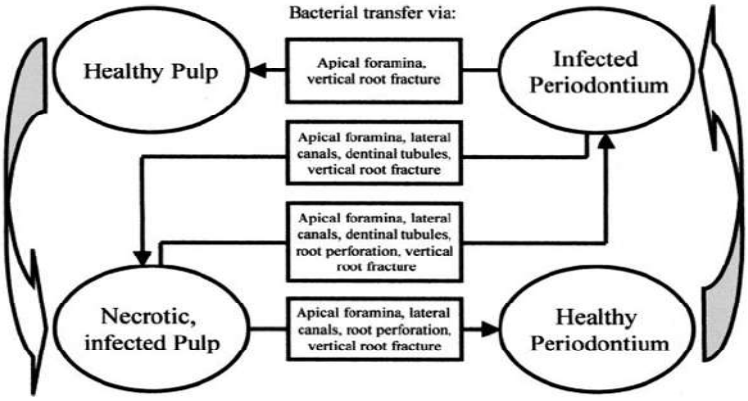

Figure 2. Bacterial transfer via pulp and periodontium

Table 1. Difference between Endo and Perio lesion

Clinical findings/ features	Endo lesion	Perio lesion
Etiology	Pulpal infection	Periodontal infection
Plaque & Calculus	No relation	Commonly seen
Tooth Vitality	Non-vital	Vital tooth
Restorations	Usually show deep and extensive restorations	No relation
Periodontal destruction	If present single, isolated	Usually present, and generalized
Pain type	Pulsating, pounding, continuous	dull
Pain localization	Easily localized due to percussive tenderness	Upon probing
Pain at night/ postural	Pain continuous	No
Swelling	Yes, often to large size	Occasionally
Mobility	Absent	Present
Bone deformity	Tubular “U”	Triangular ”V”
Gingiva and epithelial attachment	Normal	Recession of gingiva with apical migration of attachment
Pattern of disease	Localized	Generalized
Probing	Pocket, not necessarily present	Pocket usually present
Radiolucency	Periapical	Usually not related
Inflammatory and granulation tissue	Commonly seen on apical part of the tooth	Usually present on the coronal part of tooth
Generalized periodontitis	Absent	Present
Microbial flora	Few	Complex
Gingiva	Normal	Some recession
PH of saliva	Often acidic	Often alkaline
Treatment	Endodontic	Combined
Prognosis	Good	Depends on periodontal condition

Response of the pulpal tissues to long standing periodontal disease

- deposition of large quantities of reparative secondary dentine along the pulpal walls, .
- induction of pulpal fibrosis,
- dystrophic calcifications,
- reduced vascularity and fewer nerve fibres,
- (*Bender & Seltzer 1972*).

Pulpal infection can both initiate and maintain periodontal disease

- Minimal inflammation, confined to the periodontal ligament extensive destruction of the periodontal ligament, tooth socket and surrounding bone. (Czarneckie and Schilder 1979)

CLASSIFICATIONS (Hany Mohamed Aly Ahmed, 2012)

- Oliet and Pallock(1968)
- Simon, Glick and Frank (1972): *Based on aetiology*
- Primary endodontic lesion
- Primary periodontal lesion
- Primary endodontic lesion with secondary periodontal involvement
- Primary periodontal lesion with secondary endodontic involvement
- True combined lesion
- Franklin. S. Weine (1972)
- Mutschelknauss (1975) and Guldener (1975)
- Hiatt (1977)
- Guldener and langelanf (1982)
- Geurtsen *et al* (1985)
- Louis I Grossman (1991): *Based on therapy into 3 groups*
- Teeth that require endodontic therapy alone,
- Teeth that require periodontal therapy alone &
- Teeth that require endodontic as well as periodontal treatment.
- Torabinejad and Trope in (1996)
- Hany Mohamed Aly Ahmed (2012)

***Class I*:** Synchronous endoperio lesion

***Class II*:** Pulpal lesions with subsequent periodontal involvement

- Localised pathological pattern
- Unilaterally distributed pattern

***Class III*:** Periodontal lesions with subsequent Pulpal involvement

- Developmental
- Non developmental

Class IV: Independent endo-perio lesions

Class V: Iatrogenic endo-perio lesions

- Endodontic procedures causing periodontal lesions
- Periodontal procedures causing Pulpal lesions
- Non-endodontic /Non periodontal procedures causing endoperio lesions.

Class VI: Advanced endo-perio lesion

- Advanced endo-perio lesion with independent periodontal involvement
- Advanced endo-perio lesion with no independent periodontal involvement

Class VII: Indefinite endoperio lesions.

Diagnosis

The differential diagnosis of endodontic and periodontal diseases can sometimes be difficult but it is of vital importance to make a correct diagnosis so that the appropriate treatment can be provided.Accurate diagnosis can be achieved by careful history taking, examination of both endodontic and periodontal status, radiographic, diagnostic probing, and vitality test (Raja Sunitha, 2008). When doubt exits, diagnosing lesion should be considered in endodontic origin (Chang, 1997).

Treatment Plan

The prognosis of Endo-Perio Lesions treatment depends on management of both endodontic and periodontic disease process, whether they exist alone or as a combined lesion.The treatment of endo-perio lesions can be emergency treatment and local treatment. The emergency includes control of pain and infection. In case of acute pulpitis with severe pain, the emergency treatment like pulpectomypreferred and if pain is mild due to periodontal origin analgesics preferred.Infection control is achieved mainly by the use of antibiotics such as Penicillin and Erythromycin for endodontic origin and Chemo-therapeutic agents for management of lesions of periodontal origin (Bacić, 1990). Treatment of primary endodontic lesions-*Simon et al* proposed that root canal therapy should be performed with multiple appointments. Healing is rapid and is usually accomplished within 3-6 months (Simon *et al*., 1972). Treatment of primary endodontic lesion with secondary periodontal involvement requires both endodontic and periodontal treatment as there is pulpal involvement and presence of a periodontal pocket (Gargiulo, 1984).

Treatment of primary periodontal lesion needs sequence of treatment. If periodontitis progresses and periodontal pocket deepens, with continuous loss of attachment, surgical pocket eradication procedures are indicated. Treatment of primary periodontal lesion with secondary endodontic involvement is managed as follows that if a tooth does not respond to periodontal therapy alone the possible presence of a necrotic pulp may be suspected then endodontic therapy must be done to support the periodontal therapy along with osseous surgery if any bony defect is present (Snyder *et al*., 1996). True combined lesions are treated initially as for primary endodontic lesions with secondary periodontal involvement. Prior to surgery, palliative periodontal therapy should be completed and root canal treatment carried out on the roots to be saved. The prognosis of a true combined perio-endo lesion is often poor or even hopeless, especially when periodontal lesions are chronic, with extensive loss of attachment.

The prognosis of an affected tooth can also be improved by increasing bony support, which can be achieved by bone grafting and guided tissue regeneration. These advanced treatment options are based on responses to conventional periodontal and endodontic treatment over an extended time period (Raja Sunitha, 2008). Alternative for endo-perio lesion management are resective approach / redesign of anatomical

structures like Root amputation, Hemisection and Bicuspidization (Harrington, 1979). Various regenerative approaches for the management of endo-perio lesions includes the use of Tricalciumphosphate graft (TCP) Platelet Rich Plasma (PRP) and Guided tissue regeneration (GTR). Albee and Morrison noticed when Tricalcium phosphate graft (TCP) is placed in close to vital bone, ceramic matrix of the material serves as a carcass for bone formation (ArvindArora, 2012).

Laser

Treatment includes root canal therapy and routine non-surgical subgingival periodontal therapy using soft diode laser. The use of diode laser resulted in clinical attachment gain without affecting the soft tissue profile. Treatment of endo-perio lesions with a soft tissue diode laser is more effective and less traumatic than conventional surgical methods. These newer methods have enabled patients to extend their treatment options as well the clinician to learn newer techniques of treatment. Lasers have bactericidal effect and can be used effectively for disinfection of the root canal system following biomechanical instrumentation. These procedures can be performed with minimal postoperative challenges (Mithra *et al*., 2011).

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