Review Article

Endodontic-Periodontal Lesions: Diagnostic Challenges, Treatment Sequencing and Prognostic Considerations

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Abstract

Introduction: The relationship between periodontal and pulpal disease was first described by Simring and Goldberg in 1964.1 The term endo-periodontal lesion (EPL) refers to inflammatory conditions involving both pulpal and periodontal tissues. The close anatomical relationship between these tissues is maintained through several portals of communication that allow the passage of microorganisms. Disease originating in one tissue may affect the other, leading to the development of EPLs.

Relationship between Pulp and Periodontium: Endo-periodontal lesions are inflammatory conditions involving both pulpal and periodontal tissues to varying degrees. The close interrelationship permits the spread of infection and inflammatory products, contributing to disease progression. A diverse microbial flora, including Bacteroides, Fusobacteria, Eubacteria, Spirochetes, Wolinella, Selenomonas, Campylobacter, and Peptostreptococci, has been associated with these lesions.

Pathways of Communication: The pathways for the spread of bacteria between pulpal and periodontal tissues remain controversial.2,3 Pulpal infection may drain through the periodontal ligament space, producing periodontal destruction known as retrograde periodontitis. Local risk factors for periodontal disease progression include root grooves, invaginations, cemental tears, accessory roots, enamel pearls, dilaceration, and fusions/germination.

Keywords: Endo-Periodontal Lesions (EPLs); Diagnostic Challenges; Classification; Cone Beam Computed Tomography (CBCT); Treatment Protocol; Prognostic Considerations

Introduction

The relationship between periodontal and pulpal disease was first described by Simring and Goldberg in 1964[(1)]. Endo-periodontal lesions (EPLs) are inflammatory conditions that simultaneously involve both pulpal and periodontal tissues. The anatomical proximity of these two tissue systems, connected through various portals of communication, allows for the bidirectional spread of microorganisms, toxins, and inflammatory mediators. Disease arising in one tissue compartment may propagate to the other, resulting in complex clinical presentations.

A diverse polymicrobial flora has been implicated in the pathogenesis of EPLs. Organisms including Bacteroides, Fusobacteria, Eubacteria, Spirochetes, Wolinella, Selenomonas, Campylobacter, and Peptostreptococci have been identified[(2,3)]. The clinical management of EPLs demands a thorough understanding of both endodontic and periodontal disease processes, making an interdisciplinary approach essential for optimal outcomes.

Classification Of Endo-periodontal Lesions

Endo-periodontal lesions have been classified based on the primary tissue of origin and the extent of involvement. Primary endodontic lesions originate from pulpal infection and may drain through the periodontal ligament space, simulating periodontal disease. Primary periodontal lesions result from advancing periodontitis affecting the root apex. Combined lesions involve true co-infection of both endodontic and periodontal tissues and represent the most complex category, often carrying a guarded prognosis. The pathways through which bacteria spread between these compartments, including lateral and accessory canals, dentinal tubules, and the apical foramen, remain an area of ongoing investigation.

Diagnostic Challenges

The diagnosis of endo-periodontal lesions is challenging due to their complex presentation and the considerable overlap between pulpal and periodontal clinical features. A detailed history of pain, trauma, and previous dental treatment is essential. However, most EPLs are asymptomatic and may present only with pain, swelling, mobility, or a bad taste. Symptomatic cases may be associated with pulpitis, apical periodontitis, trauma, or iatrogenic damage[(4)].

Clinical examination should systematically assess carious lesions, defective restorations, developmental anomalies, occlusal discrepancies, and tooth restorability. Cracks and root fractures, which are more prevalent in patients with parafunctional habits and heavily restored dentitions, can be evaluated using magnification, transillumination, tooth

sleuth testing, and methylene blue dye staining. These findings often remain difficult to detect clinically and may only become evident during endodontic access preparation or following extraction.

A conclusive diagnosis of pulpal disease cannot be established by visual examination alone and must be supported by pulp sensibility tests and radiographic assessment. Cold and electric pulp testing help evaluate tooth innervation, though false-positive responses may occur in multirooted teeth with partial pulp necrosis[5,6].

Periapical radiographs and, where indicated, cone beam computed tomography (CBCT) are essential for assessing disease extent. Periapical radiographs provide information on root morphology, alveolar bone levels, restorations, and periradicular pathology, but are limited by anatomical noise and their two-dimensional nature. CBCT provides three-dimensional visualisation and facilitates the detection of perforations, root resorption, anatomical variations, and patterns of bone loss, thereby improving diagnosis, prognosis, and clinical decision-making[7].

Treatment Sequencing

The management of endo-periodontal lesions remains challenging, and the evidence supporting specific treatment protocols is limited. A staged treatment approach is generally recommended, with non-surgical root canal treatment and subgingival debridement as first-line interventions, provided there are no significant root fractures, perforations, or resorptive defects. In acute presentations, the primary source of pain or swelling should be identified and addressed first.

In most cases, endodontic therapy precedes periodontal treatment. Initial management focuses on debridement and disinfection of the root canal system. A period of observation follows to allow healing to be assessed, since radiographic evidence of bone regeneration may require several months to become apparent. Periodontal therapy should therefore be deferred until the outcome of endodontic treatment can be properly evaluated.

Primary endodontic lesions generally resolve following appropriate root canal treatment alone. However, lesions with secondary periodontal involvement frequently require additional periodontal therapy. Calcium hydroxide is commonly employed as an intracanal medicament due to its bactericidal, anti-inflammatory, and proteolytic properties, promoting periapical repair and reducing periodontal contamination.

True combined lesions are initially managed similarly to primary endodontic lesions with secondary periodontal involvement; however, their prognosis is often guarded, particularly in cases with extensive attachment loss. Advanced treatment options, including root amputation, hemisection, root separation, bone grafting, and guided tissue regeneration (GTR),[8] may be considered to improve outcomes.

Iatrogenic lesions require establishment of an effective seal and elimination of communication between the root canal system and periodontal tissues. Immediate perforation repair and rigorous infection control are critical determinants of success. Materials recommended for sealing root perforations include mineral trioxide aggregate (MTA), Super EBA, Cavit, IRM, glass ionomer cement, composite resin, and amalgam[9]. Palatal perforations are particularly challenging to manage and may ultimately necessitate extraction.

Prognostic Considerations

The prognosis of endo-periodontal lesions depends on accurate diagnosis, identification of pulpal involvement, and the presence or absence of root damage. A thorough clinical and radiographic assessment is essential for establishing prognosis and guiding treatment planning. Even following successful treatment, the affected tooth may remain compromised due to gingival recession, loss of periodontal attachment, and diminished bone support, making long-term maintenance and regular professional care indispensable.

Current evidence indicates that surgically treated EPLs achieve survival rates of 88.5-92% at five years and approximately 87% at ten years[10]. No long-term data are available for non-surgically treated EPLs. While survival is the most important patient-centred outcome, success is defined by more stringent clinical and radiographic criteria. Teeth affected by vertical root fractures carry a hopeless prognosis and are generally indicated for extraction.

Discussion

Endo-periodontal lesions represent a diagnostic and therapeutic continuum in which accurate classification guides management. The bidirectional spread of infection through anatomical communications, including accessory canals, dentinal tubules, and the apical foramen, underscores the need to evaluate both pulpal and periodontal status comprehensively. Emerging evidence highlights the role of CBCT in improving diagnostic accuracy, particularly in cases involving root resorption, vertical fractures, and complex bone defects[7].

The staged treatment paradigm, beginning with endodontic intervention followed by periodontal reassessment, remains the cornerstone of clinical management. The use of calcium hydroxide as an intracanal medicament supports tissue repair and reduces the periodontal bacterial load. For true combined lesions, regenerative periodontal procedures such as GTR

represent a valuable adjunct to conventional therapy, though long-term outcomes remain variable[8].

Interdisciplinary collaboration between endodontists and periodontists is essential to ensure all aspects of these complex lesions are adequately addressed. The limited availability of high-quality, disease-specific evidence underscores the need for well-designed prospective studies and randomised controlled trials to establish evidence-based management protocols for EPLs.

Conclusion

Endo-periodontal lesions are complex clinical entities that present significant diagnostic and therapeutic challenges due to their varied pathogenesis and diverse clinical presentations. Accurate diagnosis, particularly through rigorous assessment of pulp vitality and advanced imaging, is essential for appropriate treatment planning. Some periodontal lesions of endodontic origin may resolve following root canal treatment alone, whereas lesions involving true pulpo-periodontal communication require coordinated endodontic and periodontal management.

The use of non-toxic intracanal medicaments, particularly calcium hydroxide in conjunction with antimicrobial irrigation, remains important for bacterial elimination and tissue repair. Given the complexity of EPLs, an interdisciplinary approach involving endodontists and periodontists is crucial for achieving favourable outcomes. Although evidence-based management protocols specific to EPLs remain limited, current treatment outcomes appear promising when accurate diagnosis, staged treatment, and multidisciplinary care are employed.

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