

Endo-Perio Lesion: A Comprehensive Review

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Abstract: The destructive lesion caused by inflammatory substances present in both the periodontium and the pulpal tissues has been referred to as a "endo-perio" lesion. Endodontic-periodontal lesions are intricate disease entities that are widespread in routine dental care but difficult to identify and manage. A combined periodontal and endodontic lesion must be successfully treated by eliminating both disease processes. Endodontic therapy treats the endodontic component of combined endo-perio lesions, but the long-term health of the tooth ultimately depends on the resolution of the periodontal lesion. In order to achieve the best results, this review of literature will focus on the diagnostic, clinical guidelines, and treatment of these lesions.

Keywords: Endo-Perio Lesion, Endodontic therapy, Periodontal Therapy

Introduction: For many years, the connection between endodontic and periodontal disorders has been the focus of conjecture, misunderstanding, and debate. Pulpal and periodontal problems are

responsible for more than 50% of tooth mortality today. A pathogenesis for an endo-perio lesion might range from being pretty basic to being fairly complex.¹

It was Simring and Goldberg who first identified the link between pulpal and periodontal disorders in 1964. There are various channels of communication between the periodontal complex and pulp. The purpose of endodontic and periodontal therapy is to preserve the natural teeth as well as to replace missing periodontium. Periodontium and tooth pulp tissues are related from the embryonic stage on. Both the dental sac and the dental papilla, which are precursors to the PDL, share a shared mesodermal origin. The dental papilla and dental follicle are separated by the epithelial root sheath at the late bell stage, with the exception of the eventual apical foramen at the base. As a result, it is reasonable to assume that pulpal inflammation can influence any area of the periodontium and vice versa.^{2,3}

When it comes to diagnosing and predicting the prognosis of the afflicted teeth, these lesions frequently cause difficulties for the doctor. Making the right diagnosis is crucial for determining the best course of treatment. The dentist should have a good awareness and scientific knowledge of these lesions in order to provide an accurate diagnosis. To treat these lesions, restorative, endodontic, or periodontal therapy may be required, either separately or in combination.^{4,5}

In order to achieve the best results, this review of literature will focus on the diagnostic, clinical guidelines, and treatment of these lesions.

Etiopathogenesis of Endo-Perio lesion: According to the type of infection, the etiopathogenesis of the endo-perio lesion is described in cases like:

- Lesions that result from apical to coronal migration of pulpal pathogens and their toxins with or without fistula or sinus tract at the gingival margins depending upon the nature of infection.
- Originating from a marginal lesion which later on extended to more apical periodontal compartment. The periodontal and pulp are distinct from one each other and are anatomically connected through the foramina.
- Another form is the combination of the above, in which the differential diagnosis must attribute each portion of the lesion to its cause.

Pathway of Endo-Perio Relationship: Periodontal structure and dental pulp are related embryologically, anatomically, and functionally. Both of them have ectomesenchymal origins. In endodontic and periodontal illnesses, the lesion's dominant flora differs. However, some were observed shredding the surroundings.^{6,7} The majority of the flora in the tooth with periodontal pockets were rods and Rods and cocci made up the majority of the mobile organisms and those in the root canals. In teeth with endodontic disease, bacteria like *Actinobacillus actinomycetemcomitans*, *Bacterioides forsythus*, *Eikenella corrodens*, *Fusobacterium nucleatum*, *Porphyromonas gingivalis*, *Prevotella intermedia*, and *Treponema denticola* are found both apical and persistent adult periodontitis. Both endodontic infections and subgingival patients with adult periodontitis contained fungi such as *Candida albicans*. Periodontal and endodontic disease may be caused by cytomegalovirus, Epstein-Barr virus, and herpes virus, which can range from an increase in periodontal bacteria in periodontal pockets to participation in disorders of the pulp and periapex.^{8,9,10}

Pathways of developmental origin (anatomical pathways):^{12,13}

- Apical foramen, accessory canals/lateral canals
- Congenital absence of cementum exposing dentinal tubules
- Developmental grooves

Pathways of pathological origin:

- Empty spaces on root created by Sharpey's fibers
- Root fracture following trauma
- Idiopathic root resorption - internal and external
- Loss of cementum due to external irritants.

Pathways of iatrogenic origin:

- Exposure of dentinal tubules following root planning
- Accidental lateral root perforation during endodontic procedures
- Root fractures during endodontic procedures.

Classification of Endo-Perio Lesion: The most commonly used classification was given by Simon, Glick and Frank in 1972. According to this classification, Endo-Perio lesions can be classified into:¹⁴

1. Primary endodontic lesion
2. Primary periodontal lesion
3. Primary endodontic lesion with secondary periodontal involvement
4. Primary periodontal lesion with secondary endodontic involvement
5. True combined lesion

Endodontic lesion: When the pulp becomes inflamed or diseased, the periodontal ligament reacts by inflaming the area around the accessory canal openings and/or the apical foramen. Localized oedema brought on by these inflammatory lesions leads to an increase in intra-pulpal pressure and cell death. The venous portion of the local microvasculature collapses because of increased damage brought on by an inflammatory exudate. This results in localized tissue anoxia and hypoxia, which leads to localized necrosis. Localized necrosis' chemical mediators then lead to localized oedema, ending the cycle.¹²

An ordinarily sterile lesion may become contaminated with microorganism by carious lesions or by any direct exposure of dentine or pulp to the oral cavity. This illness is primarily mixed anaerobic in nature.¹³ Apical foramen, accessory and lateral canals, and dentinal tubules are where endodontic diseases are most usually initiated and sustained. A periapical lesion can simulate periodontal disease without necessarily permanently harming the cementum and its fibres by elevating the periosteum and surrounding soft tissues, draining into the gingival sulcus, and creating pseudopockets close to the apex of the cortical bone. If the acute periapical drainage becomes chronic and drainage through the gingival sulcus continues a downgrowth of epithelium along the tract can result in a periodontal pocket in which secondary periodontal disease may complicate the lesion.¹⁴

Simon, Glick and Frank further categorized endodontic lesions into two sub-categories:¹⁴

- **Primary Periodontal Lesion:** Periodontal infections are the main culprits behind these lesions. Chronic periodontitis advances apically along the root surface throughout this

procedure. Pulpal testing typically show a clinically normal pulpal reply. Plaque and calculus frequently build up, and the existence of deep pockets may be found.¹⁵

- **Primary Endodontic Lesion with Secondary Periodontal Involvement:** These lesions are caused primarily by periodontal pathogens. In this process, chronic periodontitis progresses apically along the root surface. In most cases, pulpal tests indicate a clinically normal pulpal reaction. There is frequently an accumulation of plaque and calculus and the presence of deep pockets may be detected.¹⁵

Periodontal lesions: Periodontal lesions are brought on by plaque and calculus. The periodontal ligament, alveolar bone, and gingival connective tissue are all destroyed by inflammatory mediators. Shallow resorptive lesions of cementum are caused by alteration of the root surface caused by loss of the outer cementoblast layer. Endotoxins made by plaque bacteria also irritate surrounding soft tissue, impeding repair. Although it has been demonstrated that periodontal disease causes the pulp tissue to deteriorate over time, complete pulp disintegration won't happen unless the main apical foramina are affected by bacterial plaque, which compromises the vascular supply. The presence of an intact cementum layer is important for the protection of the pulp from pathogenic agents produced by the plaque bacteria.^{16,17}

Simon, Glick and Frank further categorized periodontal lesions into two sub-categories:¹⁴

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- **Primary Periodontal Disease with Secondary Endodontic Involvement:** Until the apical tissues are affected, the apical evolution of a periodontal pocket may persist. In this situation, an infection that enters by the apical foramen or lateral canals may cause the pulp to become necrotic. The prognosis for single-rooted teeth is typically not good. The prognosis for molar teeth may be better. Root excision might be thought of as an alternative form of treatment because not all roots may lose their supporting tissue at the same rate.¹⁴

True Combined Lesion: Comparatively to other endodontic-periodontal issues, true combination illness is less common. It develops when an infected periodontal pocket that is growing apically combines an endodontic lesion that is growing coronally.¹⁴ In this kind of injury, the degree of attachment loss is almost always severe, and the prognosis is uncertain. This is especially true for teeth with a single root. Root resection is an alternate procedure for molar teeth. Combination endodontic and periodontal disease may have a similar radiographic look to a tooth that has fragmented vertically. To ascertain the cause of the lesion, it could be necessary to raise a flap if a sinus tract is present.¹⁸

Diagnosis of Endo-Perio Lesion: Clinicians face difficulties when attempting to diagnose and predict the prognosis of the affected teeth due to endo-perio lesions. A proper diagnosis solves the problem in half. An essential first step to a successful disease therapy is a thorough history taking.

Table no. 1: Diagnosis of Endo-Perio Lesion

Diagnostic Parameter	Interpretation
Visual examination	During a visual examination, the alveolar mucosa and connected gingiva are inspected for signs of inflammation, ulcerations, and sinus tracts. The sinus tract has a relationship with the necrotic pulp. ¹⁹
Pain	Different types of discomfort should be taken into account when deciding between pulpal and periodontal disease (type, intensity, frequency, duration, and activators of pain). ²⁰
Swelling	The mucobuccal folds or the facial planes are frequent sites of swelling caused by pulpal infections. Periodontal infection swelling often only affects the connected gingiva and infrequently travels to the mucogingival junction; it rarely results in facial swelling. ²⁰
Vitality Test	In primary endodontic disease, the pulp is infected and non-vital. On the other hand, in a tooth with primary periodontal disease, the pulp is vital and responsive to testing. ²¹
Radiographic examination	Radiographs are essential for detection of anatomic landmarks and a variety of pathological conditions. Radiographic examination will aid in detection of carious lesions, extensive or defective restorations, pulp caps, pulpotomies, previous root

canal treatment and possible mishaps, stages of root formation, canal obliteration, root resorption, root fractures, periradicular radiolucencies, thickened periodontal ligament, and alveolar bone loss. ²¹
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Management of Endo-Perio Lesion: The endo-perio lesion is a type of lesion characterised by concurrent endodontic infection and periodontal disease. Pulpal infection can drain through the periodontal ligament space and give an appearance of periodontal destruction, termed retrograde periodontitis. Similarly, both pulpal and periodontal infections can coexist in the same tooth, termed combined lesions, where the treatment depends on the degree of involvement of the tissues. Both endodontic and periodontal diseases are caused by a mixed anaerobic infection.

Treat the main disease when it affects a tissue, such as the pulp or periodontium, and the secondary disease is barely being started. When a secondary disease is well-established and chronic, it is necessary to treat both the primary and secondary disorders. Typically, endodontic treatment comes first and then periodontal treatment. Depending on the disease's stage, periodontal therapy may or may not be needed. After treating pulpal pathology, it is possible to anticipate that the destroyed periodontal support will fully repair. After treating chronic periodontitis, the extent of the destruction is less predicted to heal. The severity of either of the two illnesses affecting the supporting tissues cannot be determined clinically, and this is crucial to understand. As a result, the treatment plan must first target the pulpal infection before debriding and cleaning the root canal system. The level of periodontal healing brought on by the endodontic therapy is monitored during the observation phase of the second phase. Reduced probing depth is typically anticipated to occur within a few weeks, although bone regeneration may take many months to manifest itself radiographically. So, until the outcome of the endodontic treatment can be thoroughly assessed, periodontal therapy, including deep scaling with and without periodontal surgery, should be postponed.²²⁻²⁵

Table no. 2: Management of Endo-Perio Lesion

	Treatment	Prognosis
Primary Endodontic Lesion	An acute exacerbation of a chronic apical lesion on a tooth with a necrotic pulp may drain coronally through the periodontal ligament into the gingival sulcus.	They exhibit good prognosis. Radiographic and clinical healing occurs rapidly. A sinus tract heals soon after canal debridement -within 3-6 months.

	<p>This condition may mimic, clinically, the presence of a periodontal abscess.</p> <p>Endodontic therapy must be performed in multiple appointment, to reevaluate healing process between the beginning and completion of treatment. Periodontal therapy isn't required usually.</p>	
Primary Periodontal Lesion	<p>These lesions are primarily caused by periodontal pathogens. In this process, chronic periodontitis progresses apically along the root surface. In most cases, pulp tests indicate a clinically normal pulpal reaction. There is frequently an accumulation of plaque and calculus and the pockets are wider</p> <p>Surgical/non-surgical periodontal therapy. Reevaluation must be done periodically to check for retroinfection of pulp</p>	The prognosis is entirely dependent on periodontal therapy and hence, extent of periodontal damage.
Primary Endodontic Lesion with Secondary Periodontal Involvement	Endodontic therapy. Periodontal therapy – should not be employed until complete debridement of canal is achieved	Prognosis of endodontic therapy is predictable. Regeneration of periodontal tissue depends upon the extent of tissue destruction
Primary Periodontal Lesion with Secondary Endodontic Involvement	Surgical/ Non-surgical periodontal therapy/Endodontic therapy	The prognosis depends upon periodontal therapy and hence, extent of periodontal damage.
True Combined Lesion	Endodontic therapy and periodontal therapy. Root resection can be in need with regenerative therapy.	Prognosis of lesion is related to extent of periodontal damage.

Conclusion: The pathophysiology of an endo-perio lesion can vary, ranging from being pretty simple to being fairly complex. A detailed comprehension and scientific knowledge of these abnormalities are necessary for the doctor to provide an accurate diagnosis. A practitioner must provide restorative, endodontic, or periodontal therapy, either separately or in combination, despite the specialization of dentistry into several fields. As a result, a multidisciplinary strategy should be used to treat these lesions in the best possible way.

References

1. Parolia A, Gait TC, Porto IC, Mala K. Endo-perio lesion: A dilemma from 19th until 21st century. *J Interdiscip Dentistry* 2013;3:2-11
2. Foce E. *Endo-Periodontal Lesions*. London: Quintessence Publishing. 2011;3-5.
3. Simring M, Goldberg M. The Pulpal Pocket Approach: Retrograde Periodontitis. *J Periodontol*. 1964;35(1):22–48.
4. Sistla KP, Raghava KV, Narayan SJ, Yadalam U, Bose A, Roy PP. Endo-perio continuum: A review from cause to cure. *J Adv Clin Res Insights* 2018;5:188-191.
5. Khandelwal A, Billore J, Gupta B, Jaroli S, Agrawal N. Knowledge, attitude and perception on endo-perio lesions in practicing dentists- A qualitative research study. *J Adv Med Dent Scie Res* 2020;8(11):31-34.
6. Mjör IA, Nordahl I. The density and branching of dentinal tubules in human teeth. *Arch Oral Biol* 1996;41:401-12.
7. Zehnder M, Gold SI, Hasselgren G. Pathologic interactions in pulpal and periodontal tissues. *J Clin Periodontol* 2002;29:663-71.
8. Peeran SW, Thiruneervannan M, Abdalla KA, Mugrabi MH. Endoperiolesions. *Int J Sci Technol Res*. 2013;2(5):268–74.
9. Sharma R, Gupta A, Gupta KK, Jameel S, Kapoor R, Khan MA. Revisit to endo-perio lesion a review. *IP Int J Periodontol Implantol* 2020;5(2):48-52.
10. Singh P. Endo-perio dilemma: a brief review. *Dent Res J (Isfahan)*. 2011 Winter;8(1):39-47. PMID: 22132014; PMCID: PMC3177380.
11. Soames J V, Southam J C. 3rd ed. Oxford: Oxford University Press, USA; 1998. *Oral pathology*.

12. Torabinejad M, Kiger RD. A histologic evaluation of dental pulp tissue of a patient with periodontal disease. *Oral Surg Oral Med Oral Pathol*. 1985;59(2):198–200.
13. Lindhe J. 3rd ed. Denmark: Munksgaard Intl Pub; 1997. Clinical periodontology and implant dentistry; pp. 296–328.
14. Simon JH, Glick DH, Frank AL. The relationship of endodontic-periodontic lesions. *J Periodontol*. 1972;43(4):202–8.
15. Rotstein I, Simon JH. Diagnosis, prognosis and decision making in the treatment of combined periodontal-endodontic lesions. *Periodontol 2000* 2004;34:265-303.
16. Jenkins WM, Allan CJ. 3rd ed. California: Wright Publishing Company; 1994. Guide to Periodontics; pp. 146–52.
17. Kurihara H, Kobayashi Y, Francisco IA, Isoshima O, Nagai A, Murayama Y. A microbiological and immunological study of endodontic-periodontic lesions. *J Endod*. 1995;21(12):617–21.
18. Raja V S, Emmadi P, Namasivayam A, Thyegarajan R, Rajaraman V. The periodontal - endodontic continuum: A review. *J Conserv Dent* 2008;11:54-62.
19. G Dahlen Microbiology and treatment of dental abscesses and periodontal-endodontic lesions *Periodontol* 2000;28:1206-39
20. H. Aksel A. Serper A case series associated with different kinds of endo-perio lesions *J Clin Exp Dent* 2014;61:e915
21. Chang KM, Lin LM. Diagnosis of an advanced endodontic/periodontic lesion: report of a case. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1997;84(1):79–81.
22. Richard E Walton and Mahmoud Torabinejad. Principles and Practice of Endodontics. 3rd Edition Philadelphia W B Saunders Company; 2002 pp. 467-84.
23. Seltzer S, Bender IB, Ziontz M. The interrelationship of pulp and periodontal disease. *Oral Surg Oral Med Oral Pathol* 1963;16:1474-90.
24. Harrington GW, Steiner DR, Ammons WF. The periodontal-endodontic controversy. *Periodontol 2000* 2002;30:123-30.
25. Meng HX. Periodontic-endodontic lesions. *Ann Periodontol* 1999;4:84-9.