

Perio – Endo Interrelationship: A Review Article

¹Dr Vidisha Choudhary, Post-graduate, Dept of periodontology, Subharti dental college and hospital, Swami Vivekanand Subharti University

²Dr Nitin Tomar, Reader, Dept of periodontology, Subharti dental college and hospital, Swami Vivekanand Subharti University

³Dr Soundarya Singh, Senior Lecturer, Dept of periodontology, Subharti dental college and hospital, Swami Vivekanand Subharti University

Corresponding Author: Dr Vidisha Choudhary, Post-graduate, Dept of periodontology, Subharti dental college and hospital, Swami Vivekanand Subharti University

Citation of this Article: Dr Vidisha Choudhary, Dr Nitin Tomar, Dr Soundarya Singh, “Perio – Endo Interrelationship: A Review Article”, IJDSIR- July - 2020, Vol. – 3, Issue -4, P. No. 468 – 475

Copyright: © 2020, Dr Vidisha Choudhary, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Review Article

Conflicts of Interest: Nil

Abstract

The interrelationship between endodontic and periodontal diseases has been a subject of speculation, confusion and controversy for many years. Pulpal and periodontal problems are responsible for more than 50% of tooth mortality today. An endo-perio lesion can have a varied pathogenesis which ranges from quite simple to relatively complex one. These lesions often present challenges to the clinician as far as diagnosis and prognosis of the involved teeth are concerned. It is very essential to make a correct diagnosis so that the appropriate treatment can be provided. To make a correct diagnosis the clinician should have a thorough understanding and scientific knowledge of these lesions and may need to perform restorative, endodontic or periodontal therapy, either singly or in combination to treat them. Therefore, this paper will highlight the diagnostic, clinical guidelines and decision

making in the treatment of these lesions from an endodontists point of view to achieve the best outcome.

Keywords: Perio- Endo Lesion, periodontal, pulpal, endodontic.

Introduction

Dental practice often requires an interdisciplinary approach integrating the knowledge, skills and experience of all the disciplines of dentistry, medicine and its associated fields into comprehensive treatment to maximize results. Interdisciplinary practice refers to people with distinct disciplinary training working together for a common purpose, as they make different, complementary contributions to patient focused care.¹

Periodontitis is a polymicrobial infection that results in a destructive host response to the supporting apparatus of the dentition. General, behavioral, genetic, and environmental risk factors (e.g smoking) modify the

immune inflammatory response, which results in more severe periodontal destruction.²

The human periodontium and dental pulp cavity are closely connected by their proximity. Pulpal and periodontal problems are responsible for more than 50% of tooth mortality today.³

When a periapical lesion communicates with a deep periodontal pocket, the etiology can be either endodontic or periodontic. Successful therapy will result from the establishment of an accurate diagnosis and requires a methodical multi-staged approach.⁴

They can get affected individually or combined; when both systems are involved they are called true endo-perio lesions.⁵

The relationship between periodontal and pulpal disease was first described by **Simring and Goldberg in 1964**. 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 tissues.⁶

Endodontic lesion: Denotes an inflammatory process resulting from noxious agents present in the root canal system of the tooth.⁶

Periodontal lesion: Denotes inflammatory process resulting from accumulation of dental plaque on the external tooth surfaces.⁶

Endodontic- periodontal lesion: If an endodontic and a periodontal lesion affects the same tooth simultaneously and presents as a single lesion. True endodontic - periodontal lesion implies that the lesion either is the result of, or the cause of, the other, or the lesion may represent two separate processes i.e. an endodontic and a periodontal which have developed independently.⁶

Pathways of Communication between Pulp And Periodontium-⁶

Classified into 3 categories

I. Developmental origin

- a. Apical foramen
- b. Accessory canals and lateral canals.
- c. Congenital absence of cementum exposing the dentinal tubules at the cervical region of teeth.
- d. Permeability of cementum
- e. Developmental grooves
- f. Enamel projection and enamel pearls at the cervical area.

II. Pathological origin

- a. Empty spaces on the root created by destruction of Sharpey's fibers.
- b. Vertical fibers.
- c. Idiopathic resorption – internal and external.
- d. Loss of cementum due to external irritants.

III. Iatrogenic origin.

- a. Exposure of dentinal tubules following root planing.
- b. Accidental lateral perforation during endodontic procedure.
- c. Root fracture due to endodontic procedure.

Classification of Endo-Perio Lesions

1. Simon's classification (1972):⁷ It is based on etiology, diagnosis, prognosis and treatment. He classified endodontic- periodontal lesions into 5 groups.

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

2. Franklin. S. Weine (1972):⁸ Based on the etiology and treatment required.

Class I: Tooth that clinically and radiographically simulate periodontal involvement but is truly due to pulpal inflammation and / or necrosis.

Class II: Tooth with both no pulpal and periodontal disease concomitantly

Class III: Tooth that has no pulpal problems but requires endodontic therapy with root amputation to achieve periodontal healing.

Class IV: Tooth that clinically and radiographically simulate pulpal or periapical disease but in fact has periodontal disease.

3. Louis I Grossman (1991) Classified pulpo-periodontal lesions based on therapy into 3 groups-⁹

1. Teeth that require endodontic therapy alone.
2. Teeth that require periodontal therapy alone.
3. Teeth that require endodontic as well as periodontal treatment.

4. There are four types of perio-endo lesions and they are classified according to pathogenesis:¹⁰

1. Endodontic lesions- an inflammatory process in the periodontal tissues resulting from noxious agents present in the root canal system of the tooth
2. Periodontal lesions-an inflammatory process in the pulpal tissues resulting from accumulation of dental plaque on the external root surfaces
3. True-combined lesions- both an endodontic and periodontal lesion developing independently and progressing concurrently which meet and merge at a point along the root surface
4. Iatrogenic lesions- usually endodontic lesions produced as a result of treatment modalities

Effects of Pulpal Disease on the Periodontium

As long as the pulp remains vital it is unlikely that significant changes will occur in the periodontium. Necrosis of pulp can result in bone resorption. The lesion that results may be an acute apical lesion or a chronic periradicular lesion associated with lateral or accessory canal. The periapical lesion may remain small or expand

sufficiently to destroy a substantial amount of tooth and communicate with the lesion of periodontitis.⁶

Combined Lesions (Perio-Endo)

The combined lesion results from the development and extension of an endodontic lesion into an existing periodontal lesion (pocket). Such lesions may present characteristics of both diseases. This lesion can complicate diagnosis and treatment sequencing. A careful history clinical & radiographic examination is required. Usually a developing periapical lesion extends coronally to connect with the preexisting pocket.⁶

Anatomic Considerations

The pulp and periodontium are intimately related. As the tooth develops and the root is formed, three main avenues for communication are created: dentinal tubules, lateral and accessory canals, and the apical foramen.

Dentinal tubules

Exposed dentinal tubules in areas of denuded cementum may serve as communication pathways between the pulp and periodontal ligament. Exposure of dentinal tubules may occur due to developmental defects, disease, or periodontal procedures.¹¹ They run a relatively straight course and range in size from 1 to 3 mm in diameter.¹² The number of dentinal tubules varies from approximately 8,000 at the dentinocemental junction to 57,000 per square millimeter at the pulpal end.¹²

Lateral and accessory canals

Lateral and accessory canals may be present anywhere along the root. Their prevalence and location have been well documented in both animal and human teeth.¹³

The presence of patent accessory canals is a potential pathway for the spread of bacterial and toxic byproducts, resulting in a direct inflammatory process in the periodontal ligament.¹⁴

Apical foramen

The apical foramen is the principal and most direct route of communication between the pulp and periodontium. Bacterial and inflammatory byproducts may exit readily through the apical foramen to cause periapical pathosis.¹⁵

Endodontic disease and the periodontium

When the pulp becomes necrotic, there is a direct inflammatory response by the periodontal ligament at the apical foramen and/or opening of accessory canals.¹⁶ Inflammatory byproducts of pulpal origin may leach out through the apex, lateral and accessory canals and dentinal tubules to trigger an inflammatory vascular response in the periodontium. Among those are living pathogens such as bacteria and their toxic byproducts, fungi and viruses,¹⁷ as well as nonliving pathogens.

Etiologic factors

- Live pathogens
- Bacteria
- Fungi (yeasts)
- Viruses

Non-living etiologic agents

Depending on their origin and nature, non-living etiologic agents can be either extrinsic or intrinsic.

Extrinsic agents

- Foreign bodies

Intrinsic agents

- Cholesterol
- Russell bodies
- Rushton hyaline bodies
- Charcot-Leyden crystals
- Epithelium

Contributing factors

- Poor endodontic treatment
- Combined periodontal-endodontic lesions
- Poor restorations
- Trauma

- Resorptions
- Perforations
- Developmental malformations

Differential diagnosis

For differential diagnostic purposes the “endo- perio lesions” are best classified as endodontic, periodontal or combined diseases.

They can also be classified by treatment depending on whether endodontic, periodontal or combined treatment modalities are necessary.

They include: primary endodontic disease, primary periodontal disease, and combined diseases.

The combined diseases include: primary endodontic disease with secondary periodontal involvement, primary periodontal disease with secondary endodontic involvement, and true combined diseases.⁷

Primary endodontic disease

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. It is important to recognize that failure of any periodontal treatment will occur when the presence of a necrotic pulp has not been diagnosed, and endodontic treatment has not been done.

Primary periodontal disease

These lesions are caused primarily 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. The prognosis depends upon the stage of periodontal disease and the efficacy of periodontal treatment.

Combined diseases

Primary endodontic disease with secondary periodontal involvement

If after a period of time a suppurating primary endodontic disease remains untreated, it may become secondarily involved with periodontal breakdown. When plaque or calculus is detected, the treatment and prognosis of the tooth are different that those of teeth involved with only primary endodontic disease. The tooth now requires both endodontic and periodontal treatments.¹⁸

Primary periodontal disease with secondary endodontic involvement

The apical progression of a periodontal pocket may continue until the apical tissues are involved. In this case the pulp may become necrotic as a result of infection entering via lateral canals or the apical foramen. In single-rooted teeth the prognosis is usually poor. In molar teeth the prognosis may be better. Since not all the roots may suffer the same loss of supporting tissues, root resection can be considered as a treatment alternative option.^{19,20}

True combined disease

True combined endodontic–periodontal disease occurs less frequently than other endodontic–periodontal problems. It is formed when an endodontic disease progressing coronally joins with an infected periodontal pocket progressing apically.²¹

Clinical diagnostic procedures

Clinical tests are imperative for obtaining correct diagnosis and differentiating between endodontic and periodontal disease. The extraoral and intraoral tissues are examined for the presence of any abnormality or disease. One test is usually not sufficient to obtain a conclusive diagnosis.¹⁵

1. Visual examination
2. Palpation
3. Percussion

4. Mobility
5. Radiographs
6. Pulp vitality testing
7. Cold test
8. Electric test
9. Blood flow test
10. Cavity test
11. Restored teeth testing
12. Pocket probing
13. Fistula tracking
14. Cracked tooth testing
 - a) Transillumination
 - b) Wedging
 - c) Staining
 - d) Selective anesthesia test

Treatment Planning and Prognosis of Endo-Perio Lesions

In general, when primary disease of one tissue, i.e. Pulp or periodontium, is present and secondary disease is just starting, treat the primary disease. When secondary disease is established and chronic, both primary and secondary diseases must be treated. By and large, endodontic therapy precedes periodontal therapy. Periodontal therapy may or may not be required, depending on disease status. The complete healing of destroyed periodontal support can be expected following the treatment of pulpal pathology.⁴

Primary Endodontic Lesions

For primary endodontic lesions conventional endodontic therapy alone will resolve the lesion. A review of 4-6 months post-operatively should show healing of the periodontal pocket and bony repair. The sinus tract extending into the gingival sulcus or furcation area disappears at an early stage once the affected pulp has been removed and the root canals well cleaned, shaped, and obturated.

Primary Periodontic Lesions

Primary periodontal disease should only be treated by periodontal therapy. In this case, the prognosis depends on the severity of the periodontal disease, efficacy of periodontal therapy and patient response. Primary periodontal lesions should be treated by hygiene phase therapy in the first instance. Subsequently, poor restorations and developmental grooves that are involved in the lesion must be removed. Periodontal surgery should be performed after the completion of hygiene phase therapy if deemed necessary.⁴

Primary Endodontic with Secondary Periodontal Lesions

The prognosis then depends on the effectiveness of periodontal treatment and with advancement becomes comparable to that of a true-combined lesion. Tooth with these lesions should first be treated with endodontic and simple hygiene phase therapy. In this case, multi-visit endodontic therapy should be practiced and the placement of intra-canal medicament was found to be very useful in reducing inflammation and favouring repair.

Treatment results should be evaluated in 2-3 months and only then further periodontal treatment should be considered.⁴

But in cases where healing with only endodontic therapy does not occur then both endodontic and periodontic treatments should be carried out since with endodontic treatment alone.

Primary endodontic lesions with secondary periodontal involvement may also occur as a result of iatrogenic damage such as root perforation or fracture during root canal treatment or placement of pins or posts. Root perforations are treated according to their etiology.⁴

Primary Periodontal Secondary Endodontic Lesion and True Combined Lesions

Primary periodontal disease with secondary endodontic involvement and true combined endodontic-periodontal diseases require both endodontic and periodontal regenerative procedures. The success rate of the endodontic-periodontic combined lesion without a concomitant regenerative procedure has been reported to a range from 27% to 37%. Combined lesions can be classified into three types-

1. Tooth with two separate lesions, one endodontic usually periapical and one periodontal with no communication.
2. Teeth with a single lesion that involves both endodontic and periodontal pathosis.
3. Teeth with endodontic and periodontal lesions that were once separate but now communicate.⁴

True-Combined Lesions

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. Prior to surgery, palliative periodontal therapy should be completed and root canal treatment carried out. The prognosis of true combined lesion is often poor or even hopeless, especially when periodontal lesions are chronic and extensive. Though, root amputation, hemisection or bicuspidization may allow the root configurations to be changed sufficiently for a part of the root structure to be saved.⁴

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 (GTR).

The decisions and treatment strategy for the application of the regenerative procedures are made at various levels such as pre-surgical, post-root canal treatment, intra-surgical, and post-surgical. Factors influencing treatment

outcome should also be considered at each level under patient-specific, defect-specific, and healing categories.⁴

Ethical clearance from ethical committee of Subharti dental college.

References

1. Parolia A, Gait TC, Porto ICCM, Mala K. Endo – perio lesion: A Dilemma from 19th until 21st century. *J Interdiscip Dent* 2013;3:2-10.
2. Shenoy N, Shenoy A. Endo –perio lesions: Diagnosis and clinical considerations. *Indian J Dent* 2010;4:579-585.
3. Hiatt WH. Pulpal Periodontal Disease. *J Periodontol* 1977;48:598-609.
4. Das U, Das SM. An Overview on Endo-Perio Interrelationship – A Multidisciplinary Approach. *IOSR J Dent Med Sci* 2018;17:15-21.
5. Dongari A, Lambrianidis T. Periodontally derived pulpal lesions. *Endod Dent Traumatol* 1988;4:49-54.
6. Gopal S, kumar KP, Shetty KP, Jindal V, Saritha M. Interrelationship of endodontic -periodontal lesions - An overview. *Indian Journal of Dental Sciences* 2011;2:55-59.
7. Simon JHS, Glick DH, Frank AL. The relationship of endodontic-periodontic lesions. *J Periodontol* 1972;43:202-208.
8. Weine FS. Endodontic-periodontal problems. In: Weine FS editors. *Endodontic therapy*. 5th ed. St. Louis: The C.V. Mosby Co.; 1996:640-673.
9. Grossman I, Oliet S, Del Rio C. Endodontic-periodontic interrelationship. *Endodontic practice* 1988;11:313-329.
10. Endodontic by John I Ingle:638–660.
11. Harrington GW, Steiner DR. Periodontal-endodontic considerations. In: Walton RE, Torabinejad M, editors), *Principles and practice of endodontics*, 3rd edn. Philadelphia: W.B. Saunders Co., 2002:466-484.
12. Mjor IA, Nordahl I. The density and branching of dentinal tubules in human teeth. *Arch Oral Biol* 1996;41:401-412.
13. Burch JG, Hulen S. A study of the presence of accessory foramina and the topography of molar furcations. *Oral Surg Oral Med Oral Pathol* 1974;38:451-455.
14. De Deus QD. Frequency, location and direction of the lateral, secondary, and accessory canals. *J Endod* 1975;1:361-366.
15. Rotstein I and Simon JHS. Diagnosis, prognosis and decision-making in the treatment of combined periodontal endodontic Lesions. *Periodontol* 2000 2004;34:165-203.
16. Seltzer S, Bender IB, Nazimov H, Sinai I. Pulpitis-induced interradicular periodontal changes in experimental animals. *J Periodontol* 1967;38:124-129.
17. Baumgartner JC, Falkler WA Jr. Bacteria in the apical 5 mm of infected root canals. *J Endod* 1991;17:380-383.
18. Pitt Ford TR, Torabinejad M, McKendry DJ, Hong C-U, Kariyawasam SP. Use of mineral trioxide aggregate for repair of furcal perforations. *Oral Surg Oral Med Oral Pathol* 1995;79:756-763.
19. Nair PNR, Pajarola G, Schroeder HE. Types and incidence of human periapical lesions obtained with extracted teeth. *Oral Surg Oral Med Oral Pathol* 1996;81:93 -101.
20. Adriaens PA, De Boever JA, Loesche WJ. Bacterial invasion in root cementum and radicular dentin of periodontally diseased teeth in

humans. A reservoir of periodontopathic bacteria.

J Periodontol 1988;59:222-230.

21. Seltzer S, Bender IB, Ziontz M. The interrelationship of pulp and periodontal disease. Oral Surg Oral Med Oral Pathol 1963;16:1474-90.