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Endo-perio lesions: A Review

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Abstract--The interrelationship between periodontal and endodontic disease has aroused confusion, queries and controversy. Differentiating between periodontal and endodontic problems can be difficult. A symptomatic tooth may have pain of periodontal and/or pulpal origin. The nature of that pain is often the first clue in determining the etiology of such a problem. Radiographic and clinical evaluation can help clarify the nature of the problem. In some cases, the influence of pulpal pathology may create periodontal involvement. In others, periodontal pathology may create pulpal pathology. This review article discusses the various clinical aspects to be considered for accurately diagnosing and treating endo-perio lesions.

Keywords---endo-perio lesion, pulpal, periodontal.

Introduction

The endodontium and periodontium are closely related and diseases of one tissue may lead to the involvement of the other. 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. Etiologic factors such as bacteria, fungi, and viruses as well as various contributing factors such as trauma, root resorptions, perforations, and dental malformations play an important role in the development and progression of such lesions. The endo-perio lesion is a condition characterized by the association of periodontal and

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pulpal disease in the same dental element. 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 periodontium and pulpal tissue.¹

Classification of perio-endo lesions

There are four types of perio-endo lesions and they are classified due to their pathogenesis.

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 modalities²

To have the success treatment of endo-perio lesions, it is helpful to understand the pathogenesis as well as the clinical and radiographic manifestations of endo-perio lesions.¹ Several examinations help the diagnosis between endodontic and periodontal disease:

- a. Vitality test: In endodontic disease, the tooth is non-vital; in periodontal disease, the tooth is vital in most cases.
- b. Plaque/calculus: In endodontic disease, plaque or calculus may present, but they are not the primary cause of the disease; in periodontal disease, plaque or calculus is the primary cause.
- c. Pocket/probing depth: In endodontic disease, a single and narrow pocket may present; in periodontal disease, generalized periodontal pockets may present and they are located relatively wide and coronally.
- d. Radiographics: bone loss in endodontic disease is localized and mostly in the apical area; in periodontal disease, bone resorption is more generalized and mostly seen at the crestal This systematic review was written according to the guidelines of PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) for reporting studies evaluating healthcare interventions². PICO question (population, intervention, control, outcome) of the present systematic review was:
 P: patient with endo-perio lesion
 I: endo-perio treatment
 C: treated with RCT and flap operation + bone graft
 O: the mostly used treatment and the best result based on probing depth³

The most important factor in the treatment is a correct diagnosis which is achieved by careful history taking, examination and the use of special tests Specific things to look for in the history include past disease, trauma and pain. The teeth are examined for abnormalities such as caries, defective

restorations, erosions, abrasions, cracks, fractures, and discolorations. A discolored permanent tooth may often be associated with a necrotic pulp. A “pink spot” detected in the tooth crown may indicate an active internal resorption process. A conclusive diagnosis for pulpal disease cannot be achieved by visual examination alone. It therefore must always be accompanied by additional tests. Visual examination is dramatically improved by the use of enhanced magnification and illumination. Vitality testing should be carried out on relevant teeth as well as radiographic examination, paying close attention to shape, location and extension of any lesion, crestal and furcation involvement and signs of fracture or perforation. Diagnosis of primary endodontic disease and primary periodontal disease usually presents no clinical difficulty.⁴

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. However, primary endodontic disease with secondary periodontal involvement, primary periodontal disease with secondary endodontic involvement, or true combined diseases are clinically and radiographically very similar. If a lesion is diagnosed and treated as a primarily endodontic disease due to lack of evidence of marginal periodontitis, and there is soft-tissue healing on clinical probing and bone healing on a recall radiograph, a valid retrospective diagnosis can then be made.⁴ The degree of healing that has taken place following root canal treatment will determine the retrospective classification. Radiographs are essential for detection of anatomic landmarks and a variety of pathological conditions.⁵

In addition, radiographs are of utmost importance for documentation and legal purposes. 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. Advanced lesions and true-combined lesions are difficult to differentiate between and therefore, where doubt exists they should be considered as an endodontic lesion in origin.⁶

Treating Primary Endodontic Lesions

Primary endodontic diseases usually heal following root canal treatment. 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. A review of patient, 4-6 months post-operatively should show healing of the periodontal pocket and bony repair.⁷ Surgical endodontic therapy has been shown to be unnecessary even in the presence of large periradicular radiolucencies and periodontal abscesses. Invasive periodontal procedures should be avoided as this may cause further injury to the attachment, possibly delaying healing.⁷

Primary endodontic lesions with secondary periodontal involvement will not completely resolve with endodontic treatment alone. Root/re-root canal treatment is instituted immediately and the cleaned and shaped root canal filled with calcium hydroxide paste. As it is bactericidal, anti-inflammatory and proteolytic,

it inhibits resorption and favors repair. It also inhibits periodontal contamination from instrumented canals via patent channels connecting the pulp and periodontium before periodontal treatment removes the contaminants. The canals are eventually filled with a conventional obturation when there is clinical evidence of improvement. The prognosis for primary endodontic lesions is good but worsens in the advanced stages of secondary periodontal involvement.⁸

Determining the prognosis depends upon the stage of periodontal disease and the efficacy of periodontal treatment. Primary periodontal lesions are treated by hygiene phase therapy in the first instance. Subsequently, poor restorations and developmental grooves that are involved in the lesion are removed as these are difficult areas to treat successfully. Periodontal surgery is performed after the completion of hygiene phase therapy if deemed necessary. Periodontal treatment removes the noxious stimuli and secondary mineralization of dentinal tubules allows the resolution of pulpal hypersensitivity. If pulpal inflammation is irreversible root/re-root treatment is carried out followed by periodontal treatment; in some cases surgical intervention is advantageous. The prognosis of periodontal lesions is poorer than that of endodontic lesions and is dependent on the apical extension of the lesion. As the lesion advances, the prognosis approaches that of a true-combined lesion.⁹

Treating True Combined Lesions

Primary endodontic lesions with secondary periodontal involvement may also occur as a result of root perforation during root canal treatment, or where pins or posts have been misplaced during coronal restoration. Symptoms may be acute, with periodontal abscess formation associated with pain, swelling, pus exudate, pocket formation, and tooth mobility. A more chronic response may sometimes occur without pain, and involves the sudden appearance of a pocket with bleeding on probing or exudation of pus.¹⁰

True-combined lesions are treated initially as primary endodontic lesions with secondary periodontal involvement. 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.⁸ Root amputation, hemisection or separation may allow the root configuration to be changed sufficiently for part of the root structure to be saved.¹¹

Treating Iatrogenic Lesions

Although the first priority is to close the iatrogenic communication, the aim is to produce a seal. Root perforations are treated according to their aetiology. The outcome of the treatment of root perforations depends on the size, location, time of diagnosis and treatment, degree of periodontal damage as well as the sealing ability and biocompatibility of the sealer. It has been recognized that the success of the treatment depends mainly on immediate sealing of the perforation and appropriate infection control. Several materials such as MTA, Super EBA, Cavit, IRM, glass ionomer cements, composites, and amalgam have been recommended to seal root perforations. Palatal perforations are difficult to manage, even surgically, and frequently lead to extraction. The successful treatment of root

perforations depends principally on early detection and sealing. Although the prognosis is deemed poor, it appears that a successful outcome can frequently be achieved. Lesions attributable to over-filling of root canals and intra-canal medicaments can usually be resolved by periradicular surgery, probably accompanied by a retrograde root filling. Teeth with lesions caused by vertical root fractures have a hopeless prognosis and should be extracted. A review of the literature examined the factors associated with longterm survival of endodontically treated teeth and concluded that: (1) post space preparation and cementation should be performed with rubber-dam isolation, (2) the post space should be prepared with a heated plugger, a minimum of 3 mm of root canal filling should remain in the preparation, the post space should be irrigated and dressed as during root canal treatment, leak-proof restorations should be placed as soon as possible after endodontic treatment, and endodontic retreatment should be considered for teeth with a coronal seal compromised for longer than 3 months¹²

Sequencing Treatment For Endo-Perio Lesions

In acute cases, it is of paramount importance to diagnose the source of the pain and/or swelling and delineate it to be and endodontic or periodontal. This problem should be treated first as a priority. Follow soon after with other treatment¹³

Periodontal Treatment

It is a known fact that root canal infection significantly affects periodontal healing. Pocket depth reduction is significantly lesser in the presence of canal infection. There is more marginal epithelium over cemental defects if the canals are infected. Removal of cementum will expose dentinal tubules, which means that if there are bacteria in the canal, it could promote inflammatory resorption. It may also expose periodontal tissues to toxic medicaments if used in canal. This is not so critical in areas with recession.¹⁴

Endodontic Treatment

Early initiation of endodontic treatment ensures that the cementum layer is kept intact until root canal infection is eliminated. Because there would be no exposed dentine on the root surface, there is reduced chance of root resorption and improved periodontal healing. On the other hand, if the root canal filling does not have a good seal then the filled canals may be reinfected from periodontal bacteria.¹⁵

The risk of infection is heightened if periodontal treatment is delayed, especially when a "combined lesion with communication" exists between the two sites. Sterility is more likely while there is a medicated dressing like calcium hydroxide in the canal. Hence, in some cases, it might be prudent to delay the root filling until the periodontal infection has been eliminated.¹⁶

Treating Both Lesions Concurrently

This would be required when both endodontic and periodontal infection are present simultaneously. Combined endo-perio lesions that exist separately on the same tooth (meaning that they are not physically merged) have recently gained a lot of attention. The true combined endodontic and periodontic lesion requires an accurate diagnosis. This is often a difficult diagnosis and therefore requires reevaluation after either the periodontal or endodontic problems are treated. In such cases, if there is no communication, then complete the endodontic therapy first and initiate periodontal treatment soon after¹⁷.

- 1 Initial management
2. Remove existing restorations and caries
3. Chemomechanically prepare canals
4. Medicate canals (depends on symptoms)
5. Follow-up management¹⁸
6. Change intracanal dressing after 3-4 weeks
7. Provide initial periodontal treatment
8. Review healing after 3 months
9. Reassess need for further periodontal treatment¹⁸
10. If more periodontal treatment (e.g., surgery) is required,
11. Change intracanal medication again
12. If healing response is favourable,
13. Complete root canal filling¹⁸
14. Longer-term management
15. Defer root filling until after
16. Need for periodontal surgery assessed
17. Surgery completed with satisfactory outcome¹⁸

Overall prognosis has been assessed to be adequate enough to justify further endodontic and restorative treatment and their costs. When the pulp becomes necrotic, there is a direct inflammatory response by the periodontal ligament at the apical foramen or accessory canals. Many of these are similar pathogens encountered in periodontal infections. On the other hand, the effect of periodontal disease on the pulp is degenerative in nature including an increase in calcifications, fibrosis and collagen resorption.¹⁸

The primary endodontic disease with secondary periodontal involvement should first be treated with an endodontic therapy. Prognosis depend on the severity of periodontal involvement, periodontal treatment and patient response¹⁹. The differential diagnosis is difficult when a sinus tract, originating from the endodontic lesion may drain along periodontal ligament. Therefore, a primary endodontic lesion draining from attachment apparatus should be initially treated by an endodontic therapy.¹⁹

The etiology and diagnosis of dental abscesses are based on patient history as well as clinical and radiographic findings. Vitality testing can detect changes of sensation caused by pulpal inflammation and necrosis. If there is evidence of pulpal disease and the possibility of associated periodontal bone loss, the endodontic treatment should be completed first and then the patient should be

reevaluated. In many cases, apparent periodontal pathology, including bone loss, suppuration, and pocket depth resolves if there has been a pulpal lesion that has been successfully treated endodontically. Residual periodontal problems can be treated after completion of successful endodontic treatment, and in many cases, successful regeneration of periodontal defects is possible in endodontically treated teeth.²⁰

Bone grafting materials can be broadly classified into natural and synthetic types. Natural bone grafts include autogenous bone, allograft, and xenograft, while the synthetic types are commonly known as alloplastic materials. Hydroxyapatite (HA) has been used as a bone replacement material for many years and that has been demonstrated that HA has excellent biocompatibility, high osteogenic potential and anti-infection capacity.²¹

Hydroxyapatite (HA) was found to be a useful material in the reconstruction of periodontal defects, due to its ability to dissolve, break down, and allow new bone formation and remodeling required to attain optimal mechanical strength without interference². It took one month for epithelial attachment to establish and complete bone formation will occur six month after periodontal surgery.²²

Conclusion

An accurate diagnosis is mandatory for the successfully treated endo-perio lesions. This diagnosis must cover both endodontic and periodontal component of the lesion. If the primary aspect cannot be evaluated, endodontic treatment should be given precedence, followed by a wait-and-see approach until a decision for any additional endosurgical and/or periodontal procedure can be focussed.

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