Treatment and classification of periodontal-endodontic lesions: a review

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Abstract:

The periodontal endodontic relation is confusing and hard to diagnose. A single tooth might have signs and symptoms of pain from affected pulp alone, affected periodontium alone, or both combined as a true lesion. Hence, proper history and correct diagnosis are recommended for treatment. The endodontic-periodontal symptom varies in pathogenesis and causes. Few studies have focused on treatment and classification of periodontal-endodontic lesions and most of them were trials. This review highlighted the classification of periodontal-endodontic lesions and the principles of treatment for the lesions.

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1. Introduction

Periodontal –endodontic disease results from the spreading of infection from one component to the other [1]. This disease is common due to proximity between periodontium and dental pulp, which are connected by apical and lateral foramen that acts as a bridge for the passage of pathogens from one area to the other [2]. The apical foramen is considered as the main pathway for bacterial passage between the periodontium and the pulp [3]. Also, lateral canals and dentinal tubules are considered as a way for bacterial passage [4]. It is considered a confusing disease which is difficult to diagnose due to the similarity in signs and symptoms; when both lesions exist together or when endodontic or periodontal lesion exists alone [5].

The lesion may start with exposed pulp due to various causes like caries, trauma or fracture, which if not well treated by endodontic therapy, re-infection may occur and
the infection might spread to the periodontium [6]. Also, if the periodontium is affected by bacteria due to plaque accumulation, calculus, or pocket formation causing periodontal infection, which if not well treated may cause re-infection and spread from the periodontium to the pulp causing pulpal infection [7]. Many studies have concluded that bacterial infection can spread from the periodontium to the pulp when accessory canals are exposed [8,9]. Other studies suggested that bacterial infection can spread from the periodontium to the pulp through the dentinal tubules [4]. In other studies, blood supply to the pulp may decrease and affect the pulp condition due to scaling and rupture of the vascularity to the lateral canals leading to pulp necrosis [10]. In this review, the literature was focused on periodontal-endodontic relation and to clarify its classification and treatment.

2. Diagnosis of periodontal-endodontic lesions

Diagnosis of periodontal-endodontic lesion differs according to the type of lesion. Primary periodontal lesion and primary endodontic lesion are easily diagnosed because in primary periodontal lesion the pulp is vital and shows normal response to vitality test, while, in primary endodontic lesion the pulp is necrotic and doesn not show response to vitality tests [11]. On the other hand, lesions like primary periodontal disease with secondary endodontic involvement, primary endodontic lesion with secondary periodontal involvement, and a true combined lesion are hard to diagnose due to the similarity in signs and symptoms and radiographic x-ray. So, accurate dental history should be taken first for proper diagnosis and special tests should be done like [12]:

2.1. Radiographic examination
Radiographic x-ray can be a useful aid in periodontal-endodontic examination and to determine the cause of pain. With x-ray, it is easy to determine periradicular lesion, root fractures, bone resorption and defective restorations [12].

2.2. Vitality tests:

Pulp vitality tests are very useful to determine whether the cause of pain is the pulp, or the periodontal ligament. There are two types of tests [13]:

2.2.1. Thermal tests:

By application of hot water or softened gutta-percha to the tooth, or application of coldness to the tooth using ice stick. There are three types of patient response indicating the pulp vitality [14]:

a. The normal response of vital pulp will be short pain lasting 2-4 seconds.

b. If the patient complains of severe pain that is long lasting, the pulp is irreversibly inflamed.

c. If the patient didn’t show any complain, the pulp may be necrotic.

2.2.2. Electric pulp tests:

Application of the electrode of the electric pulp tester to the tooth to stimulate the myelinated A-delta fibers. This type of testing doesn’t determine the degree of inflammation but only detect if the pulp is alive or necrotic. Response to the electrode means that the pulp isn’t necrotic, while no response to the electrode means that the pulp is necrotic [15].

2.2.3. Pocket examination with probing:
Probing the periodontal pocket helps to compare between the periodontal and endodontic lesions and may indicate whether the lesion is from vertical root fracture or from pulpal lesion. Also, it is important to detect sub gingival calculus causing periodontal lesion [16].

2.2.4. Palpation:

This test is done by applying firm pressure to the alveolar mucosa with the index pressing against the cortical bone. This technique can detect any painful response and periradicular abnormalities [16].

2.2.5. Visual examination:

With visual examination, the presence of gingival inflammation and calculus accumulation can be detected. Also, abscess or gingival ulceration can be seen. Visual examination of the whole oral tissue, muscles and teeth will be useful in diagnosis [15,16].

3. Classification of periodontal-endodontic lesion

This type of lesion has various clinical classifications as following:

3.A. In a study, the authors classified this lesion into [12]:

3.A1- primary endodontic lesions:

Teeth with necrotic damaged pulp and periapical abscess may form a sinus tract into the periodontal ligament and drain the pus through this tract into the gingival sulcus. In these cases, it is clinically approved that if the tooth has undergone proper endodontic treatment, the periapical lesion will heal and the sinus tract disappears [12].

3.A2- primary periodontal lesions:
Bacteria may attack the periodontium due to many causes like plaque accumulation, calculus accumulation leading to periodontitis and pocket formation. The bacteria may spread apically along the root surface but in most cases the pulp remains healthy with normal pulp tests [12].

3.A3-primary endodontic lesions with secondary periodontal Involvement:
If the tooth has necrotic pulp and periapical lesion, and is not treated with endodontic treatment, sinus tract may form through the periodontal ligament for pus drainage, then plaque and calculus formation all lead to periodontitis and the teeth need to be treated endodontically and periodontally. Also in some cases, teeth which have undergone improper root canal treatment due to root perforation or unsuccessful place, leads to periodontitis. This type of lesion may be acute with symptoms like severe pain, tooth mobility, abscess and pus formation with periodontal pocket, and may be chronic with symptoms like dull pain, sudden pocket formation, easily bleed on propping and pus exudation [12].

3.A4- primary periodontal lesions with secondary endodontic involvement:
In cases with periodontitis and pocket formation, the bacteria infection may progress apically and affect the pulp through the apical foramen, may affect the pulp through the lateral canals, or even the dentinal tubules lead to pulpitis and pulp necrosis. If the pulpal blood supply has been decreased due to scaling and cutting of vascularity tissues around the lateral canals, the pulp also may be affected. These type of cases need to be well treated by both endodontic and periodontal treatment. The prognosis for the healing of such cases is better in multirooted teeth than single rooted teeth [12].

3.A5- True combined lesions:
This type of combined lesion isn’t common like endodontic-periodontal lesion. This type of lesion is characterized by periapical endodontic lesion which progresses coronally towards infected periodontium which progresses apically also [17]. This type of lesion characterized by high degree of attachment loss with poor prognosis especially with single rooted teeth, in multi rooted teeth there may resection of the affected root [12].

3.B. A clinical classification in another study for periodontal-endodontic lesion [18]:


3.C. A clinical classification in another study for periodontal-endodontic lesion [19]:

3.C1. Periodontal origin
3.C5. Lesions with communication.

4. Treatment of periodontal-endodontic lesions

The prognosis of treatment in this lesion must be considered before starting any treatment because treatment of periodontal-endodontic lesion may take long time and may need surgical invasion. Tooth extraction is the last choice in treatment of these lesions. The principles of treatment differ according to the type of lesions [12]:

4.1. Primary endodontic lesion:
In this type of lesion, several studies have concluded that proper endodontic treatment with the cleaning of infected necrotic pulp is enough to treat the lesion, also if sinus tract is present it usually disappears after endodontic treatment. Surgical endodontic therapy is not common and is usually not needed [20].

4.2. Primary periodontal lesion:

The prognosis of these cases depends on the periodontal situation and the periodontal therapy. The first step for treatment is the removal of any cause of periodontitis like poor restorations, plaque, and calculus accumulation. Proper scaling and root planning for the periodontal pocket should be done carefully to avoid any effect on the pulp of healthy teeth because spread of infection to the pulp may occur specially on treating the periodontium on furcation areas [12]. Periodontal surgery may be necessary in severely affected periodontium to allow periodontal regeneration. Periodontal regeneration techniques are variable like: PRF usage, gingivectomy, root resectioning, and apically displaced flap. Most of these cases who show normal tests of healthy pulp are not indicated for endodontic therapy [21].

4.3. Primary endodontic lesions with secondary periodontal Involvement:

In these cases, treatment should start with endodontic treatment and complete cleaning and shaping, or the root canals from necrotic pulp, then the canals are filled with calcium hydroxide for two to three months. This time allows the proper healing of the periapical and the periodontal tissues, also decrease the inflammation and infection because calcium hydroxide has bactericidal and anti-inflammatory effect. It also has a great role in tissue regeneration and regaining damaged periodontal tissues [22].
If the tooth and periodontal tissues have shown positive results and response to calcium hydroxide, complete root filling and periodontal treatment should be done. Sinus tract should also disappear with treatment. The prognosis of these cases is variable as the endodontic lesions show better prognosis than the periodontal lesion specially if the tooth is in healthy closed environment [23].

4.4. Primary periodontal lesions with secondary endodontic involvement

This type of lesions differs in treatment according to the effect on the pulp:

a- If the progression of the periodontal bacteria has caused reversible pulpitis, only periodontal treatment is indicated.

b- If the progression of the periodontal bacteria has caused irreversible pulpitis, endodontic treatment is done first then periodontal treatment is done.

5. True combined lesions:

The prognosis of combined lesion is poor and may be hopeless specially with large loss of attached gingival and chronic infection. The manner of treating such cases is like treatment of primary endodontic lesion, then secondary periodontal involvement. Other cases which doesn’t heal with this manner of treatment may undergo surgical treatment including hemisectionning, root amputation and bicuspidization to allow the remaining roots to heal [24].

6. Conclusion:

Periodontal-endodontic lesion is considered a complex lesion which requires proper diagnosis and treatment for healing. The most important step before treatment is to determine the cause of pain whether it is from pulpal origin, periodontal origin or both combined. There are scarce studies that were conducted on periodontal-endodontic
lesion and its classification and treatment, also most of them were trials and showed unclear results. It is recommended to establish more studies which focus on periodontal-endodontic lesions and its treatment.

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