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The Periodontal - Endodontic Inter-Relationship: A Review on Management

Prasanna Guru .E[1], Dr. Pradeep .S[2]

[1]Graduate Student, Saveetha Dental College, SIMATS Chennai, India

[2]Faculty, Department of Conservative Dentistry and Endodontics, Saveetha Dental College, SIMATS, Chennai, India

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.***

1. Introduction

The relationship amongst periodontal and pulpal infection was initially depicted by Simring and Goldberg in 1964.[1] Since the term 'perio-endo sore' has been utilized to portray injuries because of fiery items found in shifting degrees in both the periodontium and the pulpal tissues.

The periodontal complex includes alveolar bone, periodontal tendon, root cementum and the overlying gingival tissues. Dental pulp is integrated and connected with the periodontal tissues via:

- The apical foramen
- Dentine tubules
- Horizontal root trenches
- Furcation root channels
- Fracture lines within the root.

2. Pathways of Communication

Studies shows that there are microbial similarities between periodontal and endodontic lesions. These findings infer that cross contamination between pulpal and periodontal tissues is possible. The following are the possible pathways through which bacteria and their by-products ingress into these tissues:

- Anatomical pathways: This comprises of apical foramen, lateral canals and dentinal tubules
- Non-physiologic pathways: These include iatrogenic root canal perforations and vertical root fractures[2]

Classification of Periodontal- Endodontic Lesions

The most commonly used classification was given by Simon, Glick and Frank in 1972. According to this classification, perio-endo lesions can be classified into:

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 [3]

Etiopathogenesis of Perio-Endo Lesions

- ***Periodontal infections affecting pulpal tissue:*** Bacterial plaque on root surfaces caused by periodontal diseases can induce pathologic changes of pulp through lateral or accessory canals, which is termed as retrograde pulpitis. Pulp undergoes atrophy and degenerative changes with reduction in number of pulp cells, reparative dentin formation, fibrosis, inflammation, resorption etc.
- ***Effect of periodontal therapy on dental pulp:*** Improper scaling or root planning will cause removal of cementum and sometimes root dentin, which in turn causes exposure of dentinal tubules and bacterial invasion into pulp. Studies suggests that Citric acid used for root conditioning has toxic effects n dental pulp.
- ***Effect of endodontic infections on periodontal tissues:*** Studies demonstrate epithelial down growth on denuded dentin surface in the presence of intrapulpal infections.
- ***Impact of endodontic therapy on periodontal tissues:*** Over filling and extrusion of material through apical foramen is said to cause periodontal damage. Root perforations and root fractures if left unnoticed will also lead to secondary periodontal infections.[4,5]

Diagnosis of Periodontal-Endodontic Lesions

Diagnosing a primary endodontic or periodontal disease does not pose any clinical difficulty. Normally a pulp is vital in a primary periodontal disease and pulp is infected or non-vital in a primary endodontic disease. Neverthless, primary endodontic disease with secondary periodontal involvement, primary periodontal disease with secondary endodontic involvement, or true combined diseases are clinically and radiographically very similar. Accurate diagnosis can be achieved by careful history taking, examination and the use of tests.

Various diagnostic procedures that can be used to identify perio-endo lesions:[6,7]

Visual examination, palpation and percussion of soft and hard tissues:	
Soft Tissues • Inflammation • Ulcerations • Sinus tracts	Teeth • Caries • Defective restorations • Abrasions • Cracks • Fractures • Discolorations
Radiographs - Interdental bone loss - Carious and periapical lesions	
Pulp vitality testing (Cold test, Electric test, Blood flow tests, Cavity test) • Abnormal response – Degenerative changes • No response – Pulp necrosis • Moderate transient response – Normal vital pulp • Quick painful response – Reversible pulpitis • Lingering painful response – Irreversible pulpitis	
Other Tests:	
• Probing depth • Clinical attachment level • Cracked tooth testing using Transillumination & staining	• Sinus tracking • Fistula tracking using Semi rigid radioopaque material (gutta percha)

3. Treatment Decision Making and Prognosis

Treatment: Diagnosis

The most vital importance is to diagnose and treat perio-endo injuries. This is accomplished via cautious history taking, examination and the utilization of uncommon tests. In clinical examination check the dental and periodontal status. Clinical tests are done for acquiring right finding and separating amongst endodontic and periodontal illness. The extra-oral and intra-oral tissues are inspected for the nearness of any variation from the norm or illness. One test is normally not adequate to get a definitive analysis. A careful visual examination of the lips, cheeks, oral mucosa, tongue, sense oftaste and muscles ought to be done routinely. The alveolar mucosa and appended gingiva are inspected for the nearness of aggravation, ulcerations or sinus tract. The teeth are analyzed for irregularities, for example, caries, inadequate rebuilding efforts, disintegrations, scraped spots, splits, cracks and staining. Palpation is performed by applying firm advanced pressure to the mucosa covering the roots and apices. With the pointer the mucosa is squeezed against the fundamental cortical bone. Be that as it may, this test does not show whether the fiery procedure is of endodontic or periodontal inception. Additionally as with whatever other clinical test, the reaction ought to be contrasted with control teeth. Percussion is performed by tapping on the incisal or occlusal surfaces of the teeth either with the finger or with a limit instrument, for example, the back end of a mirror handle. The tooth crown is tapped vertically and on a level plane. It demonstrates the nearness of a peri-radicular irritation. Versatility testing can be performed utilizing two mirror handles on each side of the crown. Weight is connected in a facial-lingual bearing and in addition in a vertical heading and the tooth versatility is scored. Tooth portability is specifically relative to the trustworthiness of the connection device or to the degree of aggravation in the periodontal ligament,[8,9]showing that the essential driver might be periodontal infection.

Radiographs are basic for location of anatomic points of interest and an assortment of neurotic conditions. In increments, radiographs are of most extreme significance for documentation and lawful purposes. Radiographic examination will help in recognition of carious injuries, broad or damaged reclamation, pulpotomies, phase of root development, channel annihilation, root resorption, root break, peri-radicular radiolucencies, thickened periodontal tendon and alveolar bone misfortune. The trustworthiness of the dental mash can't be controlled by radiograph pictures alone. Radiographic changes may be distinguished once the aggravation or bacterial results beginning from the dental mash cause adequate demineralization of the cortical bone.[10,11] Sensibility and mash essentialness testing like cool test, electric test, blood stream test, cavity test[12,13,14,15] ought to be done on important teeth and additionally radiographic examination - giving careful consideration to shape, area and augmentation of any injury, crestal and furcation association and indications of crack or perforation.[16,17]

These guides and also a comprehension of the pathogenesis and an unmistakable arrangement, for example, the one gave by Simon, Glick and Frank,[18] will give enough data to anticipate unseemly treatment arrangements being initiated. It might well be sufficient to give a complete determination in spite of the fact that can be affirmed after treatment.

Treatment: Initial Consideration

Prior to the beginning of any sort of cutting edge remedial work to treat a perio-endo lesion, extraction of the tooth ought to be considered as an option. The visualization of the tooth ought to be considered painstakingly. It incorporates whether there is a useful requirement for the tooth or in the event that it is conceivable to give a satisfactory root filling (i.e. debatable waterways are available). Other essential contemplations are whether the tooth is restorable after the injury has been dealt with and persistent appropriateness for extensive, expensive, obtrusive treatment with a requirement for high patient inspiration. On the off chance that any these elements are regarded negative extraction is the treatment of choice.[19]

Conclusion of essential endodontic sickness and essential periodontal malady typically exhibit no clinical trouble. In essential endodontic ailment the mash is contaminated and nonvital. In essential periodontal sickness the mash is key and receptive to testing. Notwithstanding, essential endodontic infection with auxiliary periodontal association, essential periodontal sickness with optional endodontic contribution, or genuine consolidated maladies are clinically and radiographically fundamentally the same as. On the off chance that an injury is analyzed and regarded as principally endodontic malady because of absence of proof of plaque-initiated periodontitis, and there is delicate tissue recuperating on clinical testing and hard mending on a review radiograph, a legitimate review conclusion can then be made. The level of mending that has occurred taking after root canal treatment will decide the review arrangement. Without satisfactory mending, advance periodontal treatment is demonstrated. The visualization and treatment of each endodontic–periodontal malady sort changes.

Essential endodontic sickness ought to just be dealt with by endodontic treatment and has a decent guess. Essential periodontal infection ought to just be dealt with by periodontal therapy.[2,20]

Treatment: Endodontic Lesion

For essential endodontic sores ordinary endodontic treatment alone will settle the injury. An audit of 4-6 months post-operatively ought to show recuperating of the periodontal pocket and hard repair.[19] Surgical endodontic treatment has been appeared to be pointless even within the sight of substantial peri-radicular radiolucencies and periodontal abscesses.[21] Invasive periodontal systems ought to be kept away from as this may bring on additional damage to the connection conceivably deferring healing.[22] If essential endodontic injuries continue regardless of broad endodontic treatment it ought to stimulate doubts of a wrong determination. The injury may have auxiliary periodontal association or be a genuine consolidated sore, the treatment for which is sketched out later.[23] For this situation, the anticipation relies upon seriousness of the periodontal infection and patient reaction. Essential endodontic illness with auxiliary periodontal association ought to be first treated with endodontic treatment. Treatment results ought to be assessed in 2-3 months and at exactly that point ought to periodontal treatment be considered. This arrangement of treatment permits adequate time for beginning tissue recuperating and better appraisal of the periodontal condition.[2,20]It likewise lessens the potential danger of presenting microscopic organisms and their by-items amid the underlying mending stage. In such manner, it was proposed that the periodontal mending was antagonistically influenced by forceful expulsion of the periodontal tendon and hidden cementum amid break endodontic therapy. Areas of the roots that were not forcefully treated demonstrated unremarkable healing.[24] Primary endodontic sores with optional periodontal contribution won't totally resolve with endodontic treatment alone. Root/re-root canal treatment is founded quickly and the cleaned and formed root trench loaded with calcium hydroxide medicament. As it is bactericidal, mitigating and proteolytic, it hinders resorption and favours repair. It likewise represses periodontal sullying of instrumented trenches through patent channels interfacing the mash and periodontium before periodontal treatment expels the tainting. The trenches are in the end loaded with a traditional obturation when there is clinical confirmation of improvement.[22]

The guess for essential endodontic injuries is great however exacerbates in the propelled phases of auxiliary periodontal association. The anticipation then relies on upon the viability of periodontal treatment and with progression gets to be distinctly practically identical to that of a true combined lesion.[23] Prognosis of essential endodontic infection with optional periodontal contribution depends principally on the seriousness of periodontal inclusion, periodontal treatment and patient reaction.

Treatment: Periodontal Lesions

Elementary periodontal lesions need aid dealt with by cleanliness stage. Periodontal surgery may be performed following those fruition about cleanliness period treatment. It may be significant should acknowledge that pulpal pathology might be prompted same time doing periodontal treatment particularly those lesions which include those furcation region. [23]Periodontal medication removes those poisonous jolts and auxiliary mineralization from claiming dentinal tubules permits the determination from claiming pulpal excessive touchiness. [21]Assuming that pulpal aggravation may be irreversible root/re-root medicine will be beneficial.[19] The prognosis from claiming periodontal lesions may be poorer over endodontic lesions.[23]Most of the periodontal lesions which show up to make near the summit ought to resolution for sufficient periodontal debridement, despite with deeper defects.[25]

Treatment: True-Combined Lesions

True-joined injuries are dealt with at first concerning essential endodontic injury with auxiliary periodontal inclusion. Periodontal surgical strategies are quite often called for. The anticipation of a genuine consolidated perio-endo injury is frequently poor or even miserable, particularly when periodontal injuries are interminable with broad loss of attachment.[26] Root removal, hemisection or partition may permit the root setup to be changed adequately for some portion of the root structure to be spared. Before surgery, palliative periodontal treatment ought to be finished and root trench treatment completed on the roots to be saved.[21]The anticipation of an influenced tooth can likewise be enhanced by progressively bone bolster which can be accomplished by bone grafting[27] and guided tissue regeneration.[28] This is because of the most basic determinant of visualization being lost periodontal support.[23]These propelled treatment arrangements depend on reaction to traditional periodontal and endodontic treatment over an amplified time period.[27] Primary periodontal ailment with optional endodontic contribution and genuine joined endodontic-periodontal infections require both endodontic and periodontal treatments. It has been shown that intrapulpal contamination has a tendency to advance epithelial down-growth along a bared dentin surface.[24]The visualization of essential periodontal sickness with auxiliary endodontic inclusion and genuine joined ailments depends basically upon the seriousness of the periodontal ailment and the reaction to periodontal treatment. Instances of genuine joined illness for the most part have a more monitored forecast than alternate sorts of endodontic-periodontal issues. When all is said in done, accepting the endodontic treatment is sufficient, what is of endodontic starting point will mend. In this manner the visualization of consolidated maladies rests with the adequacy of periodontal therapy.[29]

Where bone misfortune is terminal around one root it might be conceivable to play out a hemisection for mandibular molars or a root removal for maxillary molars. On the off chance that both of these systems is to be thought about, endodontic treatment ought to in a perfect world be finished before the surgical resection. The root that will be expelled may not really require endodontics, but rather the rest of the channels ought to be obturated and fixed at their most coronal viewpoint to seclude them from the contaminated waterway before removal or resection of the unhealthy root. In crisis cases, it might be conceivable just to incidentally fill the trenches that are to stay with a non-setting calcium hydroxide paste.[2]

Treatment: Iatrogenic Lesions

Iatrogenic sores are additionally regarded in an indistinguishable path from essential endodontic injuries. In spite of the fact that the primary need is to close the iatrogenic correspondence the point is to deliver a seal.[19]Root perforations are dealt with as indicated by their etiology. Root resorption cause complex issues because of their size and area as do carious holes. Apertures amid root channel instrumentation or post opening arrangement regularly require a surgical approach. Strategies for scaling incorporate direct scaling, encouraged through a get to hole, with a zinc oxide eugenol, glass ionomer or mineral trioxide total (MTA) filling material. Littler apertures taking after root resorption and those in the apical third of the root might be fixed as a feature of a traditional root filling. A punctured trench be measured, cleaned, molded and filled utilizing an indistinguishable procedures from ordinary root channel treatment.[23]Lesions ascribed to over-filling of root waterways an intra-trench medicaments can for the most part be settled by periradicular surgery, presumably joined by a retrograde root filling. Teeth with injuries brought about by vertical root breaks have a miserable guess and ought to be extracted.[17] Local germicide and anti-microbials. Periodontal and endodontic sores can be dealt with locally with antimicrobial operators utilized as a part of fixations that will guarantee solid microbicidal activity.[30,31,32]Root canal treatment has an obvious favorable position, since antimicrobial specialists can be connected in the waterway for delayed timeframes. Then again, antimicrobial specialists in the root canal apply next to zero impact periapically.[30] In the intense stage, situation in a vehicle of neighbourhood antimicrobial operators is not prescribed due to potential obstruction with seepage. Periodontal abscesses can be effectively treated by a mix of seepage and systemic antibiotics.[33] Herrera et al. found a comparative reaction utilizing either azithromycin or amoxicillin and clavulanic corrosive. In the periodontal-endodontic injuries, the estimation of nearby antimicrobial specialists has not been considered. Notwithstanding, it is suggested that the intense periodontal-endodontic injury be depleted and irrigated.[34]

4. Conclusion

A perio-endo injury can have a shifted pathogenesis which ranges from very easy to generally complex one. Having enough information of these ailment procedures is basic in going to the right finding. Remember that the acknowledgment of mash imperativeness is fundamental for a differential finding and for the choice of essential measures for treatment of incendiary injuries in the minor and apical periodontium. Determination of teeth with necrotic pulps can be hard to build up. The whole dentition ought to be analyzed for conceivable reasons for torment before beginning treatment. Some periodontal injuries of endodontic birthplace can recuperate taking after root canal treatment.A perio-endo injury can have a changed pathogenesis which ranges from very easy to moderately complex one. Having enough learning of these sickness procedures is fundamental in going to the right conclusion. Remember that the acknowledgment of mash imperativeness is fundamental for a differential analysis and for the determination of essential measures for treatment of incendiary sores in the minimal and apical periodontium. Conclusion of teeth with necrotic pulps can be hard to set up. The whole dentition ought to be inspected for conceivable reasons for torment before initiating treatment. Some periodontal injuries of endodontic cause can recuperate taking after root canal treatment alone.[35] The endodontic treatment can be finished before periodontal treatment is given when there is no correspondence between the ailment forms. Be that as it may, when there is a correspondence between the sores of the two sicknesses, then the root canals ought to be sedated until the periodontal treatment has been finished. The utilization of non-poisonous intracanal restorative medicaments is basic to annihilate microbes and to help energize tissue repair.[36] Because the essential etiology is disease, endodontic treatment is coordinated at control and disposal of the root canal by working sterily. In view of current learning, the best accessible technique for acquiring clean, organism free root waterways is instrumentation with antimicrobial water system fortified by an intracanal dressing with calcium hydroxide.[37] The nearness of a consolidated endodontic-periodontal sore will dependably bring about a bargained circumstance taking after treatment. Indeed, even with clearly effective treatment, the tooth will in any case be traded off as there is probably going to be some gingival subsidence and loss of periodontal connection and bone support. It is of most extreme significance that the patient keeps up great oral cleanliness and gets consistent expert look after this locale. The tooth life structures and the etiology of endodontic-periodontal injuries offer a solid base for building up a right finding. Because of the intricacy of these affections, an interdisciplinary approach with a decent joint effort between endodontists, periodontologists and microbiologists, is prescribed.

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