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Perio - Endo Interrelationship - Diagnostic and Therapeutic Perspectives

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ABSTRACT

Introduction

The periodontal-endodontic relationship plays a crucial role in maintaining oral health, as the pulp and periodontium share common embryologic, anatomic, and functional pathways. Lesions involving both tissues often challenge diagnosis and treatment planning. Understanding the biological connection and the direction of infection spread is essential for effective management and long-term tooth preservation.

Methodology

A clinical evaluation was performed on patients presenting with combined periodontal and endodontic lesions. Diagnostic tools included pulp vitality testing, probing depth measurements and cone-beam computed tomography analysis. Sequential treatment involved initial endodontic therapy followed by nonsurgical periodontal debridement, adjunctive

antimicrobial application, and regenerative procedures where indicated.

Result

Patients exhibited marked symptomatic relief and radiographic healing following sequential treatment. Reduction in probing depth, improved attachment levels, and resolution of periapical radiolucencies were observed at six-month follow-up. The success rate was higher in cases where endodontic infection was addressed prior to periodontal intervention.

Conclusion

Effective management of perio-endo lesions requires an integrated diagnostic and therapeutic approach. Early identification, correct sequencing of treatments, and maintenance of oral hygiene are vital for achieving predictable and stable results, preserving both functionality and esthetics.

Keywords

Antimicrobial, Cone-Beam Computed Tomography Analysis, Esthetics, Periodontium

INTRODUCTION

The term "endo-perio lesions" is used to describe inflammatory lesions found in the pulp and periodontal tissues.[1][2] These two tissues have embryonic, anatomical, and functional affinities as they are both derived from ectomesenchymal tissues.[3] Cross-infection pathways in these two tissues can be through the apical foramen, lateral or accessory root canals, dentinal tubules, or iatrogenic defects (trauma, vertical root fracture, excessive root canal filling, chemical root resorption, and root perforation).[1][4] The apical foramen is a direct route between the pulp and the periodontium. Bacteria and inflammatory products can move through the apical foramen and cause apical pathosis. The apical foramen is also the main route for inflammatory products from the socket to the pulp tissue. [1][5] Furcation involvement is a common case of pulp tissue disease accompanied by periodontal tissue disease. The incidence of furcation involvement is high in maxillary and mandibular first molars because they are the first permanent double-rooted teeth to erupt, thus having a longer exposure time to dental plaque. [1][6]

Combined endodontic and periodontic lesions are commonly found in teeth with pulp necrosis. Clinical symptoms of these endo perio lesions such as hypersensitivity to heat, pain on percussion, tooth unsteadiness, and radiographically there is widening of the periodontal membrane and radiolucency in the furcation area. [5][7] Cases of furcation involvement that occur due to endo-perio lesions involve combination therapy between non-surgical treatment (endodontic) and regenerative surgical treatment (periodontic).[8][9]

CASE REPORT

Case 1- A 36-year-old systemically healthy female came to the Department of Periodontics. The patient was undergoing root canal treatment at the Department of Dental Conservation. Extra oral examination showed a symmetrical face, normal lip muscles, and no lip abnormalities. Intra-oral examination revealed plaque and BOP (+) in all dental quadrants, caries, and pus discharge in tooth 36. Periapical radiographs showed tooth 36 with caries reaching the pulp chamber with radiolucent areas in the periapical and alveolar bone extending to the furcation, widening of the periodontal membrane, and disconnection of the lamina dura (Figure 1).

The diagnosis of tooth 36 was endo perio lesion (primary pulp infection with secondary periodontal

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infection). The treatment plan includes scaling root planing and curettage followed by evaluation phase, followed by regenerative surgery on tooth 36. After surgical therapy, followed by a maintenance phase by conducting periodic control.

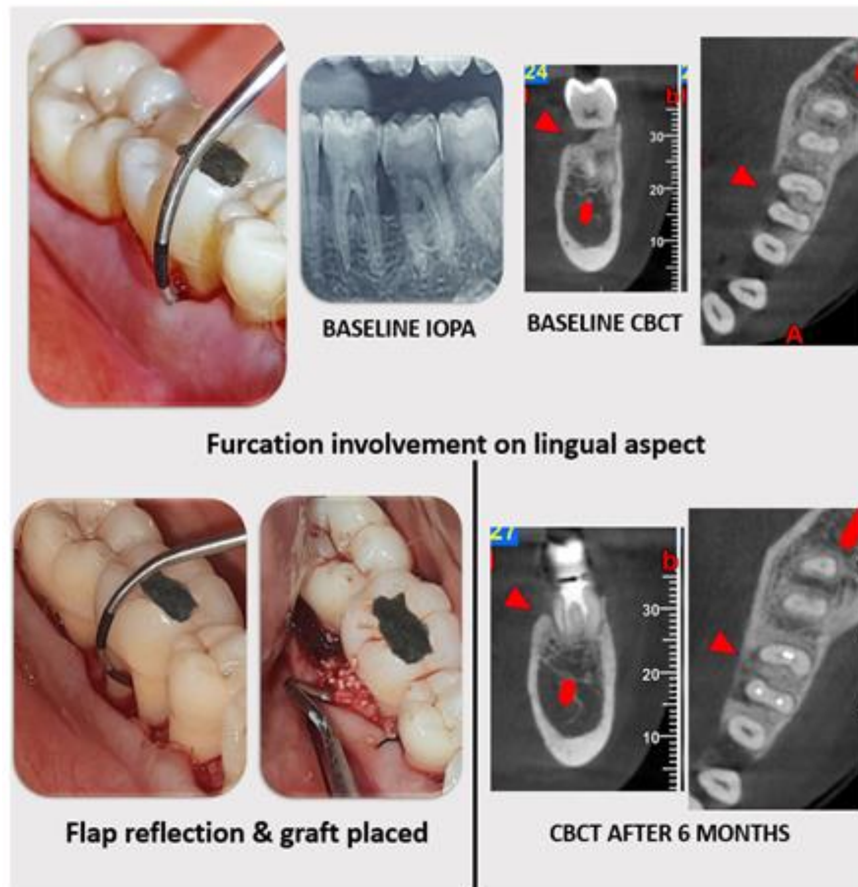

Figure 1: Case 1 - Showing lingual furcation involvement and its successful management with grafting, follow up of 6 months.

Case 1- A 28-year-old systemically healthy male came to the Department of Periodontics. The patient was undergoing root canal treatment at the Department of Dental Conservation. Extra oral examination showed a symmetrical face, normal lip muscles, and no lip abnormalities. Intra-oral examination revealed plaque and BOP (+) in all dental quadrants, caries, and pus discharge in tooth 47. Periapical radiographs showed tooth 47 with caries reaching the pulp chamber with radiolucent areas in the periapical and alveolar bone extending to the furcation, widening of the periodontal membrane, and disconnection of the lamina dura (Figure 1).

The diagnosis of tooth 47 was endo perio lesion (primary pulp infection with secondary periodontal infection). The treatment plan includes scaling root planing and curettage followed by evaluation phase, followed by regenerative surgery on tooth 47. After surgical therapy, followed by a maintenance phase by conducting periodic control.

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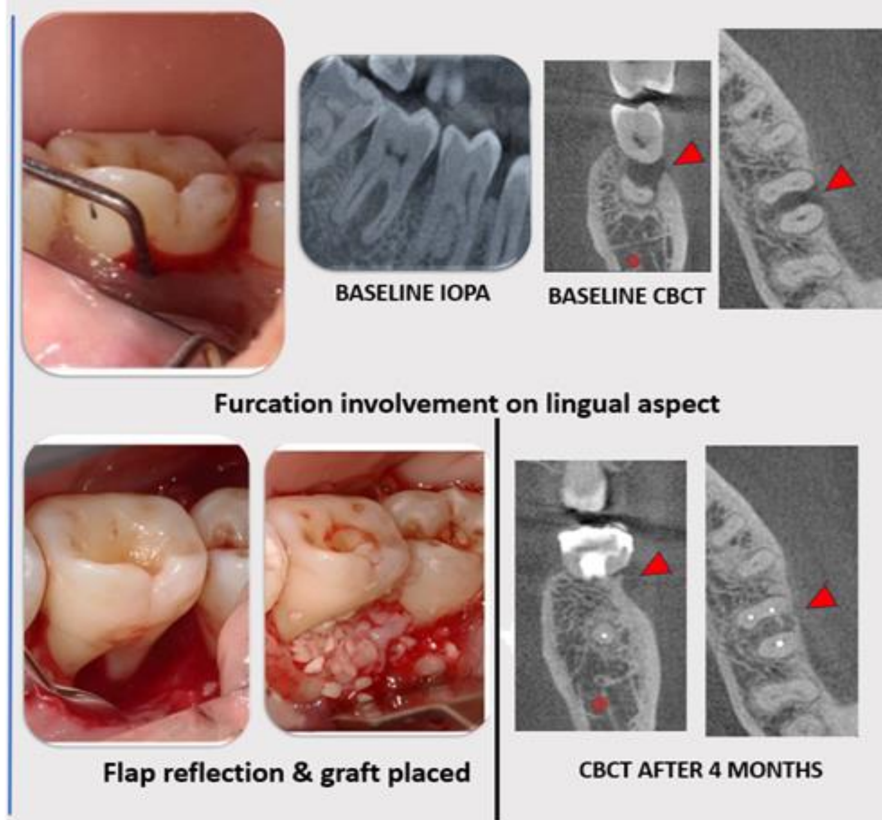

Figure 2: Case 2 - Showing lingual furcation involvement and its successful management with grafting, follow up of 4 months

CASE MANAGEMENT

At the first visit the patient was carried out first phase therapy, namely scaling and root planning and curettage. After the first phase was complete, the treatment was continue to second phase therapy using regenerative periodontal surgery. The patient signed an informed consent before starting the flap surgery in both cases. Extraoral and intraoral asepsis was started using povidone iodine 10%. An intrasulcular full thickness flap incision was made from the mesial of adjacent tooth to the distal of adjacent tooth using scalpel number 15c followed by mucoperiosteal flap reflection using periosteal elevator so that granulation tissue appeared on the root surface of tooth 36 and 47. Root planning of the root surface of affected tooth and curettage of granulation tissue in the lingual furcation area of tooth 36 and 47 so that a defect appeared around tooth 36 and 47 in case 1 and 2 respectively. (Figure1, 2).

Sharp bone surfaces are smoothed with a bone file. Ensure that the flap is in passive tension. Perform irrigation using saline solution. A bone graft that has been mixed with Platelet Rich Fibrin (PRF) is applied to the defect area of tooth in both cases followed by the placement of PRF membrane to cover the root surface of tooth 36 and 47 that has been filled with bone graft. Perform flap repositioning and fixation by suturing with the sling suture technique (Figure 1,2).

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The patient was instructed to avoid eating and drinking hot, sour, spicy, and hard food, take prescribed medication regularly, maintain oral hygiene by not brushing teeth in the surgical area, avoid chewing food on the side of the surgical area, avoid sucking on the surgical wound and not gargle too hard, contact the operator if there is discomfort that cannot be resolved, or if there is bleeding after 24 hours. At the time of control, the patient reported no complaints. Suturing was removed on day 7. The patient had no complaints until a follow-up 6 month after surgery in case 1 and a follow-up 4 month after surgery in case 2 (Figure 4).

DISCUSSION

Management of furcation involvement cases that occur due to endo-perio lesions involves combination therapy between non-surgical treatment (endodontic) and regenerative surgical treatment (periodontic). Periodontal regenerative surgery has been widely used in the management of cases of periodontal tissue destruction.[8] Cases treated without regenerative surgery will result in a poor prognosis due to the formation of long junctional epithelium at the furcation area.[5] The use of a bone graft in this procedure is a major part of rapidly regenerating damaged bone.[10][11] Bone regeneration can occur completely through three different mechanisms: osteogenesis, osteo-induction, and osteo conduction. Osteogenesis is the formation and development of bone, even without undifferentiated mesenchymal cells. Osteo-induction is the biological signaling process to induces local cells to enter a differentiation pathway leading to mature osteoblasts through growth factors present only in living bone. The osteoinduction process can induce and stimulate stem cells and osteoblasts to proliferate and differentiate by providing a scaffold or physical matrix to form a new bone or bone regeneration process. This process supports the differentiation of mesenchymal cells to grow along the surface of the bone graft material.[10] The types of bone graft materials include autogenous, allograft, xenograft, and alloplastic.[5] The above ingredients have one or more of the three mechanisms in the bone regeneration process.[11][12] The combination with the use of a membrane as a barrier in this procedure has become a routine technique since it was first introduced in 1988 at Barne University. The membrane is expected to prevent apical migration of gingival epithelial and connective tissue cells into the root surface and to facilitate wound repopulation with cells in the periodontal ligament.[4][12] The membrane is used to support the bone graft in stimulating bone formation as well as protecting the bone defect area from soft tissue formation.[1][6] Membrane as a barrier has biocompatible properties, easy to use during surgical procedures, does not easily have complications, its barrier function is durable, its size does not change, can prevent the entry of pathogenic bacteria and epithelium, and is resistant to microbial accumulation.[13] Some of the current membrane types include bioinert membranes (E-PTFE, TefGen, GoreTex) or bioabsorbable membranes (collagen; lactide, and glucolide polymers). Indications for the use of membranes as a barrier can be used in cases such as the presence of apical fenestration defects, extraction sockets, crestal dehisces, and extensive horizontal and vertical bone defects.[4][14] Platelet Rich Fibrin (PRF) is one of the options as a barrier membrane, given the nature of platelets that can trigger the healing process and can

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release growth factor agents. In addition, PRF can also regenerate periodontal tissue that has been lost. PRF fibrin network can provide bone graft support in the creation of bone matrix in the scaffold, thus accelerating the process of bone formation.[16][11][16] It can be concluded that a multidisciplinary approach is required to treat endo-perio lesions comprehensively, as they require endodontic, restorative, and periodontal treatment. The successful treatment of endo-perio lesions depends on identifying the etiology, controlling the presence of microbiota, the immunologic characteristics of the individual, and the treatment strategy and possible prognosis related to the progression of the infectious process.

CONCLUSION

Treatment of furcation involvement by regenerative therapy using bone graft and membrane can provide good results in endo perio lesions. The key to successful treatment in this case is a combination of endodontic treatment and periodontological treatment.

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