

Successful treatment of Endo Perio Lesion with furcation involvement in mandibular first molar: A case report

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Abstract

Introduction: Pulp and periodontal tissues have embryonic, anatomical, and functional attachments so that infections can easily spread to each other. Endo-perio lesions are commonly found in teeth with pulp necrosis, especially involving the furcation area. The lateral connecting channel between the pulp tissue and the periodontal tissue causes this condition.

Case Report: A 20-year-old healthy male came with the main complaint of a loose lower right back tooth and bleeding gums when brushing his teeth. Intra-oral examination revealed plaque and BOP (+) in all dental quadrants, caries, and grade 2 mobility in tooth 46. The treatment plan in Periodontology is regenerative surgery on tooth 46.

Case Management: Flap surgical therapy was performed on tooth 46 with granulation tissue debridement, bone graft, and membrane application to the furcation area.

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.

Keywords: Regenerative periodontal surgery; Endo-perio lesions; Furcation involvement; Bone grafts

1. 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⁾

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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⁾

2. Case Report

A 20-year-old systemically healthy male came to the Department of Periodontics on referral from the Department of Dental Conservation of RSGM FKG Universitas Airlangga Surabaya. The patient was undergoing root canal treatment at the Department of Dental Conservation. The patient complained of a loose lower right back tooth and bleeding gums when brushing his teeth.

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 grade 2 mobility in tooth 46. Periapical radiographs showed tooth 46 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).

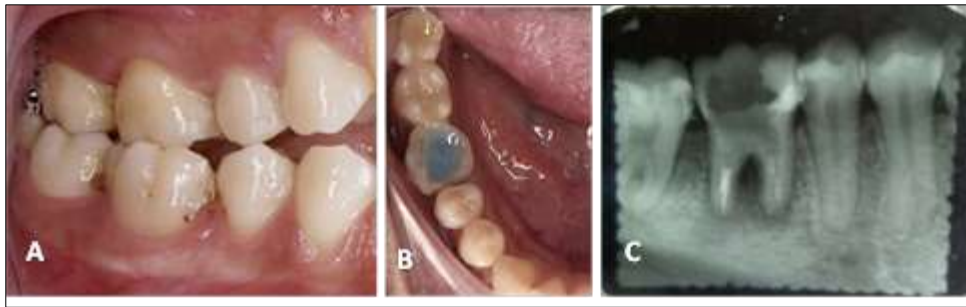


Figure 1 Baseline. (A & B) Clinical photographs. (C) Periapical radiograph of tooth 46

The diagnosis of tooth 46 was endo perio lesion (primary pulp infection with secondary periodontal infection). The treatment plan carried out in the field of Periodontia is to conduct Dental Health Education (DHE), scaling root planing and splinting reinforced composite on the tooth and the evaluation phase, followed by regenerative surgery on tooth 46. After surgical therapy, followed by a maintenance phase by conducting periodic control.

3. Case management

At the first visit the patient was carried out first phase therapy, namely scaling and root planning and splinting reinforced composite. 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 of tooth 46. Extraoral and intraoral asepsis was started using povidone iodine 10%. An intrasulcular full thickness flap incision was made from the mesial of tooth 45 to the distal of tooth 47 using scalpel number 15c followed by mucoperiosteal flap reflection using raspatorium so that granulation tissue appeared on the root surface of tooth 46. Root planing of the root surface of tooth 46 and curettage of granulation tissue in the buccal furcation area of tooth 46 so that a defect appeared around tooth 46 (Figure 2).



Figure 2 Flap surgical procedure. (a) Intra oral asepsis (b) Infiltration anesthesia (c) Intrasulcular incision with blade no. 15c of teeth 45,46,47 (d) Flap reflection using raspatorium (e) Root planing of root surface (f) Debridement of granulation tissue on furcation surface using Gracey curette.

Sharp bone surfaces are smoothed with a bone file. Ensure that the flap is in passive tension. Perform irrigation using saline solution. Next, apply EDTA as a conditioner on the root surface and irrigate with NaCl solution. A bone graft that has been mixed with Platelet Rich Fibrin (PRF) is applied to the defect area of tooth 46 followed by the placement of a membrane to cover the root surface of tooth 46 that has been filled with bone graft. Perform flap repositioning and fixation by suturing with the sling suture technique (Figure 3).

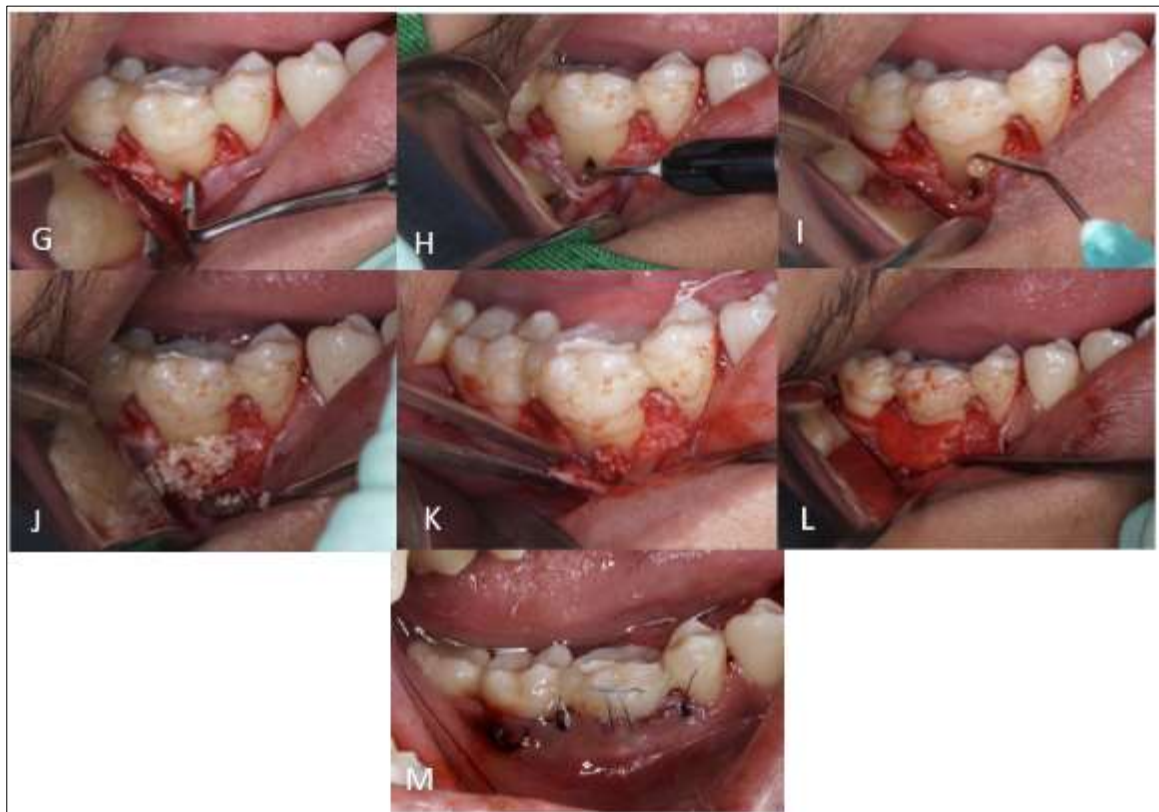


Figure 3 (G) Smoothing the bone surface with a bone file (H) Application of EDTA on the root surface as a conditioner. (I) Irrigation with NaCl solution. (J) Application of bone graft mixed in Platelet Rich Fibrin (PRF). (K) Bone graft has filled the defect area of tooth 46. (L) Application of membrane to cover the defect filled with bone graft. (M) Flap repositioning & fixation with sling suture

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 14. The patient had no complaints until a follow-up 1 month after surgery (Figure 4).



Figure 4 Control after surgery. (A) Day 7. (B) Day 14. (C) Day 30

Follow-up 4 months after surgery and root canal treatment showed good result (Figure 5).

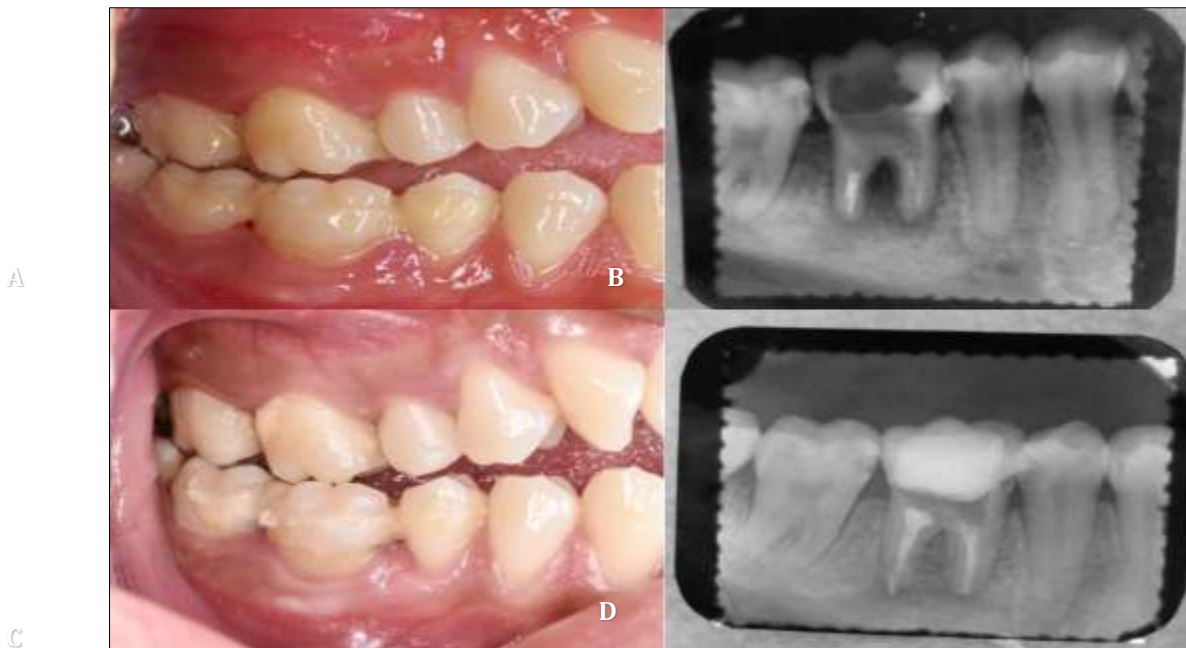


Figure 5 (A) Clinical condition before regenerative surgery on the endo perio lesion of tooth 46. (B) Radiographic image before regenerative surgery on tooth 46. (C) Clinical condition after regenerative surgery on the endo perio lesion of tooth 46. (D) Radiographic image after regenerative surgery on the endo perio lesion of tooth 46

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 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.

5. 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.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

All authors declared no conflicts of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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