
THE MANAGEMENT OF ENDO-PERIO LESION WITH FURCATION INVOLVEMENT: CASE REPORT

Verawati Ashari*, Armia Syahputra***, Erdi Effendi Nasution*, Zovi**, Budi*,
Wiriananta Putra**, Wandania Farahany***, Widi Prasetya****

*Periodontic Residency Program, Faculty of Dentistry, Universitas Sumatera Utara, Medan, Indonesia

**Conservative Dentistry Residency Program, Faculty of Dentistry, Universitas Sumatera Utara, Medan, Indonesia

***Department of Periodontic, Faculty of Dentistry, Universitas Sumatera Utara, Medan, Indonesia

****Department of Conservative Dentistry, Faculty of Dentistry, Universitas Sumatera Utara, Medan, Indonesia

Corresponding author: armia.syahputra@usu.ac.id

KEYWORDS

endodontic treatment, endo-perio lesion, furcation involvement, hemisection, bicuspidation

ABSTRACT

Introduction: Teeth with furcation involvement lesions present a significant challenge for clinicians regarding treatment options. Various methods can be employed to restore mutilated teeth for a longer period of function, including resective surgery (hemisection, bicuspidization and root amputation/root resection). **Case and Management:** This case series presents clinical and radiographic data collected from two patients who were referred to the dental and oral hospital at the University of Sumatera Utara. The patients were examined and treated by a dental conservation resident, who diagnosed a periodontal case in the patient with a chief complaint of pain and swelling associated with class II and III furcation involvement, as well as endo perio lesions on the radiograph of the first lower left and right mandibular molars. The class II and III furcation was complicated with endodontic involvement. Patients were provided with endodontic treatment in conjunction with the initial stage of periodontal treatment, which includes dental health education, root scaling and debridement. Following three months of endodontic treatment, resective surgery, including hemisection and bicuspidation, were performed. Radiographic analysis revealed that the teeth exhibited satisfactory regeneration following resective surgery, with the teeth becoming the supporting teeth for the fixed denture. **Conclusion:** It is not always necessary to extract teeth with conditions involving furcation. However, a multidisciplinary approach is essential to ensure effective treatment of the lesion.

INTRODUCTION

The periodontium and dental pulp are connected through anatomical features due to the presence of apical, lateral and accessory foramen and dentinal tubules, which allow pathogens to enter these different anatomical

areas.^{1,2} This allows the appearance of lesions that simultaneously affect the periodontal tissue and pulp, which is referred to as endodontic-periodontal (endo-perio) lesions.^{3,4} Endodontic-periodontal lesions are characterized by pulpal involvement and

periodontal disease in the same tooth. Infection of the pulp tissue can result in the development of secondary infection or destruction of the periodontal tissue.⁵ These lesions frequently remain asymptomatic for an extended period, until symptoms of acute pain and/or increasing pain begin to manifest.⁶ Endo-perio lesions have a negative impact on dental prognosis and require a multidisciplinary approach to diagnosis, treatment and prognosis. The new classification of endo-perio lesions (Table 1) reflects the current clinical state of the lesion.⁷⁻⁹

Table 1. Classification of endo-periodontal lesions (Papapanou et al. 2018)^{2,10}

Endo-periodontal Lesion with Root Damage	Root fracture or cracking	
	Root canal or pulp chamber perforation	
	External root resorption	
Endo Periodontal Lesion Without Root Damage	Endo Periodontal lesion in periodontitis patient	Grade I: Narrow deep periodontal pocket in one tooth surface Grade II: Wide deep periodontal pocket in one tooth surface
	Endo Periodontal lesion in non-periodontitis patients	Grade I: Narrow deep periodontal pocket in one tooth surface Grade II: Wide deep periodontal pocket in one tooth surface Grade III: Deep periodontal pockets in more than one

Furcation involvement is a condition that affects more than one rooted tooth. The bone defects that occur in the furcation area can vary, including loss of attachment in the furcation region, the formation of shallow to deep pockets,

advanced bone loss and clinical exposure of the furcation (Table 2). The diagnosis of furcation involvement is typically made through periodontal probing and radiographic examination.¹¹

The assessment of morphological aspects of multirouted teeth, such as root height and root divergence, indicates the choice of resection therapy.^{12,13} The assessment of tooth-related endodontic and periodontal problems is of great importance before the selection of a course of treatment. Various strategies have been employed to restore these damaged teeth, including root amputation/root resection, hemisection, and bicuspidization.¹⁰

Table 2. Classification of horizontal and vertical defects, (Rasperini et al. 2020)¹⁴

Vertical component of the furcation defects	Horizontal component of furcation defect		
	A	B	C
1	Horizontal loss of periodontal support < 3 mm of the width of the tooth with vertical attachment/ bone loss extending to the coronal third of the root.	Horizontal loss of periodontal support < 3 mm of the width of the tooth with vertical attachment/ bone loss extending to the middle third of the root.	Horizontal loss of periodontal support < 3 mm of the width of the tooth with vertical attachment/ bone loss extending to the apical third of the root.
2	Horizontal loss of periodontal support ≥ 3mm of the width of the tooth, but not “through and through” with vertical attachment/ bone loss extending to the coronal	Horizontal loss of periodontal support ≥ 3mm of the width of the tooth, but not “through and through” with vertical attachment/ bone loss extending to the middle	Horizontal loss of periodontal support ≥ 3mm of the width of the tooth, but not “through and through” with vertical attachment/ bone loss extending to the apical

	third of the root.	third of the root.	third of the root.
3	Horizontal "through and through" destruction of the periodontal attachment with vertical attachment/ bone loss extending to the coronal third of the root.	Horizontal "through and through" destruction of the periodontal attachment with vertical attachment/ bone loss extending to the middle third of the root.	Horizontal "through and through" destruction of the periodontal attachment with vertical attachment/ bone loss extending to the apical third of the root.

CASES AND MANAGERMENTS

This section presents an overview of the patient's demographic and other personal information, as well as their main concerns and symptoms. It also includes an account of their medical, family, and psychosocial history, including any relevant genetic information, past interventions and their outcomes, clinical findings, diagnostic assessment (methods, challenges, reasoning including differential diagnosis and prognostic characteristics when applicable), therapeutic intervention (types, administration and changes), and follow-up (important follow-up diagnostic, other test results, adverse, unanticipated events, and outcomes).

Case 1

A 49-year-old female patient presented at the Dental Hospital, Faculty of Dentistry, University of North Sumatra (RSGM USU) with complaints of pain and swelling in the lower right tooth. This patient has been referred by the specialist department of dental conservation at the University of North

Sumatra for an examination of the periodontal condition, furcation lesions and treatment of the teeth in question, which will be subject to final restoration in the form of fixed imitation porcelain metal crowns on the three lower right posterior teeth.

The patient denied having a history of systemic disease, allergies, or the use of medication. Upon examination of the patient's oral cavity, no abnormalities were observed in the tissues surrounding the head, neck, lymphoid tissue, or temporomandibular joint (TMJ). However, extensive and deep caries were identified on tooth 46, which exhibited a positive response to percussion. Periodontal examination revealed the presence of periodontal pockets and furcation lesions, classified as grade II, which were previously classified as grade B3. Additionally, endo-perio lesions were observed in non-periodontitis patients. Radiographic examination revealed an apical radiolucency and horizontal bone loss in the furcation. Based on subjective and objective examination, it was concluded that the case diagnosis in the patient was healthy gingiva accompanied by furcation lesions caused by endo-perio lesions.

For the first time, the patient received phase I therapy, which included instructions on oral hygiene, scaling and root planing, and polishing. Phase II therapy in the form of hemisection on tooth 46 was carried out three months after root canal treatment. Prior to surgery, the patient underwent asepsis with

povidone iodine. Subsequently, anaesthesia was administered, a sulcular incision was made from the first premolar to the second molar, and a full-thickness mucoperiosteal flap was performed and elevated.



Figure 1. A pre-endodontic retreatment radiograph and a clinical assessment of the condition prior to endodontic retreatment

A vertical incision was made at the bifurcation in the bucolingual direction using a high-speed fissure bur or carbide bur. The distal root was then removed atraumatically, and the socket was irrigated with saline. The height of the bone crest was measured against the end of the restoration and bone was removed with a carbide bur to obtain 3 mm (biological width and sulcus) and approximately 2 mm (ferrule effect). The socket was then filled with bone graft and membrane. The flap was returned to its original position and an interrupted suture was performed.

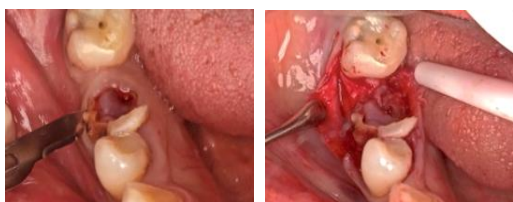


Figure 2. The sulcular incision process and full-thickness mucoperiosteal flap of teeth 45-47, flap elevation



Figure 3. The process of hemisection, which involves a vertical cutting at the bifurcation in the bucolingual direction using high-speed fissure burs or Carbide burs, pre-endodontic retreatment procedure.

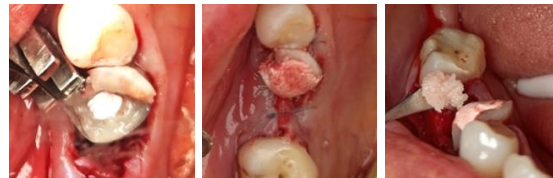


Figure 4. Build-up and rewalling, the socket was filled with bone graft and membrane, flap was repositioned and sutured with interrupted sutures.



Figure 5. Final restoration



Figure 6. Follow-up after 2 years



Figure 7. The radiograph at 2 years' follow-up.

Case 2

A 28-year-old female patient was referred from the Conservative Dental Clinic, Faculty of Dentistry, University of North Sumatra. The results of the patient's anamnesis indicated that root canal treatment had been performed approximately 10 years ago, and

the patient currently presented with chief complaints of pressing pain in the lower left tooth. The patient had undergone endodontic re-treatment by a dental conservation resident. The patient denied having a history of systemic disease or drug allergies. On extra oral examination, no abnormalities were identified in the head, neck, lymphoid or temporomandibular joint regions.

An intraoral examination revealed that tooth 36 had been filled with temporary materials. A periodontal examination indicated the presence of grade III furcation lesions. Radiographic examination demonstrated a radiolucency in the apical portion and horizontal bone loss in the furcation. This was diagnosed as an endo-perio lesion with root damage accompanied by root perforation.

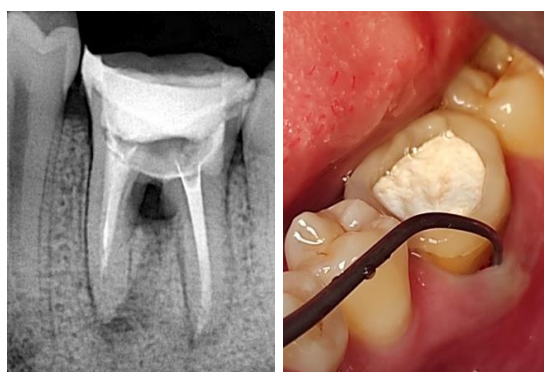


Figure 8. A radiograph of the tooth prior to endodontic retreatment and the clinical condition of the tooth prior to endodontic retreatment.

The patient was first treated with Phase I therapy. Phase II therapy, which involved a hemisection of tooth 46, was then performed three months after root canal treatment. Prior to the surgical procedure, aseptic preparation was undertaken on both the extraoral and intraoral surgical areas, using a povidone

iodine solution. Anesthesia was then administered and a sulcular incision was made, running from the distal aspect of the second premolar to the mesial aspect of the second molar. The full-thickness flap was subsequently elevated. A vertical incision was made at the bifurcation in the buccal to lingual direction using a high-speed fissure bur. The granulation tissue was curetted, the sharp bony sections osteoplasty was performed, bone graft material was applied and the membrane barrier was fixed. An ostectomy was performed in the proximal area, the flap was returned to its original position, interrupted sutures were placed and a periodontal pack was placed in the surgical area. Phase III therapy in the form of a final restoration was performed, followed by the endodontist.

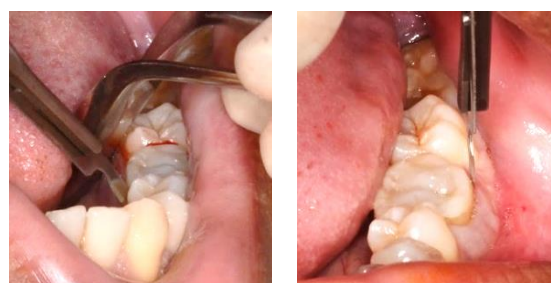


Figure 9. Sulcular incision process and full thickness mucoperiosteal flap of tooth 35-37



Figure 10. Elevation flap



Figure 11. The process of hemisection involves a vertical incision at the bifurcation in the buccolingual direction, performed with a high-speed fissure bur.



Figure 12. Placement of membranes and bone graft

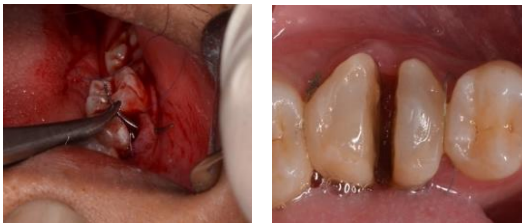


Figure 13. The technique of suturing was performed using interrupted sutures.



Figure 14. One-month postoperative period following hemisection and bone graft surgery



Figure 15. A one-month period of observation with a provisional crown.

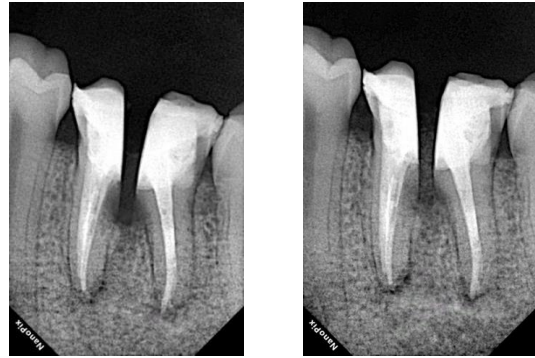


Figure 16. A radiographic examination was conducted prior to and one month post hemisection and bone graft surgery.

DISCUSSION

Exposed pulp, periodontitis, and carious lesions are of significant importance in the development of periodontal-endodontic lesions. In the event that the lesion is not treated adequately and the root canal is not properly disinfected and sealed, it will retain necrotic remnants of bacteria, which may result in the development of the lesion or reinfection and bone destruction.

In certain instances, molars exhibiting severe bifurcation defects may be preserved through the implementation of various resective surgical techniques, including hemisection, bicuspidation, and root amputation/root resection. Mostafavi et al. proposed that this procedure may confer a favourable long-term prognosis and recommended that, prior to the extraction of any molar, surgery should be considered as a potential treatment modality.¹⁵

The two case reports presented indicate that the patient complained of pain. Periapical radiographs demonstrated Class II and Class III furcation involvement, accompanied by

horizontal bone loss in the furcation area and periapical radiolucencies mesially and distally. The treatment options in this case report include hemisection and bicuspidization. In the first case, hemisection was performed as a useful alternative treatment to avoid extraction and save multi-rooted teeth with an endodontic approach, which includes root canal treatment of the remaining root and restoration of it by fabrication of a fixed denture to maintain occlusal balance.

In this case, hemisection treatment was indicated by the presence of a class III furcation lesion and severe bone damage to the distal root.^{15,16} The second case, bicuspidization surgery was performed, involving the separation of the mesial and distal roots of the mandibular molars and their coronal parts. The two segments were then preserved individually, as both roots could be maintained. Guided tissue regeneration is performed on the separated furcation area to achieve better result.

CONCLUSION

Based on the current classification, the resective surgical treatment plan for cases of furcation involvement due to endo-perio lesions must first ascertain the clinical condition, diagnosis, and prognosis of the tooth. The management of furcation involvement caused by the endo-perio lesion in this case involved root canal treatment followed by periodontal surgery. The

successful management of these cases requires the ability to identify and treat the condition. Hence it is highly recommended that a multidisciplinary approach be employed, with good collaboration between endodontists, periodontists, and prosthodontists to achieve effective treatment.

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