Regenerative approach in the treatment of grade II furcations: a case report

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Abstract

Objective: A grade II furcation involvement has been defined as a defect having a horizontal loss attachment of 3 mm or greater but not through the entire furcation. There are several techniques used alone or in combination considered to achieve periodontal regeneration. This case report aims to describe regenerative approach in the treatment of grade II furcation defects in maxillary molars.

Methods: A 43 years old male reported to the Department of Periodontics with a complaint of pain. At the initial visit, scaling and

root planning was done. It was followed by periodontal regenerative therapy using bone graft and resorbable membranes.

Results: The treatment for overall seemed success with healthy periodontium and complete closed defect with bone fill, based on the clinical and radiographic development of the patient at the end of six month follow up.

Conclusion: The regenerative approach such as resorbable GTR membrane with bone material was more effective than open debridement alone, in the treatment of furcation defects.

Keywords: Bone graft, Furcation defect, Guided tissue regeneration, Periodontitis, Periodontal treatment

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Introduction

Furcation involvement may be defined as the invasion of the bifurcation and trifurcation of multirooted teeth by progression of chronic inflammation during periodontitis.^{1,2} A study found that furcation involvement is frequently more common in maxillary first and second molars than mandibular molars. This can be explained by the difficulty in accessing the proximal surfaces on maxillary molars for cleaning.³ The most common etiologic of furcation involvement is bacterial plaque but there are various predisposing and contributing factors that can aggravate the disease.⁴

The degree of furcation involvement is commonly used as a clinical indicator to qualify the severity of existing periodontal breakdown. The extent of furcation disease can be determined by evaluating parameters vertical bone loss, horizontal bone loss or both. Most classifications used to describe the severity of furcation involvement are related to the amount of horizontal attachment loss.^{5,6} Glickman has suggested the classification into grade I, grade II, grade III and grade IV.⁷ Grade II furcation lesion is a culdesac with a definite horizontal component. The horizontal loss of periodontal tissue support >3 mm but not through-and-through defect.^{8,9}

The treatment and management of teeth with furcation involvement presents one of the greatest challenges in periodontal therapy.^{10,11} The therapy of furcation involvement depends primarily on the extent of the disease, the strategic importance of the affected tooth and on the degree of patient

cooperation and compliance. Therapies must begin with the initial periodontal treatment (systemic and cause-related phases) followed by debridement to regenerative procedures and extraction if the lesion progresses. However, the treatment must be sustained by the adequate hygiene of the patient, and by the close monitoring of the clinician.¹² Elimination of the pocket by resective or regenerative procedures and making the area accessible for plaque control is the primary objective of any furcation therapy.¹³ There are several techniques used alone or in combination, which are considered to achieve periodontal regeneration, including bone grafts or substitutes, guided tissue regeneration, root surface modification and biological mediators.¹⁴

More recently, techniques aimed at using bone grafts and/or barrier materials have been evaluated in regenerating furcation defects grade II.⁹ An important objective of regenerative therapy has been a predictable clinical course of furcation defects after periodontal regeneration, as evidenced by the formation of a new attachment apparatus including bone, cementum and periodontal ligament.¹⁵ Periodontal surgery using guided tissue regeneration (GTR) using non resorbable membran and bioabsorbable barriers has been widely used to regenerate bone and establishing a new connective tissue attachment.¹⁶ One of the most important indications for GTR treatment is the class II furcation defect. Bone graft are widely use to promote

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bone formation and periodontal regeneration. Bone graft provide a structural framework for clot development, maturation and remodeling that supports bone formation in osseous defect.¹⁷

This case report aims to describe regenerative approach in the treatment of grade II furcation with bioabsorbable barriers and bonegraft for regeneration of furcation defects in maxillary molars region.

Case Report

A 43 years old male reported to Dental Hospital Department of Periodontic, Hasanuddin University Makassar, Indonesia with the chief complaint of pain and continuous discomfort in left upper back teeth region since 1 month. Upon clinical examination, the site revealed signs of inflammation, increased vertical probing depth and grade II buccal furcation

Figure 1 Preoperative view of tooth 26

Figure 2 Preoperative intra oral periapical radiograph

Figure 3 Furcation defect

Figure 4 Bonegraft and membrane placed

Figure 5 Suture placed

Figure 6 One week post operative

Figure 7 Clinical appearance 6 months post operative

Figure 8 Radiographic features

involvement in #26 [figure 1](#). Periapical radiography was taken to confirm the presence and severity of furcation defect radiographically [figure 2](#).

The patient underwent initial therapy which included scaling and root planing, followed by oral hygiene instructions. The measurement probing pocket depth (PD) = 4mm, loss attachment level (LA) = 10 mm, Horizontal furcation defect (HFD) = 4mm was recorded. Clinical parameters were recorded at baseline and 6 months interval.

One week after the phase I therapy, patient was recalled for surgery. Prior to the surgery a signed informed consent was obtained from the patient. Surgical procedure was performed under proper aseptic precautions to keep the surgical site clean. After injecting local anesthesia, sulcular incisions were placed and a full thickness flap was elevated at

the furcation site, extending at least one tooth mesial and distal to the affected tooth, and extended beyond mucogingival junction [figure 3](#). The defect area was thoroughly debrided and cleaned using Gracey curettes followed by ultrasonic scalers. After this, the defect area was condensed with the bone graft and covered by bioabsorbable GTR membrane [figure 4](#). Flaps were then repositioned and sutured [figure 5](#). Periodontal dressing was applied over the site.

Antibiotics and analgesics were prescribed for one week and postoperative instructions were given. Patient was recalled for periodontal dressing and suture removal after 1 week [figure 6](#).

Six months post-operative periodontal examination revealed reduction in vertical probing depth [figure 7](#) and radiographs revealed increased bone density [figure 8](#). This result indicating successful resolution of inflammation and periodontal regeneration in the furcation defect area.

Discussion

The ultimate goals of periodontal therapy are to regeneration of the lost attachment apparatus and a return to pre disease architecture.¹⁸ Multiple approaches have been used to resolve furcation defect including autografts, demineralized freeze-dried bone allografts (DFDBAs), bovine-derived xenografts, barrier membranes, and combinations of membranes and bone grafts.⁹

In the present case, combined treatment approach using bone graft and GTR membrane was used for treatment of mandibular grade II furcation defect. The bone graft material that used contains apatite carbonate (which is a component of bone) as well as a naturalized collagenized polymer.

A systematic review assessed the efficacy of membrane therapy in the treatment of periodontal furcation defects measured against standard surgical periodontal treatment (i.e. open flap debridement) and confirmed superiority of guided tissue regeneration open flap debridement in class II furcation defects.² The principle of GTR was promulgated for treatment of osseous defects in human periodontitis. The concept of GTR is based on the exclusion of gingival connective tissue cells and prevention of epithelial down growth into wound, thereby allowing cells with periodontal regenerative potential (PDL cells and bone cells) to enter the periodontal wound first. Barrier techniques, using material such as expanded polytetrafluoroethylene, polyglactin, polylactic acid, calcium sulfate and collagen are widely employed now a days, in the hope of excluding epithelium and the gingival corium (the conjunctive submucous layer) from reaching the root, the belief that they interfere with periodontal.¹²

A few randomized clinical trials have investigated the clinical effectiveness of GTR in the treatment of class II maxillary furcation. Evidence indicates that GTR provides only limited advantages in the treatment of class II maxillary furcation.¹⁹ Class II furcation defects have the strongest level of evidence for predictable outcomes after regenerative therapy, that being combination therapy with barrier and bone replacement graft.²⁰ Regeneration by grafting may be further enhanced by the use of barrier membranes that exclude gingival fibroblasts and epithelium from the healing site. It has also been shown that the guided tissue regeneration procedure, using membranes, holds promise for increasing the success of bone grafting.¹⁰

Bone graft healing can be divided into five stages continuum: inflammation (chemotaxis activity stimulated by necrotic debris), osteoblast differentiation from precursors, osteoinduction (osteoblast and osteoclast function activity), osteoconduction (new bone forming over scaffold) and remodeling which process continues for years.²¹

In the present case, the clinical parameters like horizontal furcation depth, vertical probing depth and clinical attachment level showed improvement when compared at 6 months from baseline. Comparisons between the initial and six-month postoperative radiograph revealed increased bone fill as revealed by the increased radio-opacity around the furcation area at six-month postoperative evaluation.

Conclusion

The result of the present case report suggest that the successful management of the furcation of maxillary molar by periodontal regenerative therapy for the grade II furcation involvement of 26 with bonegraft along with GTR membrane resulted in a significant amount of bone fill with improved clinical attachment levels and healthy gingiva.

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Conflict of Interest

The authors report no conflict of interest.

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