

Managements of Grade II Furcation Involvements Via Periodontal Regeneration: Case Reports with 24-Month Follow-Ups

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Abstract: The alveolar bone loss around posterior teeth can result in furcation involvement of posterior teeth, which affects survival of the teeth. While resective osseous surgery or extraction of the tooth may be feasible periodontal surgical options for posterior teeth with grade III and grade IV furcation involvements, grade II furcation with deep two- or three-walled components is suitable for periodontal regenerative therapy. This article presents two case reports in management of grade II furcation involvements with different extensions of two or three bony wall components via periodontal regeneration. Case 1 treated the buccal furcation involvement of the maxillary right first molar via autogenous bone graft and a nonresorbable barrier membrane. Case 2 treated the lingual furcation involvements with circumferential bony defects around the mandibular left first and second molar via bone graft with bioactive glass. Bone fill was confirmed by a re-entry surgery in Case 1 and by a postoperative radiograph in Case 2 at 24 months follow-up.

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I. Introduction

The alveolar bone loss around posterior teeth can result in furcation involvement. In Glickman's classification for furcation involvement,¹ grade I lesion is an incipient or early stage of furcation involvement. Periodontal pocket in grade I furcation lesion is suprabony and primarily affect soft tissues. Grade II lesion is a cul-del-sac with a definite horizontal component. If multiple defects are present in the same tooth, they do not communicate with each other. In grade III furcation involvement, alveolar bone is not attached to the dome of furcation, but soft tissue still covers the furcation area. In grade IV furcation involvement, interradicular bone is destroyed, and soft tissue have receded apically so that the opening of furcation is clinically visible.

Furcation involvements have an influence on practitioners' decision to determine tooth prognosis.² A study showed that 4% molars with furcation involvement were extracted during the active periodontal therapy.³ Additional 4% molars with furcation involvement were extracted during the maintenance phase within 5 years.³ Therefore, management of furcation involvement is critical to save posterior teeth.

Nonsurgical procedures are sufficient to manage grade I and the early stage of grade II furcation involvement, but they are usually ineffective in advanced furcation involvement from the late stage of grade II to grade IV because periodontal instrumentation is compromised at furcation defect sites.⁴ Grade II furcation with deep two- or three-walled components is suitable for periodontal regenerative therapy.⁵ Resective periodontal surgery may be a feasible periodontal surgical option for grade III or grade IV furcation involvements.⁶

Periodontal regeneration therapy includes guided tissue regeneration (GTR) and/or bone graft procedure. Guided tissue regeneration (GTR) uses barrier membranes to exclude gingival fibroblasts and epithelial cells in the defect area and to achieve periodontal regeneration by selective cell proliferation.⁷ The GTR in combination with bone grafting may improve clinical outcomes.^{8,9} Various bone graft materials also provide regenerative inductive effect, although viewed primarily as providing a scaffold for healing.¹⁰ This article presents two cases in management of grade II furcation involvements with different extensions of alveolar bone loss around involved roots via periodontal regeneration.

II. Case 1

A 50-year-old, nonsmoker male presented for periodontal evaluation. The maxillary right first molar exhibited grade II buccal furcation involvement with a 7-mm probing-depth (PD) along with bleeding on probing at the midfacial site (Figure 1a). Initial prognosis for the maxillary right first molar was determined as poor,¹¹ but the therapeutic prognosis for the tooth was favorable because there was no gingival recession or tooth mobility.¹² The interproximal bone level of the maxillary right first molar was higher than the level of the buccal furcation entrance (Figure 1b), which indicated positive bony architecture was still maintained. Therefore, periodontal regeneration was recommended.

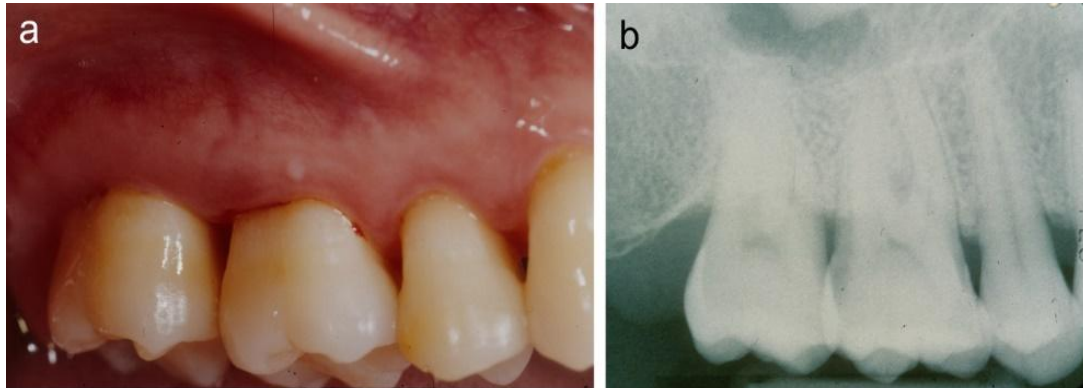


Figure 1. Initial periodontal evaluation in the maxillary right sextant in Case 1. (a) Preoperative clinical photograph with bleeding on probings on the maxillary right first molar. (b) Preoperative radiograph of the maxillary right first and second molar. Note radiolucency between the mesiobuccal and the distobuccal root of the maxillary right first molar.

Under local infiltration anesthesia, a full-thickness flap was elevated and through scaling and root planing was performed. The flap elevation and removal of granulation tissue revealed the grade II buccal furcation involvement with horizontal and vertical components on the maxillary right first molar, the grade I buccal furcation involvement on the maxillary right second molar, and bulbous buccal bony contour (Figure 2a). Root conditioning was performed on root surfaces of the two molars with tetracycline HCl diluted with saline.⁶ Autogenous bone chips harvested from the buccal exostosis were packed into the furcation defect (Figure 2b), and an expanded polytetrafluoroethylene (e-PTFE) membrane* was secured with a monofilament suture†(Figure 2c). The flap was repositioned and secured with the same suture material. Amoxicillin 500 mg, tid for one-week, 0.12 % Chlorhexidine Gluconate‡, bid for 3-week, and ibuprofen 200 mg PRN were prescribed.



Figure 2. Guided Tissue Regeneration (GTR) Procedure in Case 1. (a) Flap retracted and defect debrided. (b) Autogenous bone chips packed into class II furcation of the maxillary right first molar. (c) e-PTFE membrane secured with a sling suture around the maxillary right first molar.

The e-PTFE membrane was removed at 8 weeks post-operation. Regular periodontal maintenance was performed every 4- to 6-month. No radiolucency at the buccal furcation area of the maxillary right first molar was observed on the 24-month follow-up radiograph (Figure 3a). Re-entry surgery at a 2-year follow-up confirmed bone fill at the previous furcation defect on the maxillary right first molar (Figure 3b).

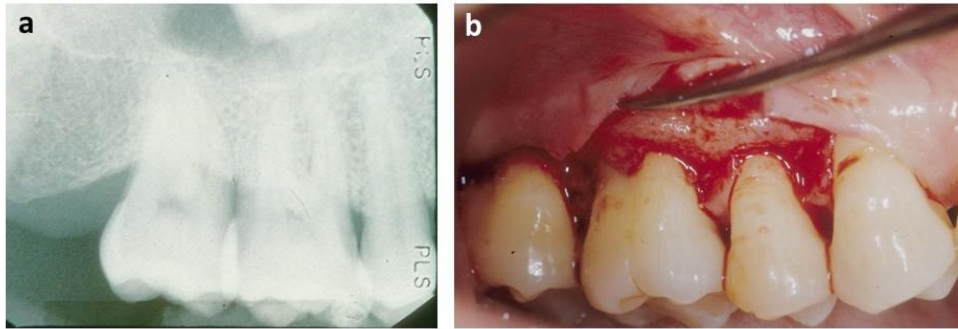


Figure 3. 24 months follow-up of the maxillary right first molar in Case 1. (a) 24 months follow-up radiograph. (b) Re-entry surgery revealing full furcation closure with bone fill of the maxillary right first molar at 24 months follow-up.

III. Case 2

A 54-year-old male presented due to severe chronic periodontitis in the mandibular left sextant (Figure 4a). The mandibular left second premolar exhibited class 3 mobility; the extraction was performed (Figure 4b and 4c). The mandibular left first molar exhibited grade II lingual furcation involvement, 9-mm PD at the distolingual site, and class 2 mobility. The mandibular left second molar showed grade II lingual furcation involvement, 7-mm PD at the mesiolingual site, and class 1 mobility. The prognosis for the mandibular left first molar deemed to be questionable and the prognosis for the mandibular left second molar deemed to be poor.¹¹ If the two mandibular left molars were extracted, guided bone regeneration would be required to restore the three missing teeth with implant-supported restorations. Furthermore, the patient did not want to extract more teeth. Considering the buccal furcations of the two mandibular left molars were either intact or grade I, regenerative therapy was recommended rather than extraction of the two teeth.



Figure 4. Initial periodontal evaluation in the mandibular left sextant in Case 2. (a) Preoperative radiographs. (b) Preoperative clinical photograph in the lingual side. (c) Preoperative clinical photograph in the buccal side after the extraction of the mandibular left second premolar.

After flap retraction, removal of granulation tissue revealed grade II lingual furcation involvement with circumferential bony defect around the distal root of the mandibular left first molar and grade II lingual furcation involvement with circumferential bony defect around the mesial root of the mandibular left second molar (Figure 5a). After root conditioning,⁶ bioactive glass⁸ was gently packed into the defect (Figure 5b). The flap was repositioned and secured with 5-0 polyglactin 910 suture¹. The same medications prescribed for Case 1 have made for Case 2.

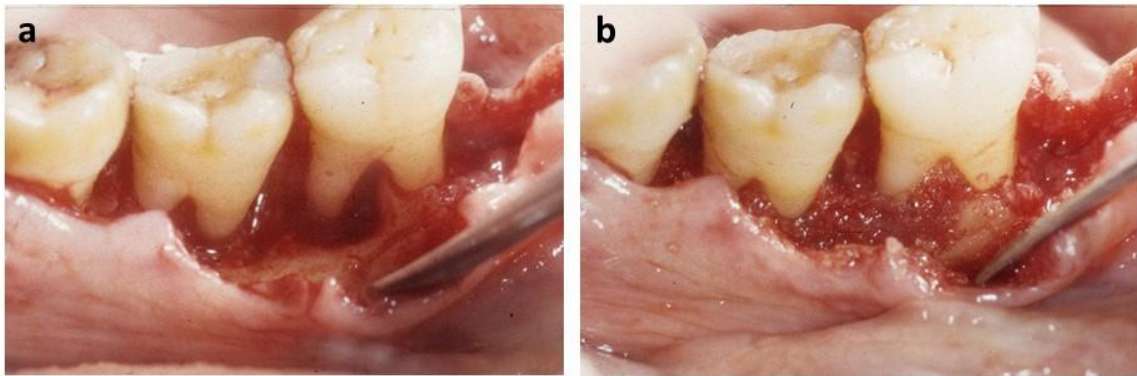


Figure 5. Bone graft procedure for the mandibular left first and second molar in Case 2. (a) Flap retracted and defect debrided. (b) Bioactive glass was packed into class II lingual furcation of the mandibular left first and second molar and intraosseous defect around the mandibular left first and second molar.

At a 2-week follow-up, the sutures were removed. The mobility of the mandibular left first molar reduced from class 2 to class 1 at 3 months following the surgery. A 4-unit fixed prosthesis from the mandibular left second molar to the mandibular left first premolar was delivered at 6 months after the surgery. At a 24-month follow-up, the mandibular left first and second molar exhibited 3 to 4 mm PDs. Radiographic bone fill at the previous defects on the mandibular left first and second molar was observed at a 2-year follow-up (Figure 6c).

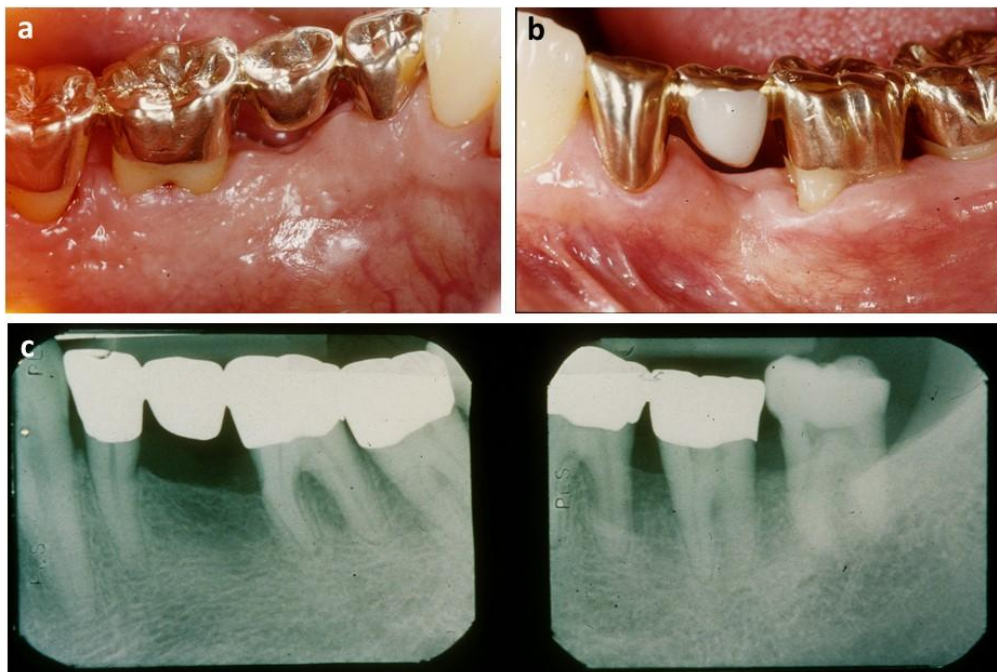


Figure 6. 24 months follow-up of the teeth in Case 2. (a) Clinical photograph in the lingual side at 24 months follow-up. (b) Clinical photograph in the buccal side at 24 months follow-up. (c) 24 months follow-up radiograph.

IV. Discussion

It was demonstrated that maintenance of furcation-involved teeth is feasible in the long term if the periodontal treatment is adequate and subsequent regenerative measure with supportive periodontal care are carried out. Patient- and defect-related factors are affecting the predictability of periodontal regeneration.¹³ Two patients in this case report exhibited good oral hygiene, localized periodontal defects, and no smoking habit, which are favorable to periodontal regeneration. In periodontal regenerative therapy, the presence of long root trunk is favorable to achieve full coverage of the furcation defect with a membrane and to facilitate full coverage of the membrane with the flap.¹⁴ The predictability of periodontal regenerative procedure improves in the defect exhibiting a deep vertical component in the furcation area.¹⁴

The choice of graft material for Case 1 was autogenous bone obtained from the buccal buttress with an e-PTFE membrane. Studies have demonstrated this combination results in the most favorable outcome.¹⁵ The choice of graft material for Case 2 was bioactive glass, a biocompatible, alloplastic material with osteoconductive and osteoinductive properties. Autogenous bone chips could not be harvested within the surgical field in Case 2. The defect around the mandibular left first and second molar in Case 2 was extensive compared to the maxillary right first molar in Case 1. The use of an e-PTFE membrane to cover the entire defect area in Case 2 would cause ischemia of the periodontal flap leading to membrane exposure during the healing course. Therefore, a barrier membrane was not used in Case 2. Uneventful healing was observed in Case 2 following periodontal regenerative therapy.

V. Conclusion

Grade II furcation with deep two- or three-walled components is suitable for periodontal regenerative therapy. Periodontal regeneration can result in bone fill at furcation defect areas, which can be maintained with a supportive periodontal care.

Footnotes

* A wide GORE-TEX, W.L. Gore, Newark, DE

† GORE-TEX® Suture, W.L. Gore, Newark, DE

‡ Peridex™, 3M, St. Paul, MN

§ Biogran®, BIOMET 3i, Palm Beach Gardens, FL

|| Coated VICRYL®, Ethicon, Somerville, NY

Conflict of interest

Drs. Oh and Idzik-Starr report no conflict of interest related to these case reports.

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