

## Case Report

### Treatment strategy for guided tissue regeneration in various class II furcation defect: Case series

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#### ABSTRACT

Periodontal regeneration is a main aspect in the treatment of teeth affected by periodontitis. Periodontal regeneration in furcation areas is quite challenging, especially when it is in interproximal region. There are several techniques used alone or in combination considered to achieve periodontal regeneration, including the bone grafts or substitutes, guided tissue regeneration (GTR), root surface modification, and biological mediators. Many factors may account for variability in response to regenerative therapy in class II furcation. This case series describes the management of class II furcation defect in a mesial interproximal region of a maxillary tooth and other with a buccal class II furcation of mandibular tooth, with the help of surgical intervention including the GTR membrane and bone graft materials. This combined treatment resulted in healthy periodontium with a radiographic evidence of alveolar bone gain in both cases. This case series demonstrates that proper diagnosis, followed by removal of etiological factors and utilizing the combined treatment modalities will restore health and function of the tooth with the severe attachment loss.

**Key Words:** Class II furcation, guided tissue regeneration, maxillary mesial furcation

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## INTRODUCTION

The ultimate aim of periodontal therapy is regeneration of the lost tissues as a consequence of periodontal disease. Lesions of the periodontal ligament and adjacent alveolar bone may originate from infections of the periodontium or tissues of the dental pulp.<sup>[1]</sup> However, when a significant loss of the periodontal attachment apparatus and osseous structure occurs, the long-term prognosis becomes poor.<sup>[2]</sup> There are several techniques used alone or in combination considered as to achieve periodontal regeneration, including the bone grafts or substitutes, guided tissue regeneration (GTR), root surface modification, and biological mediators.<sup>[3]</sup>

One of the most significant indications for GTR treatment is class II furcation defect. In GTR, a barrier is inserted between the root surface and the gingival tissues to inhibit the apical migration of the epithelium and gingival connective tissue of the flap, allowing the granulation tissue derived from the periodontal ligament and osseous tissues to repopulate the space adjacent to the denuded root surface.<sup>[4]</sup> Historically, the expanded polytetrafluoroethylene membrane was utilized during this procedure, which was non-resorbable and required a second surgical intervention after several months for its removal. Recently, a variety of resorbable barrier membranes are available that slowly resorb and is gradually replaced by the periodontal tissues and thus, eliminating the need for a secondary surgical intervention.

This paper presents two different cases of periodontal regeneration in the maxillary interproximal class II mesial furcation defect and in mandibular buccal furcation defect with combined treatment modalities using bone graft and GTR membrane. The response

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to this therapy resulted in marked pocket depth reduction, gain in clinical attachment levels and bone defect fill.

## CASE REPORTS

### Case 1

A 48-year-old male patient came to the faculty of dental sciences, with a chief complain of pain and continuous discomfort in upper right posterior region of the jaw since 2 months. Patient's medical history was uneventful. On clinical examination, the palatal gingiva showed periodontal abscess and clear signs of inflammation, mobility grade-1 and 10 mm probing depth palatally and mesially to the tooth 16 [Figure 1]. The periapical radiograph showed a deep bony defect extending to furcation of 16 [Figure 2]. Electric pulp testing and thermal pulp testing were carried out to rule out endo-perio lesion. The tooth 16 showed normal response with electric and thermal pulp testing and hence no endodontic intervention was required. Therefore, considering the dental history and radiographs, a periodontal surgery was planned. After local anesthesia, a mucoperiosteal flap was raised. Severe osseous destruction was observed on palatal surface of 16 also including the mesial furcation [Figure 3]. Furcation involvement was class II, mesially. The palatal and mesial root surfaces were root planed. The teeth had periodontal attachment remaining on facial and distal surfaces. After thorough root planing and apical curettage, this large osseous defect, at mesial furcation was filled with the bone graft (Perio bone-G, alloplastic graft) and GTR membrane (Perio col-GTR, resorbable) covering the root surface [Figures 4 and 5]. Flap was repositioned and sutured with 3-0 silk non-resorbable interrupted sutures. Antibiotics and analgesics were prescribed for 1 week. Sutures were removed 7 days later. Patient was monitored on a weekly schedule post-operatively, to ensure good oral hygiene in the surgerized area [Figure 6]. Supportive periodontal maintenance at 3 months was prescribed to maintain periodontal health and to re-evaluate this area. At 11 months recall, the tooth was asymptomatic with the successful healing, mobility was absent and probing depth was minimal. The radiograph after 11 months follow-up showed evidence of apparent bone fill with resolution of the osseous defect [Figure 7].



Figure 1: Pre-operative (10 mm probing depth)

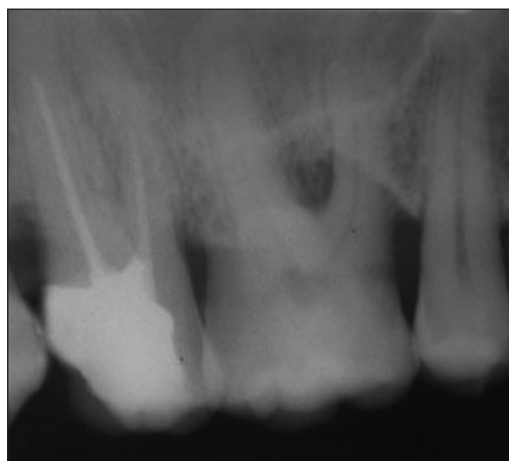


Figure 2: Pre-operative intra-oral periapical radiograph



Figure 3: Mesial furcation defect

### Case 2

A 34-year-old female patient came to the faculty of dental sciences, with a chief complain of pain and continuous discomfort in the lower left posterior



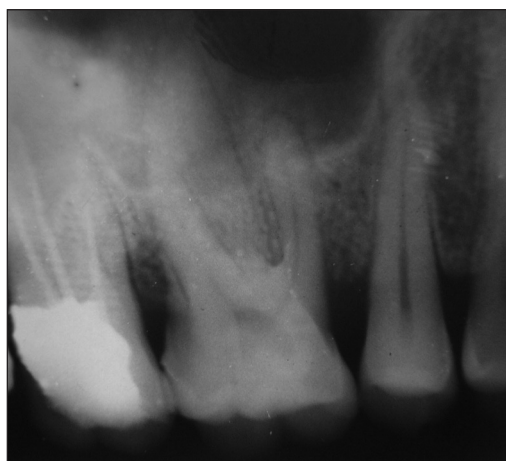
**Figure 4:** Bone graft



**Figure 5:** Guided tissue regeneration membrane placed over bone graft



**Figure 6:** Post-operative



**Figure 7:** Post-operative intra-oral periapical radiograph

region of the jaw since 2 months. On clinical examination, signs of inflammation with buccal furcation involvement were present in tooth 36. No recession, neither mobility was present nor periapical radiograph showed a deep bony defect in furcation of 36 and a periapical lesion [Figure 8]. Electric and thermal pulp testing showed negative response and there was a periapical lesion hence an endodontic intervention was required. Therefore, considering the dental history and radiographs, first of all root canal treatment was performed and then a periodontal surgery was planned. After local anesthesia, a mucoperiosteal flap was raised. Class II furcation with severe osseous destruction was observed in buccal furcation of 36. A horizontal attachment loss was about 5 mm [Figure 9]. After thorough root planing, furcation area was filled with the bone graft (Perio bone-G, alloplastic graft) and GTR membrane (Perio col-GTR, resorbable) covering the root surface [Figures 10 and 11]. Flap was sutured

with 3-0 silk sutures. Post-operative antibiotics and analgesics were prescribed for 1 week. Sutures were removed 7 days later. Patient was monitored on a weekly schedule post-operatively, to ensure good oral hygiene in the surgerized area [Figure 12]. At 1 year recall, the tooth was asymptomatic with the successful healing. Radiograph after 1 year follow-up showed the resolution of osseous defect in the furcation area [Figure 13].

## DISCUSSION

The main aim of regenerative therapy is regeneration of periodontal hard and soft-tissues, including formation of a new attachment apparatus. Bone loss caused by pulpal disease is reversible, whereas advanced bone loss caused by periodontal disease is usually irreversible. The necessity of periodontal surgical therapy most likely was because the



**Figure 8:** Pre-operative intra-oral periapical radiograph



**Figure 9:** Buccal furcation defect



**Figure 10:** Size determination before guided tissue regeneration membrane placement



**Figure 11:** Bone graft placed



**Figure 12:** Post-operative



**Figure 13:** Post-operative intra-oral periapical radiograph

periodontal bone loss was more advanced and was less likely to resolve after nonsurgical therapy alone.<sup>[1]</sup> However, periodontal regeneration in the furcation

defects, although possible, is not considered totally predictable, especially in terms of complete bone fill. Many factors may account for variability in response

to regenerative therapy in class II furcation. Novaes and Novaes<sup>[5]</sup> reported eight different situations of class II furcations in which GTR is not indicated: (a) Lack of access for adequate debridement of the furcation, (b) endodontic or prosthetic perforations in the furcation areas of the roots, (c) crown lengthening procedures that invade the furcations, (d) root proximities untreatable by the restorative alveolar interface technique, (e) extensive gingival recessions, (f) deep caries involving the roots, (g) untreatable endo-perio lesions, and (h) longitudinal root fractures. In these cases, hemisection is recommended. It should be noted that there are many factors acting collectively that influence the final outcome of GTR in class II furcations. Selecting a defect that is amenable to regeneration is also critical for achieving success.<sup>[6]</sup> Wang and Boyapati<sup>[7]</sup> suggested four factors, the so-called PASS principle that are critical for predictable bone regeneration: Primary wound closure, angiogenesis as a blood supply and source of undifferentiated mesenchymal cells, space maintenance, and stability of the wound. GTR has offered better results than open-flap debridement or bone replacement grafts alone, in class II furcation.<sup>[8]</sup> Despite achieving significant positive gains in new attachment using the GTR, consistently successful treatment of furcation defects with the membrane techniques remains a challenge. Furcation morphology may restrict access for adequate debridement and the root instrumentation and may have a reduced source of available cells and blood supply from the periodontal ligament and bone defect.<sup>[9]</sup> One important factor for successful regeneration at furcation and non-furcation sites is the amount of periodontium that remains apical and lateral to the defect. Coronal migration of cells originating from the periodontal ligament and bone marrow spaces is particularly critical to the healing outcome following periodontal regenerative procedures in furcation defects. Here, the role of bone graft was for space-making and also for inducing bone formation. Space maintenance involves the creation of space for periodontal tissues to grow into. To increase the predictability and clinical success of regenerative therapy, factors related to the patient, furcation, surgical treatment, and post-operative period should be considered. Each patient has a different healing potential that can directly influence the response to treatment. The patient-related factors that have a negative influence on the regeneration of these lesions include smoking, stress, diabetes mellitus, acquired immunodeficiency syndrome and other acute and

debilitating diseases, and the presence of multiple deep periodontal pockets. Periodontal regeneration is a technique-sensitive procedure requiring training and experience, even for a competent surgeon. Poor operative technique in membrane placement or surgical soft-tissue management and failure to adequately cover the membrane can cause gingival recession and consequently membrane exposure. Recession may create the root sensitivity and can complicate plaque control, whereas membrane exposure may lead to infection to the site and bone graft.<sup>[10]</sup> However, in the above cases, use of GTR membrane combined with the bone graft, resulted in successful healing. The clinical and radiographic findings were quite impressive, resulting in a significant reduction of probing depth, and gain in bone fill.

## CONCLUSION

Although traditional nonsurgical periodontal therapy can be predictably used to arrest mild to moderate defects, it might be inadequate for the treatment of deep pockets or wide circumferential furcation defects. Presently, multiple regenerative techniques are widely available. The above case series suggest that various class II furcation defects can be successfully managed with combined treatment modalities like use of the GTR membrane in adjunct to the bone graft.

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