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# Clinical and Radiological Evaluation and Comparison of Bioresorbable Barrier Membrane with Allograft and Alloplastic Bone Graft Material in Treating Grade II Mandibular Furcation Defects: A Case Report

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***Abstract – Regeneration of the bone loss as a consequence of periodontal disease can be achieved by using bone regenerative material, several autogenous and alloplastic materials are being used for the main purpose of reconstruction of osseous tissue in grade 2 furcation defects. There is paucity on published literature on demineralized freeze dried bone grafts (DFDBA) and hydroxyapatite (HA) in the management of grade 2 furcation defect management. A 45-year-old patient-reported pain in both the left and right lower back region of the jaw and want to get treated. The final diagnosis was Generalized chronic stage 2 and grade 3 periodontitis and bone graft materials were placed accordingly in the sites to be treated and there were positive outcomes in both sites with no significant difference when compared with each other. The use of both bone graft materials aids in bone fill, there are better results observed in site treated with DFDBA.***

***Key Words – Case Report, Grade 2 Furcation, Guided Tissue Regeneration (GTR), Alloplastic Bone Grafts, Autogenous Bone Graft***

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## INTRODUCTION

Periodontal disease is an inflammatory infection caused by bacteria, that affects the supporting tissues of the teeth.[1] Impairment of the periodontal structures in particular alveolar bone is accountable for tooth loss[1]. Pritchard et al., 1965, stated that bony damage created as a consequence of periodontal disease can be of different bony defects.[2]

On progression of disease apically in multirooted teeth bone loss leads to furcation involvement.[3] Furcation is defined as the anatomic area of a multirooted tooth in which the roots diverge. Glickman classified furcation defects mainly into 4 grades. When there is inter radicular bone loss along with pocket formation into the furcation but not through and through bone is classified as a grade 2 furcation defect. The intricate morphology of furcation leads to hassle in treatment of such defects.[4]

The treatment of osseous defects is aimed at repair or regeneration. Several reconstructive and resective treatment options are available to manage furcation defects such as guided tissue regenerative(GTR) procedures, root resection, furcation plasty, bone grafting, hemisection, or combination therapy. Although bone tissue exhibits a large regenerative potential and may restore its original structure and function completely, bony defects may fail to heal with bone tissue.[5]

Melcher's concept of repair of periodontal tissues lays foundation for GTR mechanism, in which it is stated that only regenerative cells that are capable to reproduce whole periodontium. This concept

was supported by different studies where they have used bone grafts along with GTR by gain in bone volume and clinical attachment level along with reduction in pocket probing depth.[6] Different bone graft materials can be used.

Allografts are the bone graft material that has been used extensively in periodontal therapy. Demineralized Freeze Dried Bone Allografts (DFDBA) was first introduced by Urist et al in 1965 and has been extensively in use for periodontal regeneration.[7] They have been successfully used to reconstruct intraosseous periodontal defects. The current widespread use of DFDBA is based on the purported osteoinductive ability of bone graft preparations.

Alloplastic grafts are another option for use as a bone graft material. Porous particulate hydroxyapatite (HA) is a synthetic ceramic grafting material that is composed of biphasic composite with 60% hydroxyapatite (HA) and 40% β-tricalcium phosphate (β-TCP) in particulate form which is formed through replamine form process, which yields a material with interconnecting channels of 190 to 230 µ sized to support osteon formation and fibrovascular ingrowth. Although replamine form hydroxyapatite preparations are readily available stored and exhibit biocompatible tissue reactions, they are considered osteoconductive.[8]

The comparison between DFDBA and Hydroxyapatite in the management of grade 2 furcations defects has been reported in this case report. This comparison is a rarity in the wide range of available research reports on the grade 2 furcation treatment options. Therefore, the acme of this case report is the comparison between DFDBA and hydroxyapatite bone grafting materials in the terms of bone gain in grade 2 furcation defects of the mandibular molar.

The patient was selected from outpatient department of periodontology and oral implantology, Santosh Dental College and Hospital, Santosh deemed to be University, Ghaziabad, Delhi NCR, India. Patient was given a detailed description regarding the purpose and procedure of treatment and also written informed consent was provided by the patient prior to procedure.

**Case Report**

A 45-year-old male patient turned up at the Department of Periodontology and Oral Implantology, Santosh Dental College and Hospital, Santosh deemed to be University, Ghaziabad, Delhi NCR, India. With a chief complaint of pain on chewing in both lower back tooth regions of the jaw for the past few months. The oral hygiene status of the patient was fair. There was generalized gingival inflammation. The probing depth in relation to(i.r.t) 36 was as measured by using the UNC-15 probe was 7 mm buccal, 8 mm mesially, 5 mm lingual and 8 mm distally; Horizontal probing depth as measured by Naber's probe was 5 mm. The probing depth i.r.t 46 was as measured by using the UNC-15 probe was 7 mm buccal, 7 mm mesial, 5 mm lingual and 6 mm distal; horizontal probing depth as measured by Naber's probe was 5 mm. Intraoral radiograph supported these findings at pre-operative examination. The final diagnosis was decided as chronic generalized stage II grade 3 periodontitis. Complete oral prophylaxis was performed and patient was advised oral hygiene instructions. At the recall visit (15days from oral prophylaxis) there was a reduction in the probing pocket depths to 4 mm buccal, 5 mm mesial, 3 mm lingual and 5 mm distal i.r.t 36 whereas i.r.t 46 there was also a reduction in pocket probing depth to 5 mm buccal, 5 mm mesial, 2 mm lingual and 5 mm distal. Thus, a decision was made to perform a surgical intervention to treat the mandibular grade II furcation defect i.r.t 36 and 46. Clinical parameters horizontal and vertical probing pocket depths, gingival index and CAL were recorded at baseline, 3 months and 6 months.

**Treatment Procedure**

Sterile introral condition was attained by 0.12% chlorhexidine digluconate oral rinse. Following this LA was administered, number 15C blade was used to place incision and a full-thickness mucoperiosteal flap was raised i.r.t 35,36,37. Following this, complete debridement was done using Gracey curettes. After placing the collagen membrane, with help of sutures in the defect, it was filled using 500 cc of 500µ DFDBA. 3–0 vicryl suture were placed to obtain primary closure and non- eugenol periodontal dressing (COE PACK) was placed. Similar steps were followed i.r.t [45,46,47] but the defect was filled using 500 cc of 0.5 – 1 mm synthetic hydroxyapatite bone graft material.

**Postoperative care**

Following the surgical procedure, postoperative instructions were given along with analgesics and antibiotics. Post-surgery the patient was also advised to use chlorhexidine digluconate (0.12%) twice daily for 2 weeks. After two weeks patient was called for suture removal and thereafter patient was recalled after 3 and 6 months for a review. An RVG was taken at 6 months to assess bone regeneration.

**Recall Visit**

On 10 day recalled visit the surgical site was examined and uneventful healing was observed.

At 3months post-operatively there was a reduction in PPD and gingival index along with gin in gain in CAL i.r.t both 36 and 46.

At 6 months post-operatively intraoral radiograph was taken which indicated a gain in bone fill in response to bone grafting i.r.t 36 and 46.

## RESULT

Satisfactory healing was observed at 10th post-operative day. At 3 months there was reduction in periodontal pocket probing depth and a positive gain in clinical attachment level. At 6 months post-operatively radiographic evaluation was done and sufficient bone fill was observed in both the sites.

## DISCUSSION

Treatment concerning furcation involvement stands difficult and complex, among other periodontal defects because of its morphological and anatomical features. The goal of furcation therapy is to achieve bone fill in the region and regain lost anatomic normalcy and facilitating long term maintenance which improves the patient's periodontal health.

The defect was categorized in to grade II furcation defects based on 1953 Glickman's classification of furcation defects.[9] All the measurements were obtained using UNC-15 probe and Naber's probe.

Alloplastic and autogenous bone graft substitutes in osseous regeneration have been evaluated for several years. But there are only of a handful of case reports comprising them in the management of grade II furcation defects.

In our case report, we have used alloplastic and Autogenous bone graft material in regaining lost bone fill in grade II furcation defects. Along with the bone graft, we have also use the collagen membrane as a barrier in both sites. Collagen membrane is used as it is a haemostatic agent, act as a lattice for migrating PDL fibroblast and enhances cell migration.

There was a gain in clinical attachment level in both sites. These results are per house et al and khanna et. al. [10] wherein their study have mentioned that GTR enhances gain in clinical attachment level.

The reduction in the vertical probing depth and horizontal probing depth in both sites are in accordance to Cury et. al.[11], Andersson et. al.[12], Couri et. al.[13] and Tsao et. al.[14].

## CONCLUSION

Taking into consideration the results obtained and the patients perspective, in this case, the report we are concluding that bone grafts combined with bioresorbable membrane give satisfactory results in the management of furcation defects irrespective of the nature of the bone graft. However the findings need to be confirmed by Randomized Control Trails(RCTs).

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**Figure 1 Intraoral Pre-operative in relation to 36, 37**

**Figure 2 Introral Pre-operative in relation to 36,37**


**Figure 3 Allograft (DFDBA Graft)**

**Figure 4 Intra-operative following reflection of Flap in relation to 36, 37**

**Figure 5 Placement of allograft material in relation to the 36, 37**

**Figure 6 Placement of barrier membrane in relation to the 36, 37**

**Figure 7 Intraoperative measurement of defect in relation to 46, 47**

**Figure 8 Alloplastic graft placement on relation to 46, 47**

**Figure 9 Barrier membrane placement on relation to 46, 47**

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