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Original Research

Comparison of two graft material Concept of GBR in infrabony defects

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ABSTRACT:

Aim of the study: To compare two graft material Concept of GBR in infrabony defects. **Materials and methods:** The present study was conducted in the Department of Periodontology and implantology in Himachal Dental College Sundernagar, Himachal Pradesh. The subjects were patients who underwent simultaneous GBR using non-resorbable membranes and implant placement performed by the same department of Periodontology and implantology. A total of 10 patients were included in the study, 7 were males and 3 were females. The age of patients ranged from 32 years to 60 years, with mean age to be 46.39 years. Patients were divided into two groups according to the type of membrane used i.e. e-PTFE or d-PTFE. The patients were assigned randomly to either the e-PTFE group or the d-PTFE group according to the order of the surgery. The effect of each barrier membrane was assessed by measuring the amount of the bone defect at the time of the GBR and second surgery after GBR. **Results:** vertical bone defect around implant fixture at the time of the first surgery are shown in Table 2 (P>0.05). With regard to the amount of the bone defect, a statistically significant difference between the two groups was not detected. The marginal bone loss after functional loading was compared, and a significant difference between the two groups was not observed. **Conclusion:** Within the limitations of the present study, it can be concluded that e-PTFE and d-PTFE did not show a significant difference in bone regeneration effects.

Keywords: Guided bone regeneration, infrabony defects, GBR.

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INTRODUCTION:

The general goals of periodontal therapy include: 1. The primary and secondary prevention of periodontal disease by controlling infection and inflammation and 2. The maintenance and improvement of the health,

function, comfort and aesthetics of all supporting structures and tissues (gingivae, periodontal ligament [PDL], cementum and alveolar bone). A number of "so called" pathological entities may necessitate special attention, either because they are considered to be areas

of minoris resistentiae, e.g., intrabony and interradicular defects, or because of perceived aesthetic concerns and/or pain to the patients, e.g., marginal tissue recession defects. Therefore the ultimate goal for periodontal treatment is the regeneration of the lost periodontal tissues. Nevertheless, bone loss or insufficiency, as a hallmark of several systemic and periodontal diseases, trauma, and tumors, remains a major challenge. To achieve a good long-term prognosis for periodontitis tooth, a sufficient volume of bone should exist at the site. Different strategies, such as bone-grafting techniques and guided bone regeneration (GBR), have been applied to reconstitute the lost bone to allow^{1, 2}. Guided bone regeneration is considered as one of the methods most commonly applied to reconstruct bone and to treat infrabony deficiencies.^{3,4} Guided bone regeneration is presumed to be achieved when the osteoprogenitor cells are exclusively allowed to repopulate the bone defect site by preventing the entry of non-osteogenic tissues.^{5, 6} Hence, the present study was conducted to compare two graft material Concept of GBR in infrabony defects.

MATERIALS AND METHODS:

The present study was conducted in the Department of Periodontics of the Dental institution. The ethical clearance for the study was approved from the ethical committee of the hospital. The subjects were patients who underwent simultaneous GBR using non-resorbable membranes. The subjects were patients who had periodontitis in more than 4 teeth. Smoking history was assessed, and patients with uncontrolled systemic diseases were excluded from this study. A total of 10 patients were included in the study, 7 were male and 3 were female. The age of patients ranged from 32 years

to 60 years, with mean age to be 46.39 years. [Table 1] Patients were divided into two groups according to the type of membrane used i.e. e-PTFE or d-PTFE. The patients were assigned randomly to either the e-PTFE group or the d-PTFE group according to the order of the surgery. The effect of each membrane was assessed by measuring the amount of the bone defect at the time of the GBR and second surgery after GBR. In all cases, the surgical procedure was done simultaneously. After performing the bone graft, more than 2 mm of the margin of the bone defect area was covered with a barrier membrane. All barrier membranes were removed after 6-8 weeks. The amount of the bony defects was determined by measuring the horizontal and vertical bone defects using a periodontal probe from the mesial, distal, buccal, and lingual sides and calculating the mean of these measurements (unit: millimeter). At the time of the second surgery, the amount of the bone defect was measured using the same method.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student’s t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS:

The average amount of horizontal and vertical bone defect at the time of the first surgery are shown in Table 2 (P>0.05). With regard to the amount of the bone defect, a statistically significant difference between the two groups was not detected. The marginal bone loss postoperatively was compared, and a significant difference between the two groups was not observed. (Table 3, P>0.05)

Fig 1: Primary bone defects

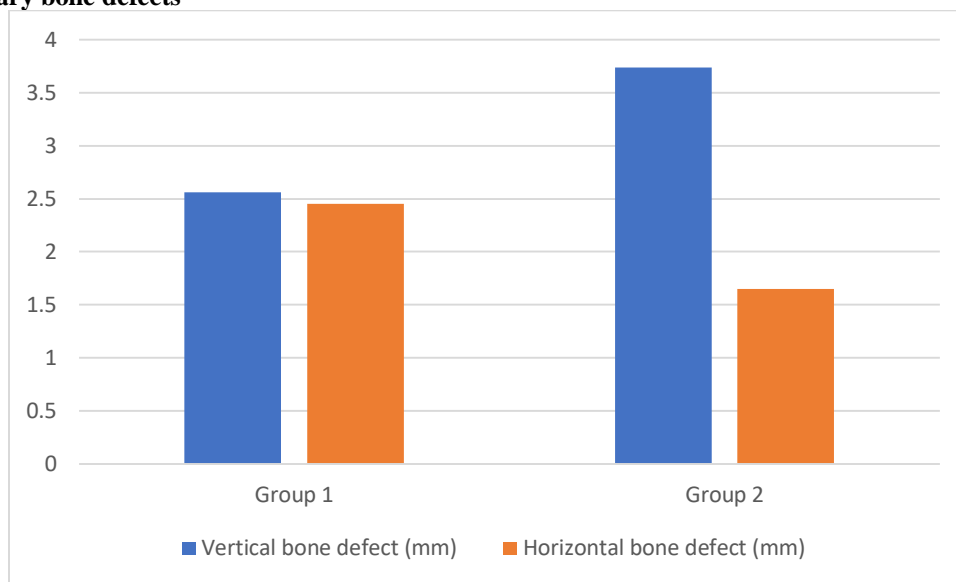


Table 1: Demographic variables

Demographic variables	Number
Total patients	10
Male patients	7
Female patients	3
Mean age (years)	46.39

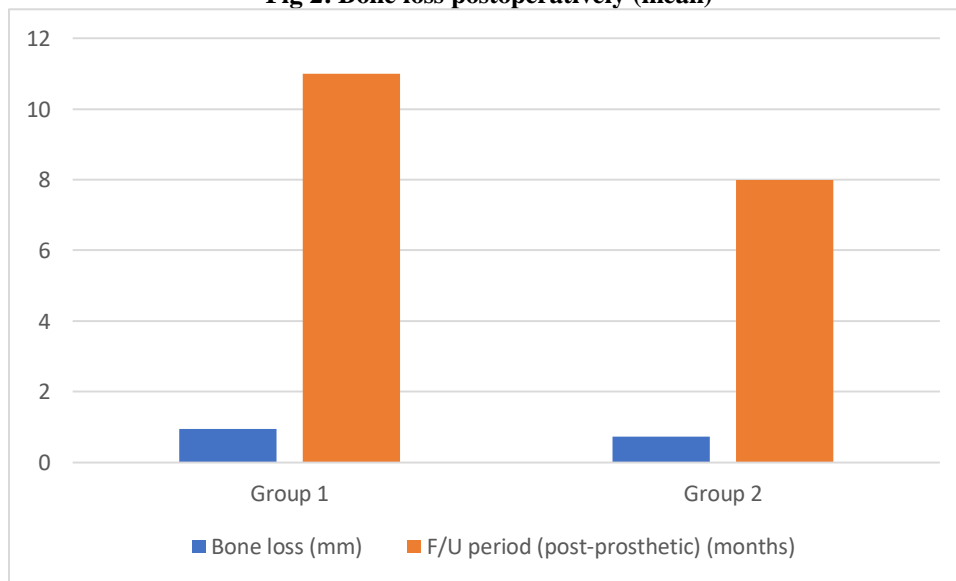
Table 2: Primary bone defects (mean)

	Group 1	Group 2	p-value
Vertical bone defect (mm)	2.56	3.74	0.5
Horizontal bone defect (mm)	2.45	1.65	

Table 3: Bone loss postoperatively (mean)

	Group 1	Group 2	p-value
Bone loss (mm)	0.95	0.73	0.002
F/U period (post-prosthetic) (months)	11	8	

Fig 2: Bone loss postoperatively (mean)



DISCUSSION:

In the present study, we observed that there is a non significant relation between the two groups on the basis of amount of bone defect. Furthermore, there was non-significant data for marginal bone loss postoperatively. The results were compared with previous studies and were found to be consistent. Chung YM et al assessed and compared the clinical and radiographic outcomes of guided tissue regeneration therapy for human periodontal intrabony defects using two different collagen membranes: a porous nonchemical cross-linking collagen membrane (NC) and a bilayer collagen membrane (BC). Thirty subjects were randomly assigned and divided into the following 3 groups: a test group (NC+BM), in which a NC was used with xenograft bone mineral (BM), a positive control group (BC+BM), in which a BC was used with xenograft BM,

and a negative control group (BM), in which only xenograft BM was used. The following clinical measurements were taken at baseline and 3 months after surgery: plaque index, gingival index, probing pocket depth, gingival recession, and clinical attachment level. Radiographic analysis was performed at baseline, 1 week and 3 months after surgery. Membrane exposure was not observed in any cases. Significant probing depth reduction, attachment-level gain and bone fill were observed for both test and control groups compared to baseline at 3 months after surgery. However, there were no statistically significant differences in clinical improvement and radiographic bone fill between treatment protocols. They concluded that both NC and BC were comparable in terms of clinical and radiographic outcomes for the treatment of periodontal intrabony defects in human subjects. Crea A

et al compared guided tissue regeneration (GTR) to enamel matrix derivative (EMD) for the treatment of intrabony defects in patients with chronic advanced periodontitis. Forty (39 evaluable) 3-wall intrabony defects, each with a depth ≥ 4 mm measured from the crest of the bony defect, were treated in 40 subjects with advanced chronic periodontitis. Regeneration of angular bone defects was induced using non-resorbable membranes (GTR group; $n = 20$) or EMD (EMD group; evaluable $n = 19$). Clinical parameters, including probing depth (PD), clinical attachment level (CAL), gingival recession, radiographic measurement of the defect depth, plaque index, and bleeding on probing, were measured at baseline and at 12 and 36 months following surgery. Twelve months after surgery, sites treated with GTR demonstrated a mean CAL gain of 2.5 ± 1.2 mm and a mean reduction in PD of 3.5 ± 1.2 mm compared to baseline. The corresponding outcomes at 36 months were 2.0 ± 1.1 mm (CAL) and 3.2 ± 1.1 mm (PD). Sites treated with EMD demonstrated a mean CAL gain of 2.9 ± 1.4 mm and a mean reduction in PD of 3.5 ± 1.4 mm at 12 months, with a mean CAL gain of 2.4 ± 1.2 mm and a mean PD reduction of 3.1 ± 1.4 mm at 36 months. The differences in PD reduction and CAL gain were statistically significant between the groups and for each time point compared to baseline. Attachment loss was seen in both groups between the 12- and 36-month observations. Measured radiographic bone fill was $57.0\% \pm 21\%$ at 12 months and $53.7\% \pm 14.3\%$ at 36 months in the GTR group compared to $50.5\% \pm 19\%$ at 12 months and $58.8\% \pm 14.9\%$ at 36 months in the EMD group. They concluded that the treatment of intrabony defects in patients with chronic advanced periodontitis using GTR or EMD led to significantly improved clinical parameters.^{7,8}

Chen CC et al compared the clinical regenerative capacity of collagen membrane with and without demineralized freeze-dried bone allografts (DFDBA) in treating periodontal intrabony defects. Ten systemically healthy patients with similar bilateral periodontal defects were scheduled for surgery. Each patient had at least ≥ 6 mm clinical probing depth and loss of attachment at selected sites. Baseline measurements included gingival index (GI), plaque index (PI), gingival recession (GR), clinical attachment level (CAL), probing depth (PD), and mobility. At the time of surgery, the defects were randomly assigned to either test or control group. Stent to base of the defects, stent to crest bone, crest of bone to base of the defect, and width of the defects were recorded at the time of surgery and reentry. Eight patients returned after 6 months for reentry surgery. Statistical analysis with a paired t test was used to evaluate the treatment effect and comparison between test and control groups. In addition, a McNemar test was used to analyze the

significance of GI, PI, and mobility at different times. The result of this study indicated that both the collagen plus DFDBA and the collagen alone treatment groups had a significant decrease of PD, gain of CAL, and defect fill when compared to the presurgery status. However, there was no significant difference in PD, AL, GR, defect fill, crestal bone resorption, GI, PI, or mobility between the test group and control group. No adverse tissue reaction, infection, or delayed wound healing was noted throughout the treatment in either group. They concluded that the collagen membrane is well tolerated by the human tissues. Both treatments, either collagen membrane plus DFDBA or collagen membrane alone, promoted significant resolution of periodontal intrabony defects. The addition of a bone graft (DFDBA) with a collagen membrane appears to add no extra benefit to the collagen membrane treatment. Lee JY et al examined the clinical results of different non-resorbable barriers for GBR; expanded polytetrafluoroethylene (e-PTFE), and high-density polytetrafluoroethylene (d-PTFE). The analysis was performed on patients treated with GBR and implant placement from January 2007 to October 2007 in the department of the Seoul National University Bundang Hospital. The patients were divided into two groups based on the type of non-resorbable barrier used, and the amount of bone regeneration, marginal bone resorption after prosthetics, implant survival rate and surgical complication in both groups were evaluated. The implants in both groups showed high survival rates, and the implant-supported prostheses functioned stably during the follow-up period. During the second surgery of the implant, all horizontal defects were filled with new bone, and there was no significant difference in the amount of vertical bone defect. They concluded that in bone defect areas, GBR with non-resorbable barriers can produce favorable results with adequate postoperative management. There was no significant difference in bone regeneration between e-PTFE and d-PTFE.^{9,10}

CONCLUSION:

Within the limitations of the present study, it can be concluded that e-PTFE and d-PTFE did not show a significant difference in bone regeneration effects.

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