Management of periodontal osseous defect by using equine xenograft & equine pericardial GTR membrane and its clinical and radiological evaluation: Clinical study

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Abstracts

Aim: Successful treatment of periodontitis is considered to be dependent on early diagnosis, targeted antimicrobial therapy and modifying the tissue architecture that is conducive to long-term maintenance. Osseous defects present a challenge in periodontal practice and successful treatment depends primarily on selection of the correct technique and materials.

Objectives: This clinical study presents the cases treated with different techniques and with same materials. The periodontal osseous defect was filled up with a equine based bone graft substitute Collagen granules Bio-Gen (Bioteck®, Italy) and covered with a restorable pericardial derived equine based Bio-collagen GTR membrane (Bioteck® Italy). The results in all the cases discussed here are satisfactory and have shown long-term stability emphasizing the importance of selection of technique and material.

Conclusion: Use of equine based xenograft with pericardial originated GTR bioresorbable membrane showed significant improved outcomes in treating periodontitis.

Keywords: Periodontal Osseous Defects, Guided Tissue Regeneration (GTR), Equine Xenografts .Pericardial Membrane.

Introduction

Periodontitis is an infectious disease of the gingival tissue, changes that occur in the bone are crucial because the destruction of the bone is responsible for tooth loss.(1) The purpose of periodontal therapy is to eliminate the inflammation of the periodontal tissues, to arrest the destruction of soft tissue and bone caused by periodontal disease, and regenerate the lost tissue, if possible.(2)

Bone grafting is the most common form of regenerative therapy and has been used for almost 100 years in attempts to stimulate healing of bony defects.(3) The predictable complete periodontal regeneration remains a major goal in the planned therapy.

Despite several procedures such as usage of guided tissue regeneration (GTR), grafting materials, growth factors and/or host modulating agents have been attempted, the outcomes are not always predictable.(4-6) However, to our knowledge, there are no available studies comparing the efficacy of using an equine bioabsorbable collagen barrier (Biocollagen®) alone or combined with equine graft (Bio-Gen®), in treating intrabony defects of aggressive periodontitis.(7)

Subjects & Methods

Twenty patients (with thirty defects) diagnosed with generalized chronic periodontitis having two or more vertical defects, were selected for this study from the OPD of Periodontics, Chandra Dental College and Hospital, Barabanki, U.P. (India). Inclusion criteria are Patients diagnosed as with probing depth of ≥5 mm and radiographic evidence of vertical bone loss**,** age group of 35-55 years.

Study design: After Phase I therapy baseline measurements included Plaque Index, Gingival index, Probing pocket depth, and Clinical attachment level (using a UNC-15 probe with an occlusal stent). All the sites were examined to record the clinical and radiographic parameters.

Radiographic parameters: An Intraoral periapical radiograph of each defect site was exposed using the long cone-paralleling technique. Digitized images were displayed on the monitor at 5X magnification using Adobe Photoshop 7.0 computer software.

Surgical protocol: At the experimental sites, the defect was filled up with an equine based bone graft substitute, and sutures given. The control sites were left unfilled after surgical debridement, thorough root planing, and irrigation of surgical wound was done with normal saline. The mucoperiosteal flaps were repositioned and secured in place using black, braided (4-0), interrupted silk sutures to obtain primary closure of the interdental space, and protected with a noneugenol dressing. All patients were prescribed an analgesic Diclofenac sodium 50 mg, twice a day, and Amoxycillin 500 mg thrice a day for five days.

Figure 1: Clinical photograph showing [bioabsorbable equine collagen membrane (Biocollagen®) & equine bone graft (Bio-Gen®)].

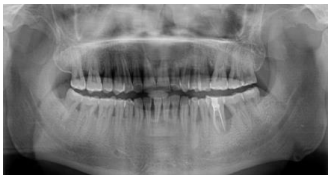


Fig 1: Preoperative radiographic view

Fig 2: clinical view of defect in 36,37

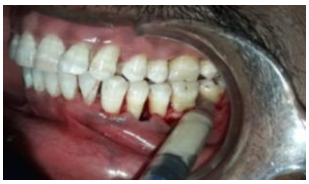


Fig 3: Bone Graft Placement

Fig 4: Membrane placement

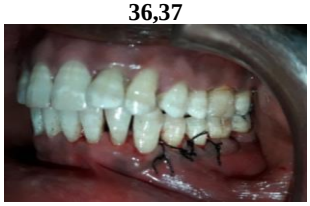


Fig 5: Suturing

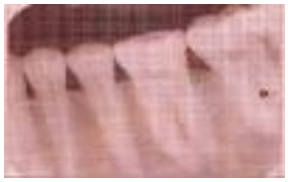


Fig 6: Postoperative radiographic view

Figures of one of the case

Post-surgical protocol: After one week following surgery, the dressing and sutures were removed and the surgical site was irrigated thoroughly with saline. Clinical parameters and radiographic measurements were repeated for both control and experimental sites.

Results

Plaque index: No statistically significant differences were found in the mean values for the plaque index between the test and control groups at baseline (P = 0.173), one month (P = 0.956), three months (P = 0.729), and six months. (P = 0.181)

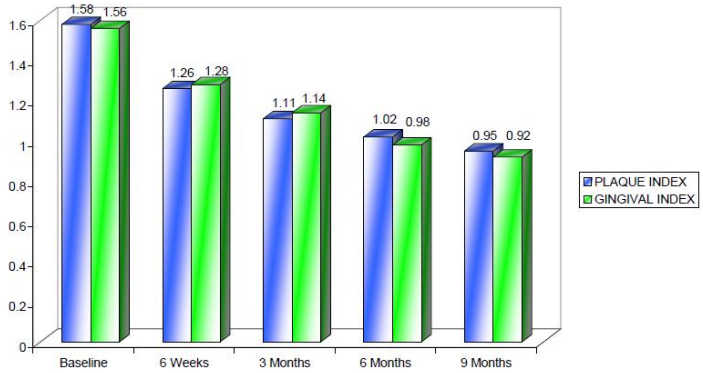
Gingival index: No statistically significant differences were found in the mean values for the gingival index between the test and control groups at baseline (P = 0.069), at one month (P = 0.050), three months (P = 0.060), and six months. (P = 0.172)

Table 1: Mean changes in plaque index and gingival index score at different intervals

		Mean ± SD	Mean Reduction from Baseline	% Reduction	t-Value P-Value
Plaque Index	Baseline	1.58 ± 0.35	-	-	-
	6 Weeks	1.26 ± 0.22	0.32 ± 0.29	20.3	3.46 <.05
	3 Months	1.11 ± 0.22	0.47 ± 0.24	29.7	6.18 <.001
	6 Months	1.02 ± 0.17	0.56 ± 0.27	35.4	6.62 <.001
	9 Months	0.95 ± 0.16	0.63 ± 0.26	40.0	7.71 <.001
Gingival Index	Baseline	1.56 ± 0.28	-	-	-
	6 Weeks	1.28 ± 0.27	0.28 ± 0.13	17.9	6.73 <.001
	3 Months	1.14 ± 0.28	0.42 ± 0.14	26.9	9.50 <.001
	6 Months	0.98 ± 0.21	0.58 ± 11	37.2	16.16 <.001
	9 Months	0.92 ± 0.19	0.64 ± 0.14	41.0	14.15 <.001

*Paired t-test
P<.001 Highly singificant

Graph 1: **Mean changes in plaque index and gingival index score at different intervals**



Probing pocket depth: No statistically significant differences were found between the test and control groups at baseline ($P = 0.646$) and three months ($P = 0.109$). However, the mean values at six months ($P = 0.014$) were highly significant. The decrease in probing depth in the experimental site from baseline to six months postoperation was 64.26% as compared to the control group which showed a decrease of 54.52%.

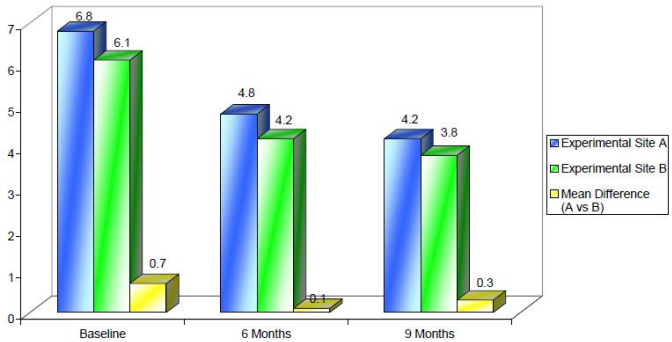
Clinical attachment level: The difference between the mean values for the levels of clinical attachment at baseline ($P = 0.65$) in the test and control groups was not significant. However, the differences in the mean values of clinical attachment levels at three ($P = 0.036$) and six months ($P < 0.001$) were statistically significant. This gain in clinical attachment from the baseline to six months postoperatively was 84.82% for the experimental group and 68.83% for the control group.

Table 2: Mean changes in probing depths and clinical attachment levels score at different intervals at control and experimental site

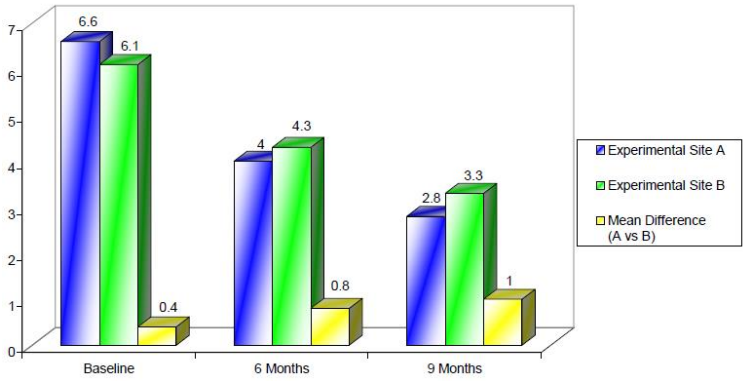
	Assessment Time	EXPERIMENTAL SITE-A				EXPERIMENTAL SITE-B				A vs B		
		Mean ± SD	Difference from Baseline	%	Significance* P-Value	Mean ± SD	Difference from Baseline	%	Significance*	Mean Difference	t-Value	Significance** P-Value
Pocket Probing Depth	Baseline	6.80 ± 1.40	-	-	-	6.10 ± 1.37	-	-	-	0.70	1.13	0.27 NS
	6 Months	4.80 ± 0.92	2.00 ± .33	29.4	4.74 P<.09	4.20 ± 1.55	1.90 ± 0.88	31.1%	6.86 P<.09	0.10	0.20	0.85 NS
	9 Months	4.20 ± 0.79	2.60 ± 1.43	38.2	5.75 P<.001	3.80 ± 1.55	2.30 ± 1.25	37.7	5.81 P<.001	0.30	0.50	0.62 NS
Clinical Attachment Level	Baseline	6.60 ± 1.07	-	-	-	6.10 ± 1.37		-	-	-	-	-
	6 Months	4.00 ± 0.82	2.60± 1.35	-	6.09 P<.001	4.30 ± 1.49	1.80 ± 0.65	-	9.00 P<.001	0.80	1.70	0.11
	9 Months	2.80 ± .63	3.80 ± 1.48	-	8.19 P<.001	3.30 ± 1.42	2.80 ± 1.03	-	8.57 P<.001	1.00	1.76	0.10

*Paired "t" test
** Unpaired "t" test
P<.001 highly significant
P>0.05 Not significant

Graph 2: Mean changes in probing depths and clinical attachment levels score at different intervals at control and experimental site



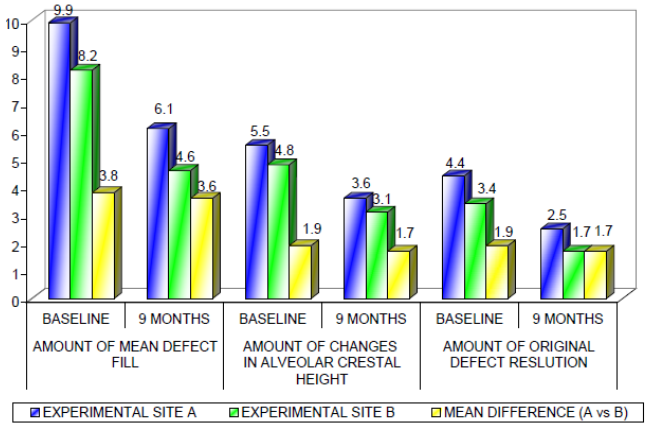
Graph 3: Mean difference in the clinical attachment levels score at different intervals at control and experimental site



Amount of bone fill in the defects

For control sites, the statistically significant mean difference in defect fill from the baseline was 4.2000 ± 0.9783 mm (P = 0.212) at three months and 3.8000 ± 0.8619 mm (P = 0.014) at six months. For experimental sites, the statistically significant mean difference in defect fill from baseline was 3.6667 ± 1.0293 mm (P = 0.013) at three months and 2.6333 ± 0.8958 mm (P < 0.001) at six months .The differences in the mean values of the amount of defect fill at baseline (P = 0.925) and at three months (P = 0.157) were not significant but the difference was statistically significant at six months (P < 0.001) between the experimental and control groups.

Graph 4: Amount of mean defect fill, amount of changes in alveolar crestal high and amount of original defect resolution score at different intervals at control and experimental site



Discussion

A equine bone substitute has been used in this study and clinical parameters and radiographs were compared. Comparative analysis of plaque index non-significant difference between the two sites. This improvement in gingival status could be due to the surgery and frequent supportive therapy provided. Experimental site had a higher percentage of defect fill than did the control site, the difference being statistically highly significant.

Conclusions

Although equine based bone graft substitute has shown promising results on clinical and radiographic evaluation, additional long-term studies should be undertaken to obtain more clinical evidence for regular use of this material.

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