International Journal of Applied Science

ISSN (Online): 2208-2190
Volume 09 Issue 03-September, 2023

DOI: https://doi.org/10.53555/2ccc3g08

COMPARATIVE EVALUATION OF PRF COMBINED WITH XENOGRAFT (STICKY BONE) vs CORONALLY ADVANCED FLAP SURGERY IN THE TREATMENT OF STAGE I / II WITH GRADE A/B PERIODONTITIS- A CLINICAL STUDY

Tulica Mittal[1*], Rakshita Sharma[2], Gurpreet Kaur,[3] Navneet Kaur[4]

PG student, Department of Periodontics & Oral Implantology, National Dental College & Hospital, Derabassi, Punjab Email-id: tulicamittal95@gmail.com contact no. 9478879339.
PG student, Department of Periodontics & Oral Implantology, National Dental College & Hospital, Derabassi, Punjab Email-id: Rbrakshitha123@gmail.com contact no. 9717236405.
Professor & HOD, Department of Periodontics & Oral Implantology, National Dental College & Hospital, Derabassi, Punjab. Email: gurpreet.nenu@gmail.com, Contact no. 9915655003
Reader, Department of Periodontics & Oral Implantology, National Dental College & Hospital, Derabassi, Punjab. Email: kaurparneet1963@gmail.com, Contact no: 9780925518.

***Corresponding Author:** Dr. Tulica Mittal*
**PG student, Department of Periodontics & Oral Implantology, National Dental College & Hospital, Derabassi, Punjab Email-id: tulicamittal95@gmail.com contact no. 9478879339.*

ABSTRACT

INTRODUCTION

Periodontal therapy aims to prevent periodontal tissue destruction while achieving regeneration of lost and damaged tissues. Platelet Rich Fibrin (PRF) is the latest advancement in fibrin technology and is a rich autologous source of various growth factors and leukocytes. PRF has a strong potential to influence the cellular mechanisms responsible for periodontal regeneration to be achieved. A combination of the two grafting modalities may prove to be an advantageous regenerative treatment option for management of Stage I/II with grade A/B Periodontitis.

AIMS AND OBJECTIVES

To clinically evaluate, the additional effectiveness of PRF when used in combination of with Xenograft (Sticky bone) as compared to Coronally advanced flap in the treatment of Stage I/II with grade A/B Periodontitis.

MATERIALS AND METHODS

A total of 12 patients with age group of 30-50 years diagnosed with Stage I / II with Grade A/B Periodontitis with probing pocket depth ≥ 5mm will be randomly selected & divided into two groups with 6 patients in each group: Group 1 i.e. Test group, 6 patients treated with Coronally advanced flap surgery with a placement of Platelet rich fibrin in combination of Xenograft (sticky bone). Group 2 i.e. Control Group, 6 patients treated with Coronally advanced flap surgery alone. Clinical parameters such as Pocket probing depth, gingival index, recession depth, width of keratinized gingiva and plaque index will be recorded at baseline & after 3 months post operatively.

RESULTS

Both the groups revealed a statistically significant difference with meaningful reduction from baseline to 3 months when comparing intragroup clinical measures (Gingival index, Probing pocket depth, width of keratinized gingiva and recession depth). On Intergroup comparison of all the clinical parameters except plaque index revealed a statistically significant difference in between group 1 and group 2.

CONCLUSION

The result obtained from the study showed that there is an additional effectiveness of PRF when used in combination of with Xenograft (Sticky bone) as compared to Coronally advanced flap in the treatment of Stage I/II with grade A/B Periodontitis.

KEYWORDS: *Coronally advanced flap, Sticky bone, Recession depth, Platelet Rich Fibrin, Osseograft, Periodontal Regeneration, Intrabony defect*

INTRODUCTION

The goal of periodontal therapy includes arrest of periodontal disease progression and the regeneration of structures lost due to pre-existing disease process. Conventional surgical techniques offer only limited potential towards recovering the lost periodontal structures. Successful periodontal reconstruction comprises of regeneration of multiple tissues of the periodontium. It is a complex biological process in itself which is intricately regulated between cells, locally acting growth factors and the extracellular matrix components. The key to periodontal regeneration is to stimulate the progenitor cells to re-occupy the defect.[1] Periodontal regeneration can be defined as the complete restoration of lost periodontal tissues to their original architecture and function by recapitulating the crucial wound healing events associated with their development[2] Regeneration of any tissue type in a complex biological process in itself, requiring intricately regulated interactions between cells, locally acting growth factors, systemic hormones, and the extracellular matrix components in which these interact. In periodontium, such regeneration involves the creation of new alveolar bone, cementum and periodontal ligament. Among the various surgical techniques used to achieve the ideal biologic conditions required for periodontal regeneration, open flap debridement (OFD) or coronally advanced flap.is promising procedures resulted in significant clinical benefits when used along with various biomaterials.[3,4] Earlier attempts to achieve regeneration included denudation of interdental bone to treat intrabony defects and use of autografts to fill the surgical site. However, recently, the attention has shifted to the use of growth factors which are the biologic mediators that can regulate the proliferation, chemotaxis and differentiation of the locally derived progenitor cells in the defect site.[5] Among the rich sources of autologous growth factors, the various generations of platelet concentrates are currently in use. PRF is a second-generation autologous leukocyte platelet concentrates which is being successfully used in various fields of dentistry for regeneration of lost periodontal tissue. PRF has shown successful results when used as a sole agent in the treatment of periodontal intrabony defects. However, limited research is available for PRF as a combination therapy with bone graft materials.[6] PRF has been shown to be a source of transforming growth factors β-1 (TGIF β -1), vascular endothelial growth factor (VEGF), and platelet derived growth factor (PDGF). These growth factors are bound within the fibrin matrix, resulting in a slow, sustained release through the natural maturation and recognition of clot. PRF is a form of platelet gel which can be used in addition with bone grafts, to offer growth and maturation, graft stabilization, wound sealing and haemostasis, and improving the handling properties of graft materials.

Hence the present study will be conducted to clinically evaluate, the additional effectiveness of PRF when used in combination of with Xenograft (Sticky bone) as compared to Coronally advanced flap in the treatment of Stage I/II with grade A/B Periodontitis.

MATERIAL AND METHODS:

STUDY POPULATION

For the proposed study, a total of 12 patients with age group of 30-50 years diagnosed with Stage I / II with Grade A/B Periodontitis with probing pocket depth ≥ 5mm were randomly selected from the outpatient department of Periodontics and Oral Implantology. An ethical approval for the study was obtained from the Institutional Ethical Board Committee and a detailed verbal and written consent was taken from each of the patient**.**

Patients were randomly selected and divided into 2 groups: Group 1 i.e. Test group, 6 patients treated with Coronally advanced flap surgery with a placement of Platelet rich fibrin in combination of Xenograft (sticky bone). Group 2 i.e. Control Group, 6 patients treated with Coronally advanced flap surgery alone.

INCLUSION CRITERIA

i. Patients within age group of 30-50 years will be diagnosed with STAGE I / II with Grade A/B Periodontitis (**classification of periodontal and peri implant condition by 2017 world workshop of AAP and EEP**).
ii. Presence of Miller Class I gingival recession (RT 1) in involving atleast 2 teeth with adequate keratinized gingival and thick gingival phenotype.
iii. Presence of 2-walled and 3-walled interproximal defect depth ≥ 3 mm deep. (distance between alveolar crest and base of the defect)
iv. Systemically healthy patients with debilitating conditions.

EXCLUSION CRITERIA

i. Patients with history of periodontal surgical treatment within last 6 months.
ii. Formers/ current smokers.
iii. Pregnant and lactating ladies.
iv. On antibiotic therapy within 6 months.
v. Patients with non-vital teeth with furcation defect or teeth with mobility ≥ Grade 2.
vi. Patients with Endo- Perio involvement.

METHODOLOGY

CLINICAL PROCEDURE

A total of 12 patients with of Stage I / II with Grade A/B Periodontitis will be randomly selected & divided into two groups with 10 patients in each group.

Group 1 (Test group) – 6 patients treated with Coronally advanced flap surgery with a placement of Platelet rich fibrin in combination of Xenograft (sticky bone).

Group 2 (Control Group) – 6 patients treated with Coronally advanced flap surgery.

After local anesthesia, crevicular incision will be made on buccal, facial, lingual and palatal surfaces extending on the tooth on each side of the defect using BP blade no. 15. A full mucoperiosteal flap will be reflected using periosteal elevator. After the reflection, a thorough surgical debridement of soft tissue and hard tissue will be done using Gracey curettes. Debridement will be followed by copious 0.9% saline irrigation.
In group 1, the defect will be filled with PRF in combination of Xenograft (sticky bone). Freshly prepared PRF gel will be obtained after centrifugation and immediately used. The defect will be filled with either sticky bone with a light pressure till it will be filled upto most coronal part of osseous wall.
The flap will be repositioned and secured with sutures along with placement of periodontal pack. Post operative instructions will include antibiotic (Amoxicillin 500 mg tds for 7 days) and NSAIDs (Ibuprofen 400 mg every 4 to 6 hours as needed). Patients will be instructed to use Chlorhexidine gluconate 0.2% twice a day for 15 days.

ASSESSMENT OF CLINICAL PARAMETERS:
Clinical parameters included the assessment of Pocket probing depth, gingival index, recession depth, width of keratinized gingiva and plaque index were measured at baseline and after 3 months.

STATISTICAL ANALYSIS
The parameters were tabulated and put to statistical analysis. The data for the present study was entered in the Microsoft Excel 2013 and analyzed using the SPSS statistical software 23.0 Version. The descriptive statistics included mean and standard deviation. The level of the significance for the present study was fixed at 5%. The intergroup comparison for the difference of mean scores between independent groups was done using unpaired/ independent t test.

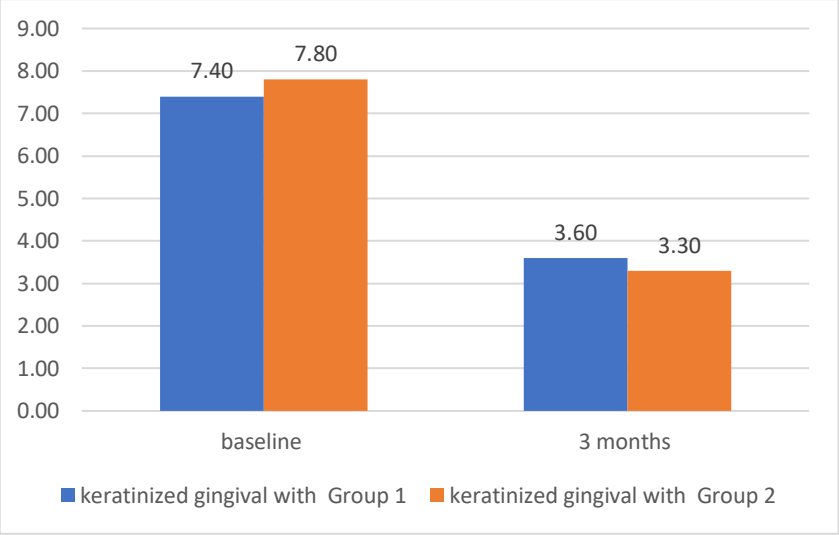
RESULTS

Table 1: Intragroup comparison of all clinical parameters at various time interval

CLINICAL PARAMETERS	GROUP 1			GROUP 2		
	BASELINE (Mean±SD)	3 MONTHS (Mean±SD)	P-VALUE	BASELINE (Mean±SD)	3 MONTHS (Mean±SD)	P-VALUE
PLAQUE INDEX	1.52	1.23	0.14	1.66	1.43	0.27
GINGIVAL INDEX	2.04	1.31	0.02	2.01	1.22	0.00
WIDTH OF KERATINIZED GINGIVA	7.40	3.60	0.00	7.80	3.30	0.00
PERIODONTAL PROBING DEPTH	4.80	2.40	0.01	5.00	2.20	0.01
RECESSION DEPTH	2.80	1.20	0.00	2.80	1.10	0.02

*P value ≥ 0.05 (statistically significant)
*P value ≤ 0.05 (non-statistically significant)

In **Group I** (the test group), the baseline scores of various clinical parameters decreased after 3 months. This reduction was statistically significant, as indicated by a p-value of 0.00-0.02. This suggests that the test group experienced a meaningful reduction in plaque index scoring, gingival index scoring, width of keratinized gingiva scoring and Probing pocket depth over the 3 months period. Similarly, in **Group II** (the control group), the baseline scores reduced at 3 months for plaque index scoring, gingival index scoring, width of keratinized gingiva scoring and Probing pocket depth. This reduction was also statistically significant, with a p-value of 0.00 - 0.02 respectively. This indicates that, the control group also showed a significant decrease in the values at 3 months.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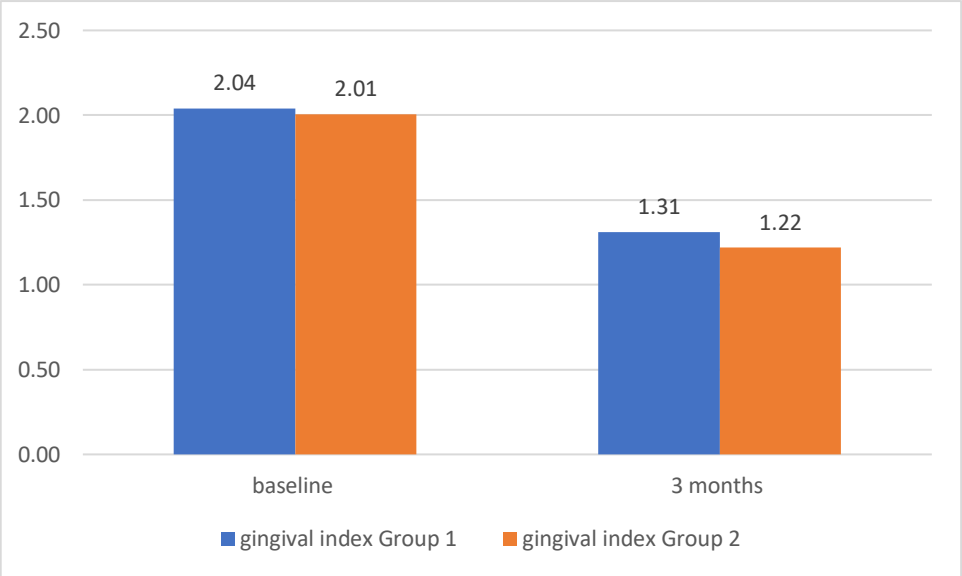
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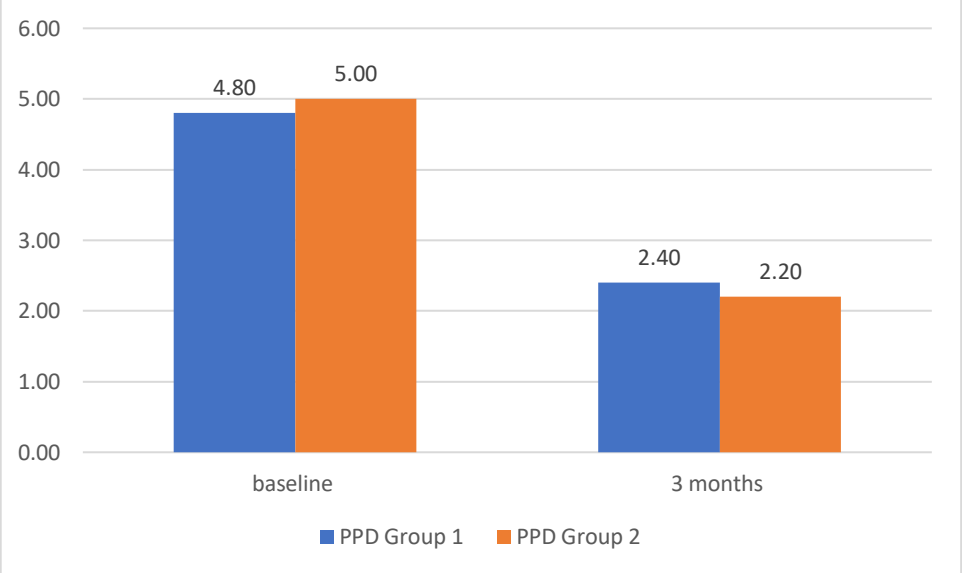
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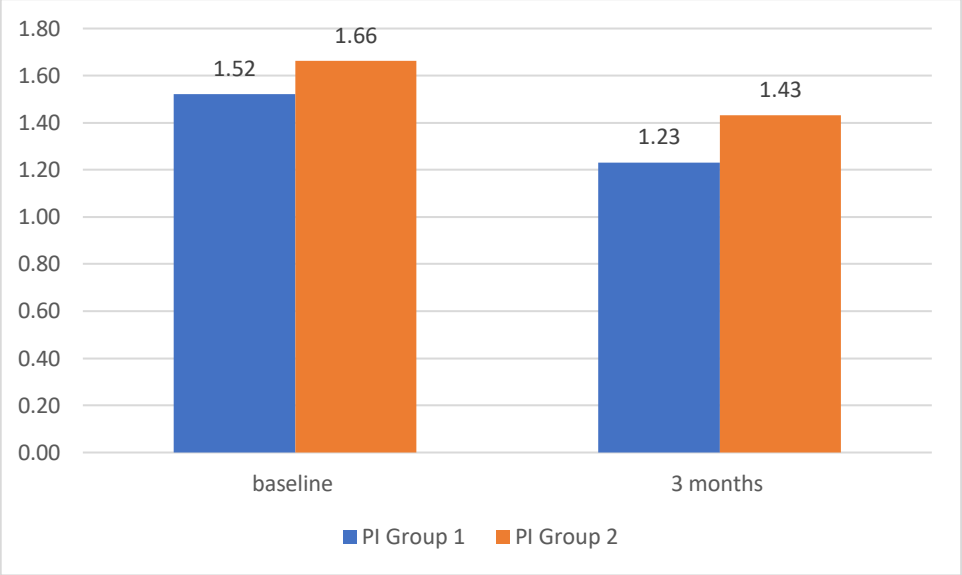

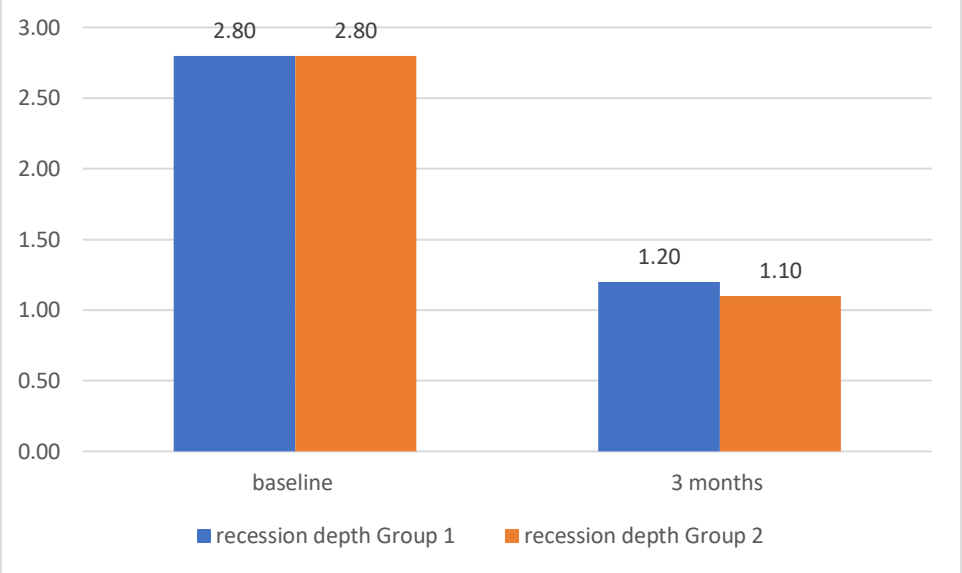

Table 2: Intergroup comparison of all clinical parameters at various time interval

CLINICAL PARAMETERS	GROUP 1			GROUP 2		
	BASELINE (Mean±SD)	3 MONTHS (Mean±SD)	P-VALUE	BASELINE (Mean±SD)	3 MONTHS (Mean±SD)	P-VALUE
PLAQUE INDEX	1.52±0.34	1.23±0.33	0.14	1.66±0.29	1.43±0.27	0.27
GINGIVAL INDEX	2.04±0.57	1.31±0.33	0.02	2.01±0.50	1.22±0.30	0.00
WIDTH OF KERATINIZED GINGIVA	7.40±0.82	3.60±0.89	0.00	7.80±0.57	3.30±0.97	0.00
PERIODONTAL PROBING DEPTH	4.80±0.76	2.40±0.55	0.01	5.00±0.61	2.20±1.10	0.01
RECESSION DEPTH	2.80±0.84	1.20±0.45	0.00	2.80±0.84	1.10±0.22	0.02

PLAQUE INDEX score in Group 1 was 1.52±0.34 at baseline and 1.23±0.33 after 3 months reveals a reduction in the plaque index. In Group 2 the Plaque index score was 1.66±0.29 at baseline and 1.43±0.27 after 3 months. Intergroup comparison of mean Plaque index score was found to be statistical non-significant between group 1 & group 2.

GINGIVAL INDEX score in Group 1 was 2.04±0.57 at baseline and 1.31±0.33 after 3 months reveals a reduction in the gingival index score. In Group 2 the gingival index score was 2.01±0.50 at baseline and 1.22±0.30 after 3 months. Intergroup comparison of mean gingival index score was found to be statistically significant between group 1 & group 2.
WIDTH OF KERATINIZED GINGIVA mean score in Group 1 was 7.40±0.82 at baseline and 3.60±0.89 after 3 months reveals a reduction in the width of keratinized gingiva score. In Group 2 the width of keratinized gingiva mean score was 7.80±0.57 at baseline and 3.30±0.97 after 3 months. Intergroup comparison of mean wkg score was found to be statistically significant between group 1 & group 2.
PERIODONTAL PROBING DEPTH mean score in Group 1 was 4.80±0.76 at baseline and 2.40±0.55 after 3 months reveals no reduction in the periodontal probing depth score. In Group 2 the periodontal probing depth mean score was 5.00±0.61 at baseline and 2.20±1.10 after 3 months. Intergroup comparison of mean periodontal probing depth score was found to be statistically significant between group 1 & group 2.
RECESSION DEPTH mean score in Group 1 was 2.80±0.84 at baseline and 1.20±0.45 after 3 months reveals reduction in the recession depth score. In Group 2 the recession depth mean score was 2.80±0.84 at baseline and 1.10±0.2 after 3 months. Intergroup comparison of mean recession depth score was found to be statistically significant between group 1 & group 2.

DISCUSSION

Platelet rich fibrin (PRF) has been introduced by Choukron et al in 2001 belongs to a second-generation platelet concentrate. It is a biomaterial which is Platelet rich fibrin (PRF) has been introduced by Choukron et al in 2001 belongs to a second-generation platelet concentrate. It is a biomaterial which is fibrin – based and is prepared from anticoagulant –free blood harvest without any biochemical additions. The PRF concentrates almost all the growth factors and platelets of the blood harvest. PRF preparation can be done with a REMI centrifuge and a blood collection kit consisting of 24-gauge needle and 9ml blood collection tubes. A sample of blood is taken from the patient and centrifuged at a rate of 3000 rpm for 10 min. The PRF clot will be seen as a middle layer. It can also be prepared in the form of a membrane by squeezing out the fluids present in the fibrin clot. Since it is prepared without the addition of anticoagulants it is classified as a second-generation platelet concentrate. PRF has a dense fibrin network comprising of glycoproteins, and various cytokines. It contains transforming growth factor b1, vascular endothelial growth factor, and thrombospondin-1. The PRF scaffold which contains leukocytes will result in growth factor release regulation of immune reactions, anti-infectious activities and matrix remodeling during wound healing. For favorable wound healing, the slow polymerization mode of PRF plays a crucial role.
Studies show that by stimulation of alkaline phosphatase activity, the production of osteoprotegrin, differentiation of osteoblasts, and increasing the RUNX2 expression, PRF enhances the alveolar bone formation. **Hanna R et al (2004)** compared the clinical outcomes obtained by the combination of PRP and a bovine derived xenograft (BDX) to those obtained from the use of the bone replacement graft alone, in a 9 months clinical trial. The addition of a high concentration of autologous platelets to a bovine derived xenograft to treat intrabony defects significantly improved their clinical periodontal response.
Gassling et aI (2010) in their in-vitro study compared of PRF with the commonly used collagen membrane Bio-Gide as scaffolds for periosteal tissue engineering. The proliferation level as measured by quantitative and qualitative revealed higher values for PRF. Thus, suggesting superior nature of PRF to collagen (Bio-Gide) as a scaffold for human periosteal cell proliferation and bone tissue engineering.
Pradeep et at (2011) in their clinical trial compared autologous platelet rich fibrin to open flap debridement alone in treatment of 3-Wall Intrabony Defects in Chronic Periodontitis patients. They observed mean reduction in probing depth greater in test group (4.55 mm-1.87mm) than control group (3.21mm-1.64 mm) while mean PAL gain was also found to be greater in test group (3.3mm-1.76mm) compared to controls (2.77mm-1.44mm) Furthermore, significantly greater percentage of mean bone fill was found in the test group (48.26mm &5.72%) compared to control (1.80mm &1.56%).

CONCLUSION

Within the limitation of present study, it is concluded that there is an additional effectiveness of PRF when used in combination of with Xenograft (Sticky bone) as compared to Coronally advanced flap in the treatment of Stage I/II with grade A/B Periodontitis.

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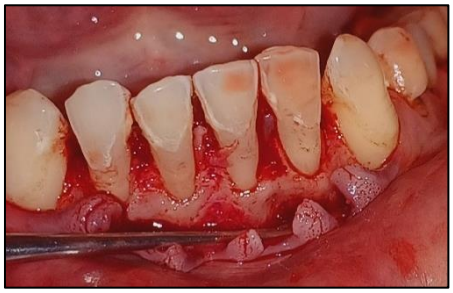
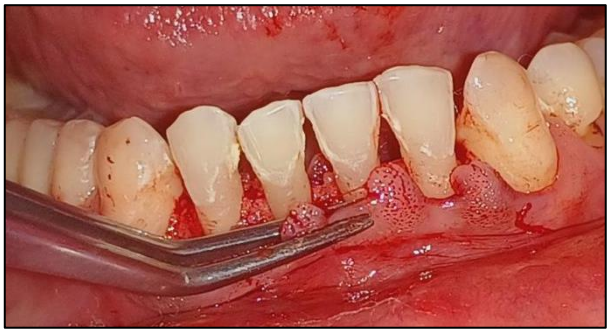
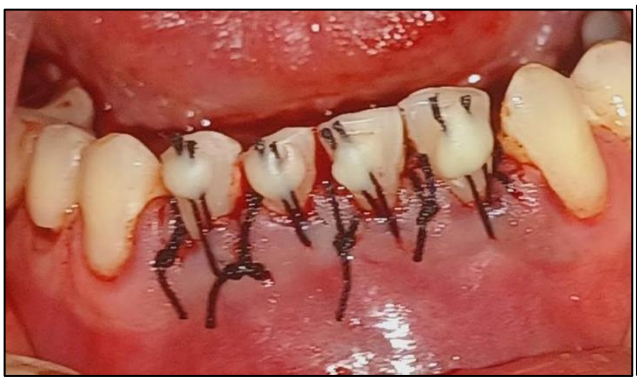
PRE- OPERATIVE



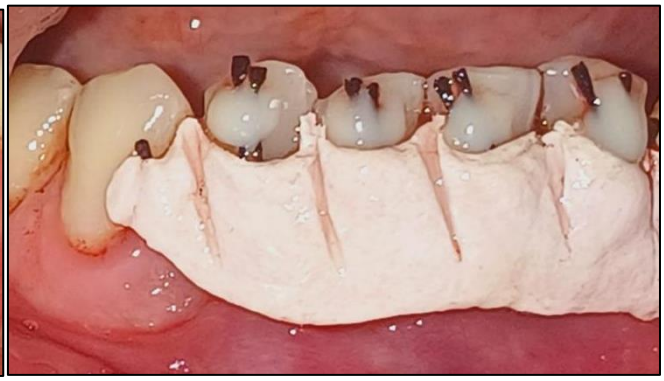
FLAP REFLECTION & DEBRIDEMENT



CORONALLY ADVANCING THE BUCCAL FLAP

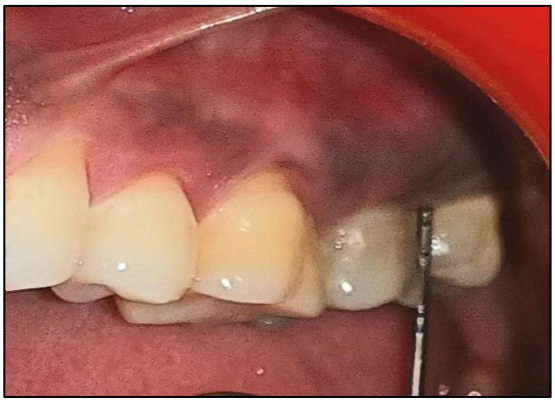


HOLDING SUTURES PLACED

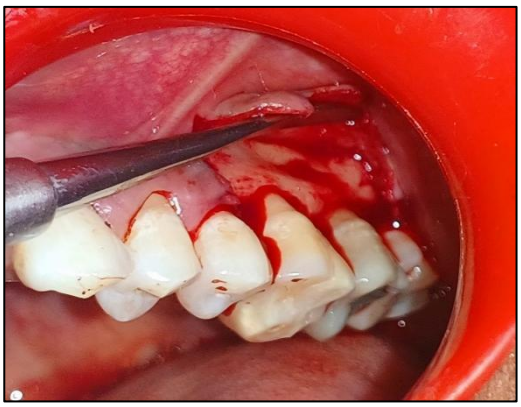


COE- PACK DRESSING

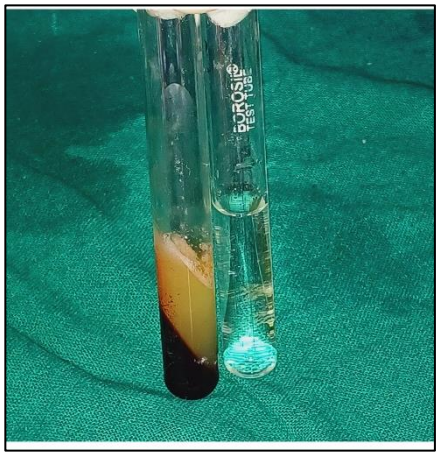
CORONALLY ADVANCED FLAP



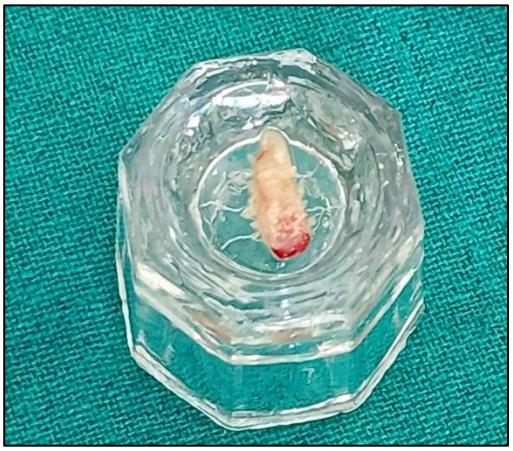
PRE-OPERATIVE



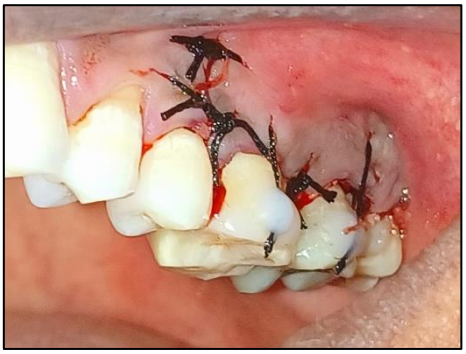
FLAP REFLECTION & DEBRIDEMENT



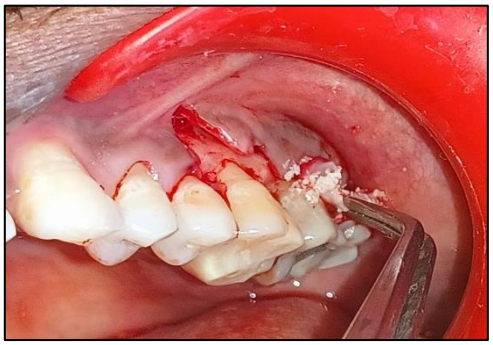
PLATELET RICH FIBRIN



STICKY BONE FORMATION



PLACEMENT OF STICKY BONE IN THE DEFECT SUTURES PLACED



HOLDING SUTURES AND INTERRUPTED

CORONALLY ADVANCED FLAP WITH STICKY BONE PLACEMENT