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Evaluation of the Effectuality of Using Sticky Bone Combined with Platelet Rich Fibrin Membrane in the Management of Intrabony Defects: A Randomized Controlled Clinical Trial

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Aim: In this randomized controlled clinical trial, sticky bone combined with PRF membrane (SB –PRF) was used and compared to collagen membrane and bone graft (CM-BG) using the same graft material to determine its regenerative efficacy& capacity.
Materials and Methods: According to our study, A total of (24) IBDs were treated by (SB –PRF) representing test group and (CM-BG) representing the control one. Periodontal regenerative evaluation was both clinically and radiographically performed. The clinical parameters including probing pocket depth (PPD) and clinical attachment level (CAL), Gingival index (GI) and plaque index (PI) were assessed at baseline and 6 months postoperatively, whereas radiographic assessment was exerted by a direct digital image radiographic system to obtain and calculate bone changes using the image processing software at baseline and 6 months
Results Both the study treatment groups (SB –PRF) & (CM-BG) showed statistically significant improvements clinically and radiographically at 6 months in terms of PI, GI, PPD, CAL, defect fill measurement compared to baseline. However, there were insignificant difference in terms of both the clinical and radiographic parameters after 6 months between the two groups.
Conclusion: Intra-bony defects treated with sticky bone combined with PRF membrane showed improved clinical and radiographic parameters that are demonstrative of the enhanced periodontal regenerative efficacy compared to the use of bone grafting material conjugated with collagen membrane.

Keywords: Collagen membrane, periodontal regeneration, periodontitis .

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Introduction

A healthy periodontium with its intricacy architecture along with dynamic and complex interactivity of its peculiar type and heterogeneity of cells is considered as a cornerstone of oral health. Pathological conditions of this unparalleled apparatus need various treatment strategies from traditional therapies to more advanced and up to date regenerative periodontal modalities.[1]

Periodontal therapy is performed with the primary objectives of gaining access to the diseased sites, achieving reduction in pocket depth, arresting further disease progression and finally restoring the periodontal tissues lost due to disease process.[2]

To rectify & bring back missing periodontal tissues during disease progression, Diverse regenerative periodontal surgical modalities endeavor to manage and treat IBDs. Among regenerative modalities used are GTR, enamel matrix derivatives, Nd:YAG laser, bone grafts, and biologic modifiers to achieve periodontal regeneration.[3]

Clinical researchers hypothesized that the deficient compartmentalization between the periodontal defect and the overlying soft tissue explained the low regeneration rates. A series of pioneering papers by Nyman et.al.[4] discussed the problem of selective remodeling and repopulation of the periodontal defect by cells having the ability to enhance periodontal regeneration which in turn lead the way to the evolution of the concept of GTR.[5]

Moreover, the implementation of autologous platelet concentrates in wound healing and tissue regeneration, exceptionally in the dental scope has been achieved practical innovation with time. Diverse methods to allocate various forms of autologous platelet concentrates by changing centrifugation speed and time used during preparation which in turn will pursuant to the regeneration potentiality according to preparation protocol.[6]

PRF is a second-generation platelet concentrates prepared with whole blood taken from a patient without any anticoagulants.[7] Thus, the unneeded chemical alteration of the blood, makes it purely an autologous preparation. PRF was firstly developed by Joseph Choukroun and colleagues in 2001.[8] Facileness of preparation unescorted by anticoagulant, additionally obtaining high regenerative tissue potentiality making PRF take priority over platelet rich plasma.

Dohan Ehrenfest et.al.[9] found that PRF membrane can stay intact and release continually massive amounts of growth factors slowly for at least 1 week, thanks to its fiber network scaffold. Therefore, PRF can foster healing of both soft and hard tissues in surpassing manner than PRP.
Afterwards, researchers developed new products of PRF which aims to improve the properties of PRF and obtain better autogenous biological material by changing the centrifugation time and speed namely Injectable-PRF, Advanced-PRF, Titanium-PRF and Concentrated growth factor.[10]

Injectable Platelet-Rich Fibrin (I-PRF) is a liquid form of PRF that could be injected with a high regeneration potential. Comparable to platelet rich plasma, an injectable PRF has supremacy as it does not encompass anticoagulants. [11] I-PRF coagulation occurs speedily after injection or while mixing with biomaterials, capacitate for a longer time with ceaseless releasing of growth factors over platelet rich plasma.[12]

"Sticky bone" is a composite biomaterial designed for bone regeneration, combining particulate bone substitutes with autologous platelet

aggregates, such as I-PRF and concentrated growth factors.[13] Sticky bone can be easily reshaped and manipulated to adapt to various bony defects, preventing graft movement and preserving bone volume during healing, thus minimizing the need for block bone and titanium mesh. Its fibrin network captures platelets and leukocytes, releasing growth factors that accelerate bone and soft tissue regeneration without requiring biochemical additives. Additionally, the fibrin interconnection prevents soft tissue ingrowth, making sticky bone suitable for treating IBDs, furcation defects, ridge augmentation, and edentulous alveolar ridge defects.[14]

Limited data is available on effectiveness of sticky bone in treating IBDs. This randomized controlled clinical trial assessed the clinical and radiographic outcomes of I-PRF combined with xenograft and PRF membrane in the management of periodontal IBDs.

Materials and methods

The current study protocol followed the Declaration of Helsinki (revised in October 2018) and after getting approval from the Research Ethics Committee (Approval number: # REC-FDBSU/05092024-01/ER). Twenty-four patients were subjected to periodontal therapy and allocated in this randomized controlled clinical and Radiographic trial from the outpatient clinic of Periodontology Department, Faculty of Dentistry, Beni Seuf University, Cairo-Egypt between June 2023 till September 2024. Participants were acquainted with all procedures verbally and a written informed consent was obtained.

Eligibility criteria

Patients enrolled in this study were diagnosed with Stage III periodontitis, according to the 2017 World workshop classification of periodontal disease.[15]

Inclusion criteria: the presence of interproximal periodontal defects with ≥5 mm CAL after phase I therapy, and the presence of 2 or 3 osseous wall interproximal IBDs that are ≥3mm in depth. Defect depth was estimated as the distance from the cementoenamel junction (C.E.J) to the base of the defect by the aid of an intraoral periapical radiograph.

Exclusion criteria: any systemic diseases and/ or conditions of blood dyscryasis that adversely affect periodontal surgeries and/or formed elements of the blood, patients who submitted to antimicrobial and/or anti-infammatory therapy within the last 6 months, mischievous habits. Smokers, gravid females and individuals with inappropriate oral hygiene (Plaque index >1 after phase I therapy) at the time of re-evaluation of were excluded.

Sample size calculation:

A study of a continuous response variable was planned from matched pairs of study subjects. Prior data indicates that the difference in the response of matched pairs is normally distributed with standard deviation 1.13. [16] If the true difference in the mean response of matched pairs is 1.33, the sample size were 12 pairs of subjects to be able to reject the null hypothesis that this response difference is zero with probability (power) 0.95. The Type I error probability associated with this test of this null hypothesis is 0.05.

Presurgical phase and treatment allocation

Nonsurgical periodontal therapy was given to the patients followed by oral hygiene instructions. The patients were re-evaluated 6 weeks after initial therapy to

assess the status of complete oral hygiene. The treatment groups were allocated in a random manner by a predetermined computer-generated randomization (www.randomizer.org). Each patient was randomly assigned to test Group (SB+PRF): application of sticky bone followed by PRF membrane coverage in the IBDs or control group (BG + CM): application of bone graft covered with collagen membrane in the IBDs.

Surgical phase

After administration of an adequate local anesthesia (2%Xylocaine with epinephrine 1: 100,000), via infiltration or nerve block techniques. For both the studied groups, an envelope flap was performed through sulcular incisions extending one or two tooth /teeth mesially and distally followed by mucoperiosteal flap reflection on the facial and lingual/palatal aspects of each involved site, exposing ≥ 3mm of the alveolar bone beyond the defect margin. The inner surface of the flap was carefully curetted to remove the diseased pocket epithelium and granulation tissue along with planning the exposed root surfaces. No osseous recontouring was exerted. Copious saline irrigation was performed to allow reappraisal of the bone defect morphology.

For the test group (SB-PRF)

Preparation of PRF: Fresh blood was withdrawn by venipuncture of the antecubital vein into a sterile 10 ml glass vacuum tube (Voma Med, Chongqing, China) without anticoagulant. Four tubes were obtained from each patient and the tubes were immediately centrifuged (Digital Tabletop Centrifuge, rotor angle: 45° and a maximum radius of 10.6 cm, Velab, VE-4000, TX, USA) at centrifugal force of 1300 rpm at room temperature. Every 2 tubes were used to balance the centrifuge during the spin cycle.

Preparation of I-PRF: centrifugation for two tubes was done for 2 minutes. One milliliter of liquid I-PRF was withdrawn from each tube by a sterile syringe. Preparation of solid PRF: centrifugation was continued for the other two tubes for 8 minutes.[17] The fibrin clot was easily separated after the removal of platelet-poor plasma at the top and by scraping the underlying concentrated red blood cells. One of the PRF clots was cut by scissor into small pieces (1mm in size). While the other clot was compressed between two glass slabs to form a PRF membrane.

Preparation of the sticky bone block: was prepared by mixing the bone graft particles (TUTOBONE®: Xenograft particle size0.25-1mm/1cm^3. TUTOGEN, Germany) with Solid PRF fragments at a proportion of 1:1 followed by addition of 1 ml liquid I-PRF drop by drop and stirred gently for 15 seconds before shaping the bone block.[18]

The IBDs was filled with the molded sticky bone then covered by the compressed PRF membrane. PRF membrane was extended over the periphery of the defect in the buccal and lingual directions. A demonstration for the steps of PRF preparation is shown in Figure 1.

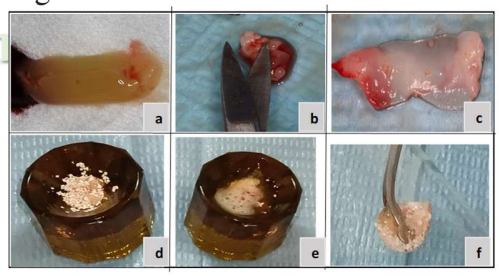

Figure 1: PRF prepartion steps. (a)PRF clot after centrifugation (b) PRF fragments cut by scissors (C) PRF membrane after compression (c) PRF fragments mixed with bone graft (d) I-PRF injected drop by drop and stirred for 15 seconds with bone graft mix (e) sticky bone block formation after 2 minutes.

For the control group (CM + BG): the periodontal defect was filled with the bone graft (TUTOBONE®: Xenograft particle size0.25-1mm/1cm^3.TUTOGEN, Germany) without overfilling. Then a barrier membrane (Hydro-sorb® F: Bovine atelo-collagen membrane. bioimplon Gmbh, Germany) was placed and adapted over the defect area in such a form that the entire defect and ≥ 2 to 3 mm of the surrounding alveolar bone were entirely covered to prevent membrane collapse within the defect.

Primary closure of the flap was passively obtained with 4–0 Polypropylene sutures using simple interrupted suture design. A demonstration for the surgical protocol for every group is shown in Figures 2 and 3.

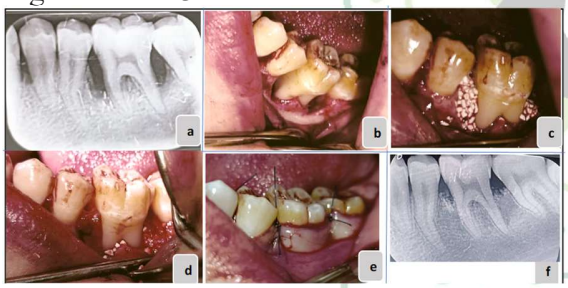

Figure 2: full case presentation for the study group (a) preoperative periapical radiograph (b) flap reflection and subgingival debridement (c) the IBD was filled with the sticky bone block (d) PRF membrane was placed over the sticky bone (e) The flap was sutured in place (f) Postoperative periapical radiograph after six months showing partial bone fill.

Post-operative medications of analgesics (Ibuprofen 400 mg twice daily (Brufen 400 mg; Kahira Pharm. & Chem. Ind. Co., Under license from:Abbott Laboratories) and Antimicrobials (Amoxicillin trihydrate 500 mg (Floxamo 500 mg; Amoun Pharmaceutical Company S.A.E. Cairo – Egypt) thrice daily for 7 days were prescribed for all patients. Patients were asked to cease mechanical oral hygiene measures at the surgical site for one week, and to rinse with 10 mL of 0.2% chlorhexidine gluconate mouth-rinse (Hexitol; Kahera Pharmaceutical, Cairo, Egypt) for two weeks. They were also instructed to report any unfavorable incidents such as pain, swelling, and bleeding from the surgical site. Patients returned after 14 days for follow up and suture removal as well as at the 6th month following surgery for clinical and radiographic follow up measurements.

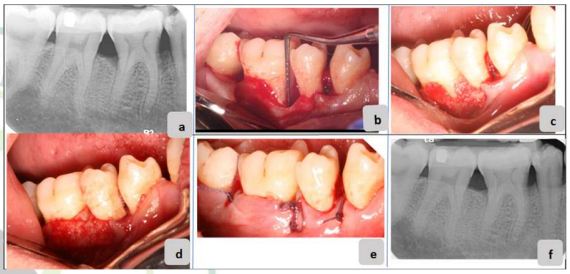

Figure 3: full case presentation for the control group (a) preoperative periapical radiograph (b) flap reflection and subgingival debridement (c) the IBD was filled with the xenogenic bone graft (d) collagen membrane trimmed and placed over the bone graft (e) The flap was sutured in place (f) Postoperative periapical radiograph after six months showing partial bone fill.

Clinical & Radiographic evaluation

The Clinical measurements included (i) PI; (ii) GI; (iii) PPD; and (iv) CAL that were recorded using a graduated UNC-15 periodontal probe (Hu-Friedy Mfg. Co., LLC, USA). A single masked examiner performed all of the clinical measurements at baseline and 6 months after surgery.

For obtaining the radiographic images, a size 2 digital sensor (New IDA, Eagle, Brazil) was used then the radiographic image was captured to appear on the computer monitor using operating parameters at 60 kVp, 7 mA and 0.212 second exposure time via the long cone paralleling technique and using specialized holders. After images were captured, calibration and analysis were performed. Linear radiographic measurements in mm

between 2 marked points were made on the periapical radiographs. The distance from CEJ to the base of the periodontal defect (CBL) was measured which denoted to defect fill. Defect fill was calculated as the difference between CBL values at baseline and 6 months.

Statistical analysis:

Paired t-test was used to compare the baseline and 6-month follow-up values for PPD, CAL and radiographic measurements within each study group. Independent t-test was used to compare the changes in PPD and CAL, PI and GI between the control and test groups to determine if there were any significant differences in the effectiveness of the two treatment approaches.

One-way ANOVA was used to analyze the changes in PI, GI and radiographic measurements over time within each study group. The post-hoc multiple comparisons using Tukey's test (indicated by letters A, B, C) was then conducted to determine where the significant differences occurred.

Overall, the study utilized a combination of paired t-tests, independent t-tests, and one-way ANOVA with post-hoc analysis to thoroughly evaluate and compare the clinical outcomes between the two treatment approaches over the 6-month follow-up period.

Results

This controlled randomized clinical trial included a total of 24 IBDs in 24 participants with stage-III periodontitis. The IBDs were selected in the maxillary and mandibular molar regions. IBDs were randomly assigned either into sticky bone combined with PRF membrane (n = 12, test-group) or collagen membrane and bone graft (n = 12, control-group). All surgical sites demonstrated uneventful healing without any wound site infection or flap dehiscence. All subjects completed the follow-up visits and study recall appointments.

The age and gender data analysis for the two study groups showed that the control group had a mean age of 30 ± 5.05 years, with 60% male and 40% female participants. In contrast, the test group had a younger mean age of 19.8 ± 2.05 years, with a higher proportion of female participants at 60% compared to 40% males.

Clinical outcomes

The test group showed a mean PPD reduction from 9.6 mm at baseline to 6.2 mm at 6 months, and a mean CAL gain from 10.2 mm at baseline to 6.8 mm at 6 months, both of which were statistically significant. For the control group, the mean PPD decreased from 9.6 mm at baseline to 5.6 mm at 6 months, a statistically significant reduction. Similarly, the mean CAL improved from 10.0 mm at baseline to 6.2 mm at 6 months, also a statistically significant change. However, when the changes in PPD and CAL were compared between the two groups, the differences were not statistically significant table (1). Regarding PI and GI, there were statistically significant reduction between baseline and 6 months follow up records within each group. However, comparing between the two groups, changes in PI and GI were statistically insignificant after 6 months from surgical intervention.

Table (1): Paired t-test between baseline and six months follow up of periodontal probing depth and clinical attachment level followed by Independent t-test between control and test groups

	Collagen membrane + Bone Graft Group (Control Group)			Sticky Bone + PRF Group (Test Group)			Collagen membrane + Bone Graft Group (Control Group)			Sticky Bone + PRF Group (Test Group)		
	PPD Baseline	PPD Six Months	PPD Reduction	PPD Baseline	PPD Six Months	PPD Reduction	CAL Baseline	CAL Six Months	CAL Gain	CAL Baseline	CAL Six Months	CAL Gain
Min	7.000	3.000	4.000	7.000	4.000	3.000	8.000	4.000	4.000	8.000	4.000	4.000
Max	12.00	8.000	4.000	12.00	8.000	4.000	12.000	8.000	4.00	13.000	10.00	3.00
M	9.600	5.600	4.000	9.600	6.200	3.400	10.00	6.200	3.800	10.200	6.800	3.4
SD	2.074	1.949	0.7071	1.949	1.643	0.8944	1.095	1.643	1.871	0.8367	2.168	2.000
SEM	0.9274	0.8718	0.3162	0.8718	0.7348	0.4000	0.4899	0.7348	0.8367	0.3742	0.9695	0.8944
Significance (Paired t-test)	<0.05*			<0.05*			<0.05*			<0.05*		
Significance (Independent t-test)	>0.05 (NS)						>0.05 (NS)					

(PPD); Probing Pocket depth, (CAL); Clinical attachment level
Min; Minimum, Max; Maximum, M; Mean, SD; Standard Deviation, SEM; Standard Error of Mean
SED; Standard Error of Difference, P; Probability Level
NS; Insignificant difference using Paired t-test/Independent t-test
***; significant difference using Paired t-test/Independent t-test**

Radiographic outcomes

Table (2) presents a comprehensive comparison of radiographic bone level (CBL) measurements between the two treatment groups. Both groups showed similar baseline CBL measurements (8.878 mm for test and 8.928 mm for control). After six months, both groups demonstrated significant improvement, with CBL reducing to around 6.12 mm in both cases. The defect fill, which represents the amount of bone regeneration, was slightly higher in the control group (2.892 mm) compared to the test group (2.758 mm), but this difference appears to be minimal.

Table (2): One way ANOVA test for follow up of radiographic bone level (DBL) followed by Independent t-test between control and test groups:

	Collagen membrane + Bone Graft Group (Control Group)			Sticky Bone + PRF Group (Test Group)		
	CBL Baseline	CBL Six Months	CBL Defect Fill	CBL Baseline	CBL Six Months	CBL Defect Fill
Mean	8.928	6.116	2.892	8.878	6.120	2.758
Std.Deviation	1.912	1.757	1.238	3.040	2.833	1.210
Std. Error of Mean	0.5520	0.5073	0.3573	0.8777	0.8179	0.3492
Lower 95% CI	7.713	4.999	2.106	6.946	4.320	1.990
Upper 95% CI	10.14	7.233	3.678	10.81	7.920	3.526
gnificance (Paired t-test)	0.0092*			0.011*		
gnificance (One Way ANOVA test)	<0.0001*					
Post Hoc Multiple Comparisons	A	B	C	A	B	C

CBL; Distance from C.E.J to base of defect., M; Mean, SD; Standard Deviation, SEM; Standard Error of Mean, P; Probability Level

***; significant difference using One Way ANOVA/t-test**

Same letters in the same row indicated insignificant difference using Tukey`s post hoc test for multiple comparisons

Different letters in the same row indicated significant difference using Tukey`s post hoc test for multiple comparisons

Discussion

A two-way weapon for both general and oral health is the permanence of IBDs. On the one hand considered a risk factor for further disease progression, that jeopardize tooth- supporting structures[19] and on the other hand epidemic studies have connected it to systemic diseases diversity encompassing diabetes, cardiovascular, Alzheimer's, diseases, obesity, and premature births.[20] Accordingly, it became a must expeditious as possible to cease disease progression along with planning strategies to motivate their regeneration.

GTR refers to the presence of an occlusive barrier membrane between gingival tissue and alveolar bone/periodontal ligament tissue to hinder the emigration of connective and epithelial tissue through the treated periodontal defect.[21] Regarding the residual periodontal ligament, Progenitor cells residing in it are given the time to re-populate the root region at the defect site and divide into new periodontal elements.[22]

The use of resorbable barrier membranes such as collagen membranes are most commonly used nowadays. The presence of collagen in these membranes integrate with different biological activities. As being biocompatible, biodegradable, and hemostatic, aside from being catchy to the gingival and periodontal ligament fibroblast, it contributes in the soft tissue augmentation. collagen type I, as well as a mixture of collagen types I and III[23] are commercially available collagen membranes which are produced and developed,

Also, bone replacement grafts are utilized to favor the reconstruction of the lost supporting apparatus via osteoneogenesis, osteoinduction and osteoconduction. Osteogenesis indicates the existence of osteoblast progenitor cells or osteoblasts inside the bone graft that is able to promote bone formation. On the other hand, osteoinduction is provided by growth factors that cause the mobilization of mesenchymal progenitor cells and their differentiation into bone forming cells. Whereas, osteoconduction refers to a three-dimensional scaffold that directs

bone formation on the graft surface and support space provision for bone formation.[24,25] Xenografts, referred to as an organic bone, represents osteoconductive grafts because their trabecular hydroxyapatite frame is close to human cancellous bone upon which osteoblast migration, revascularization and woven bone formation occur. The available sources of xenografts are porcine bine, bovine bone and natural corals.[26]

Besides to the previous regenerative concepts, autologous platelet concentrates became in the last years an optimistic biological agent in the management of diversified periodontal defects exceeding clinical expectations in achieving both significant Periodontal PPD reduction and CAL gain whether with PRF alone or in conjugation with bone replacement grafts.[27,28]

Both the ability to enhance the periodontal wound healing by means of consecutive delivery of a plurality of growth/differentiation factors into the wound site through its circumfluent leukocytes and platelets simultaneously with acting as three-dimensional fibrin scaffolds for cellular migration, adhesion, and differentiation, are ascribed to the PRF conspicuous clinical results.[29]

Regarding periodontal regeneration, it was discovered that PRF enhances cell attachment, proliferation and collagen matrix synthesis in human periodontal ligament fibroblasts and osteoblasts.[30,31] When platelet concentrates are added to various kinds of grafting materials, a more predictable outcome is derived after bone augmentations as this mixture offers several benefits. First, PRF pieces act as a "biological connector" that enhance graft handling properties and stabilization. Moreover, the platelets growth factors are gradually released as the fibrin matrix is resorbed, thus adding an osteoinductive property to the bone graft. Also, the fibrin network assists cellular migration, vascularization, and survival of the graft. Finally, the presence of leukocytes and cytokines in the fibrin network play an important role in the self-regulation of inflammatory and infectious phenomena within the grafted material.[8,32]

In this study, the advanced PRF protocol was chosen to prepare the solid PRF because it was proven that centrifugation using lower g-forces for less time consistently resulted in a better distribution of platelets throughout the PRF matrix in the upper 4–5 ml of the fibrin clot compared to use of the 2700 rpm by 12-min protocol which concentrated all cells, platelets and leukocytes in the buffy coat layer. Whereas, the common method for preparing liquid PRF (I-PRF) at 800 rpm ~ 60g for 3 minutes was avoided due to its poor ability to separate cell types or produce high concentrations of platelets and leukocytes, therefore it was recommended to increase the relative centrifugal force to permit the separation of cells in the blood sample.[33]

The idea of fabrication of sticky bone constituting of particulate bone graft reinforced with growth factors using autologous PRF has been implied since 2010.[34] This gave the advantage of stabilizing the bone graft in the defect present, and hence accelerating tissue healing and minimizing bone graft loss during the healing phase. Several protocols are present to prepare sticky bone however, the choice of this particular way for preparing the sticky bone was done in accordance with a study[35] that compared 3 bone blocks formed from mixing PRF + bone graft. The study found that combining Solid-PRF fragments + bone graft + Liquid-PRF had the greatest mechanical and biological properties compared to the other bone blocks which were made of

either Solid-PRF fragments + bone graft or made with Liquid-PRF + bone graft. The bone block formed from the mixture of Solid-PRF fragments + bone graft + Liquid-PRF showed the most resistance to degradation and the fastest solidification time (2 minutes only). Also, it induced the highest osteoblast migration and differentiation. In addition, the mechanical properties were better in strength when compared to the other groups (10-fold greater increased tensile resistance).

Worthy to mention that our present study is the first to scrutinize the effectuality of using a bone graft complex (PRF Block) consisting of bone graft particles conjoined with PRF fabricated from both Liquid-PRF and Solid-PRF compared to the guided tissue regeneration concept using bone graft particles with collagen membrane in managing periodontal IBDs.

Regarding all clinical parameters, PI, GI, PPD, CAL, there were statistically significant improvement between baseline and 6 months in the 2 study groups. The test group (SB/PRF) showed PPD reduction of 3.4 mm from baseline to 6 months follow up. Similarly, CAL gain was 3.4 mm after 6 months. Also, the radiographic defect fill showed a significant improvement (2.758 mm) after 6 months follow up. These results were in accordance with Ghoderao et.al.[36] that used sticky bone to treat 20 periodontal defects and followed up for 12 months. PPD reduction and CAL gain were 3.20 mm after 12 months follow up and defect fill was 2.59 mm after 12 months. However, they used different protocol to prepare sticky bone by mixing autologous fibrin glue, that was centrifuged at 2400–2700 rpm for 2 minutes only, with particulate bone powder. The previous study reported longer time for solidification which took more than 10 minutes to produce yellow-colored sticky bone while in our study, sticky bone was prepared by PRF membrane + bone graft + I-PRF and solidification time took place after 2 minutes only.

The control group (CM/BG) showed PPD reduction of 4 mm and CAL gain 3.8mm after 6 months. The radiographic defect fill showed a significant improvement (2.892 mm) after 6 months follow up. When the two study groups, test group (SB/PRF) and control group (CM/BG), were compared together, there were no statistically significant differences between them in all clinical and radiographic parameters which suggests that the two treatment approaches, had similar effectiveness in improving periodontal parameters over the 6-month follow-up period.

Future studies are required for the histologic demonstration of the formation of a completely new attachment apparatus, and is the evidence for the periodontal regeneration which could not be examined in the present study.

Conclusion

The similar outcomes in both study groups indicate that sticky bone with PRF membrane may be a viable alternative to the traditional collagen membrane with bone graft technique to manage periodontal intrabony defects with less treatment costs and easy preparation and handling of the PRF membrane that is completely autologous. Beside to the advantage of adding growth factors power to the healing periodontal sites.

Ethics approval: the Faculty of Dentistry Beni-Suef University Research Ethics Committee (Approval number: # REC-FDBSU/05092024-01/ER).

Conflicts of interest: There are no conflicts of interest.

Data availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.
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