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A Comparative Evaluation of Clinical Effectiveness of Platelet Rich Fibrin and Bone Graft in the Management of Intrabony Defects: Clinico - Radiographic Study

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Abstract: ***Introduction**: Periodontitis, an inflammatory disease, causes tooth support loss primarily due to periodontal ligament fiber and bone loss, resulting in periodontal endosseous defects. Demineralized bone matrix (DBM), known for its osteoinductive properties, is widely used. Combining PRF with bone grafts shows promising result in enhancing wound healing and bone regeneration, especially in intrabony defects, warranting further research for comprehensive efficacy assessment. **Aim & Objectives**: The aim of this study is to assess the efficacy of combining autologous platelet - rich fibrin (PRF) with bone graft (DBM) in treating three - wall intrabony osseous defects, in comparison with PRF alone. **Methodology**: The data for this study were sourced from outpatient Department of Periodontology and Implantology at D. J. College of Dental Sciences and Research, Modinagar, Uttar Pradesh, India. A total of 45 participants were randomly assigned to three groups: PRF alone, PRF + DBM, and Open Flap Debridement (OFD), with sufficient sample size justified for power analysis. The study beholden inclusion and exclusion criteria followed a prospective, randomized clinical trial design, involving detailed pre - treatment assessments, surgical interventions, and postoperative evaluations at 6 and 9 months. **Result**: Group II (PRF + DBM) showed superior outcomes in probing depth reduction, clinical attachment level (CAL) gain, width of keratinized gingiva, and radiographic bone defect reduction compared to PRF alone (Group I) and OFD (Group III). Statistical analyses confirmed the synergistic effect of PRF and DBM, suggesting their potential for enhancing periodontal regeneration. **Conclusion**: The study demonstrated that PRF combined with DBM improved clinical and radiographic parameters compared to PRF alone in intrabony defect. Addition of DBM change the effect of PRF in CAL gain and radiographic defect fill.*

Keywords: PRF, bone graft, intrabony defect, periodontal regeneration, demineralized bone matrix

1. Introduction

Periodontitis is an inflammatory disease of Periodontal tissue, which is characterized by loss of support of the affected teeth, specifically periodontal ligament fibers and the bone into which they are inserted. Periodontal Endosseous defect are most common manifestation in Chronic and Aggressive periodontitis. These are caused by bone loss due to extension of gingival inflammation, trauma from occlusion, spread of infection secondary to dental caries, resulting in mobility and loss of tooth if untreated. Periodontal defects are categorized as "supraosseous" (also known as "suprabony") and "infraosseous" (also known as "infrabony") depending on the pattern of bone resorption patterns. Suprabony defect are those in which the base of the pocket is situated coronal to the alveolar crest. Conversely, intrabony defect are those in which the base of the pocket is positioned apically with respect to the bone crest.1 The goal of periodontal therapy includes arrest of periodontal disease progression and the regeneration of structures lost due to pre - existing disease process. 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.2 Horizontal bone defects are usually difficult to regenerate, while vertical bone defects, especially intrabony defects, are considered to have good regeneration potential.3, 4 As

conventional surgical techniques offer only limited potential towards recovering the lost periodontal structures, a variety of different surgical techniques, including guided tissue regeneration, various types of bone grafts or bone substitutes techniques, growth and differentiation factors, root surface demineralization, enamel matrix proteins or various combinations there of, have been investigated to regenerate periodontal tissues [5, 6].

Bone replacement grafts are the most widely used treatment option for the correction of periodontal osseous defects. Bone replacement grafts include autografts, allografts, xenografts and alloplasts. Bone grafts and their synthetic substitutes have been used in an attempt to gain regeneration. The use of bone grafts for reconstructing osseous defects produced by periodontal disease dates back to **Hegedus in 1923** and was revived by **Nabers & O'Leary in 1965**. Using bone graft materials can induce regeneration of bone height or volume with improvements in the clinical parameters[7, 8, 9]. Demineralized Bone Matrix (DBM) is an approved osteoconductive and osteoinductive commercial biomaterial and approved medical device used in bone defects with a long track record of clinical use in diverse forms.1[0, 11] True to its name and as an acid - extracted organic matrix from human bone sources, DBM retains much of the proteinaceous components native to bone, with small amounts of calcium - based solids, inorganic phosphates and some trace cell debris. Many of DBM's proteinaceous components (e. g., growth factors) are known to be potent osteogenic agents.1[2, 13] Commercially sourced as putty, paste, sheets and flexible pieces, DBM provides a degradable matrix facilitating endogenous release of these compounds to the bone wound sites where it is surgically placed to fill bone defects, inducing new bone formation and accelerating healing. Given DBM's long clinical track record and commercial accessibility in standard forms and sources, opportunities to further develop and validate DBM as a versatile bone biomaterial in orthopedic repair and regenerative medicine contexts are attractive[11, 14]

However, recently, the attention has been 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. Among the rich sources of autologous growth factors, various generations of platelet concentrates are currently in use. Platelet - rich plasma, first generation concentrate, has been used alone and in combination with grafting materials and barrier membranes in treatment of periodontal and surgical defects. However, the effects of Platelet rich plasma on bone regeneration have been limited.1[5, 16, 17] Platelet rich fibrin (PRF), a second - generation platelet concentrate was introduced by Choukroun et al (2001) being a promising, completely autologous leukocyte and platelet concentrate successfully used in various fields of dentistry and medicine. PRF has a three - dimensional fibrin architecture, forming a scaffold to maintain growth factors, in which platelet cytokines, growth factors, and cells are embedded and growth factors are released for more than 7 days. It offers several advantages, such as promoting wound healing, bone growth and maturation, graft stabilization and wound hemostasis **Choukroun et al, (2001) [16]**. Moreover, it has minimum disadvantages in terms of antigenicity and cost. 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.1[7] To enhance wound healing and bone regeneration in intrabony defects, the use of bone substitutes associated with growth factors has been proposed based on the therapeutic concept that a supraphysiological concentration of growth factors better supports the early stages of wound healing and bone regeneration.1[1] The study aims to compare the clinical and radiographic efficacy of PRF alone versus a combination of PRF with bone graft in managing intrabony defects, seeking to optimize treatment outcomes.

Study Design:
This study was a prospective, randomized, controlled clinical trial aimed at comparing the outcomes of three periodontal treatments. Participants were allocated randomly to one of the three groups to ensure unbiased results, and the clinical and radiographic outcomes were analyzed over a defined follow - up period.

A total of 45 participants, randomly selected from the outpatient Department of Periodontology and Implantology at D. J. College of Dental Sciences and Research in Modinagar, Uttar Pradesh, India.

Participants - Inclusion and Exclusion Criteria:
Participants aged 20 - 45 years, with probing pocket depth (PPD) ≥5mm and radiographic evidence of vertical bone loss, were included. Exclusion criteria were poor oral hygiene, recent periodontal therapy, medication use within 6 months, systemic diseases, pregnancy/lactation, and tobacco use.

Study Groups:
Participants were divided into three groups: Group I received PRF alone, Group II received PRF combined with DBM, and Group III underwent open flap debridement (control). The allocation to the groups was randomized to ensure comparability.

Study Parameters:
The primary clinical parameters measured were probing pocket depth (PPD), clinical attachment level (CAL), and the width of keratinized gingiva. Radiographic parameters included linear bone growth and percentage bone fill, assessed through intraoral periapical radiographs.

Study Procedure:
The pre - surgical procedure involved scaling, root planing, and the administration of antibiotics. Surgical intervention followed local anesthesia, and each site underwent root debridement. Group I defects were filled with PRF, Group II with PRF and DBM, and Group III underwent open flap debridement without filling materials.

Study Data Collection:
Data were collected at baseline, 6 months, and 9 months post - surgery. Clinical measurements were recorded using standardized tools, and radiographs were obtained with a

long - cone paralleling technique to evaluate bone growth and defect resolution over time.

Data Analysis:
Statistical analyses were performed using descriptive and inferential statistics, including ANOVA, Kruskal - Wallis tests, chi - square tests, and Fisher's exact tests. A significance level of 0.05 was applied, and post - hoc tests were conducted for pairwise comparisons.

Ethical Considerations:
Ethical approval for the study was obtained from the institutional review board of D. J. College of Dental Sciences and Research. All participants provided written informed consent before enrollment, and the study was conducted in accordance with the Declaration of Helsinki.

2. Result and Analysis

Intergroup Comparison of Mean Plaque Score Between Group I, Group II and Group III at Baseline, 6 Month and 9 Months
The Mean Plaque Score was 0.706 at baseline and 0.438 at 6 months' time interval in the Group I. In the Group II, the Mean Plaque Score was 0.710 at the baseline and 0.466 at 6 months. In the Group III, the mean plaque score was 0.704 at the baseline and 0.456 at 6 months. The mean change in the plaques score between baseline and 6 months when compared between the three groups (Intergroup Comparison) was statistically non - significant

The Mean Plaque Score was 0.706 at baseline and 0.289 at 9 months' time interval in the Group I. In the Group II, the Mean Plaque Score was 0.710 at the baseline and 0.372 at 6 months. In the Group III, the mean plaque score was 0.704 at the baseline and 0.343 at 9 months. The mean change in the plaques score between baseline and 9 months when compared between the three groups (Intergroup Comparison) was statistically non - significant

	Baseline		**At 6 Months**		**Mean Change**		**P value**
	Mean	SD	Mean	SD	Mean	SD	
Group I	0.706	0.328	0.438	0.244	0.268	0.148	0. .871 (Non - Sig)
Group II	0.710	0.389	0.466	0.237	0.244	0.155	
Group III	0.704	0.312	0.456	0.221	0.248	0.164	
	Baseline		At 9 Months		Mean Change		P value
Group I	0.706	0.328	0.289	0.216	0.417	0.162	0.364 (Non Sig)
Group II	0.710	0.389	0.372	0.207	0.338	0.197	
Group III	0.704	0.312	0.343	0.219	0.361	0.187	

Intergroup Comparison of Mean Gi Scores Between Group I Group II And Group III at Baseline, 6 Month And 9 Months
The Mean Gingival Score was 0.659 at baseline and 0.402 at 6 months' time interval in the Group I. In the Group II, the Mean Gingival Score was 0.636 at the baseline and 0.408 at 6 months. In the Group III, the Mean Gingival Score was 0.632 at the baseline and 0.412 at 6 months. The mean change in the Gingival Score from baseline to 6 month was 0.257 in the Group I and 0, 228 in the Group II and 0.220 in the Group III. The mean change in the Gingival score between baseline and 6 months when compared between the three groups (Intergroup Comparison) was statistically non - significant

The Mean Gingival Score was 0.659 at baseline and 0.215 at 9 months' time interval in the Group I. In the Group II, the Mean Gingival Score was 0.636 at the baseline and 0.292 at 9 months. In the Group III, the Mean Gingival Score was 0.632 at the baseline and 0.280 at 9 months. The mean change in the Gingival Score from baseline to 9 months was 0.443 in the Group I and 0, 344 in the Group II and 0.352 in the Group III. The mean change in the Gingival score between baseline and 9 months when compared between the three groups (Intergroup Comparison) was statistically non - significant

	Baseline		**At 6 Months**		**Mean Change**		**P value**
	Mean	SD	Mean	SD	Mean	SD	
Group I	0.659	0.235	0.402	0.191	0.257	0.091	0.846 (Non - Sig)
Group II	0.636	0.273	0.408	0.137	0.228	0.078	
Group III	0.632	0.264	0.412	0.139	0.220	0.75	
	Baseline		At 9 Months		Mean Change		P value
Group I	0.659	0.235	0.215	0.200	0.443	0.056	0.321 (Non - Sig)
Group II	0.636	0.173	0.292	0.197	0.344	0. .064	
Group III	0.632	0.264	0.280	0.184	0.352	0.069	

Intergroup Comparison of Probing Depth between Control Group and Test Group
The Probing Depth was 5.59 at baseline and 4.00 at 6 months time interval in the Group I. In the Group II the probing depth was 7.26 at the baseline and 5.40 at 6 month. In the Group III the probing depth was 5.37 at the baseline and 4.30 at 6 month. The mean change in the probing depth from baseline to 6 months was 1.59 in the group I.1.86 in the Group II and 1.07 in the Group III. The change in the probing depth was highest in the Group II followed by Group I and least in the Group III. The post hoc analysis revealed that the intergroup comparison between Group I

and Group II, between Group I and Group III, Group II and Group III was statistically significant.

The Probing Depth was 5.59 at baseline and 2.26 at 9 months time interval in the Group I. In the Group II the probing depth was 7.26 at the baseline and 2.93 at 9 month. In the Group III the probing depth was 5.37 at the baseline and 3.40 at 9 months. The mean change in the probing depth from baseline to 9 months was 3.32 in the group I.4.33 in the Group II and 1.97 in the Group III. The change in the probing depth was highest in the Group II followed by Group I and least in the Group III. The post hoc analysis revealed that the intergroup comparison between Group I and Group II, between Group I and Group III, Group II and Group III was statistically significant.

	Baseline		At 6 Months		Mean Change		
	Mean	SD	Mean	SD	Mean	SD	P value
Group I	5.59	0.441	4.00	0.630	1.59	0.640	0.001 (Sig)
Group II	7.26	0.923	5.40	0.849	1.86	0.972	
Group III	5.37	0.547	4.30	0.550	1.07	0.463	
	Baseline		At 9 Months		Mean Change		P value
Group I	5.59	0.441	2.26	0.454	3.32	0.606	0.001 (Sig)
Group II	7.26	0.923	2.93	0.416	4.33	1.190	
Group III	5.37	0.547	3.40	0.412	1.97	0.326	

Independent t test with p value less than 0.05 is significant

Intergroup Comparison of Cal Between Control Group and Test Group

The Mean CAL was 5.34 at baseline and 4.03 at 6 months time interval in the Group I. In the Group II the Mean CAL was 5.87 at the baseline and 3.93 at 6 month. In the Group III the Mean CAL was 5.76 at the baseline and 4.80 at 6 month. The mean change in the Mean CAL from baseline to 6 months was 1.30 in the group I.1.94 in the Group II and 0.96 in the Group III. The change in the Mean CAL was highest in the Group II followed by Group I and least in the Group III. The post hoc analysis revealed that the intergroup comparison between Group I and Group II, between Group I and Group III, Group II and Group III was statistically significant.

The Mean CAL was 5.59 at baseline and 2.52 at 9 months time interval in the Group I. In the Group II the Mean CAL was 7.26 at the baseline and 2.58 at 9 month. In the Group III the Mean CAL was 5.37 at the baseline and 3.50 at 9 month. The mean change in the Mean CAL from baseline to 9 months was 2.82 in the group I.3.29 in the Group II and 2.26 in the Group III. The change in the Mean CAL was highest in the Group II followed by Group I and least in the Group III. The post hoc analysis revealed that the intergroup comparison between Group I and Group II, between Group I and Group III, Group II and Group III was statistically significant.

	Baseline		At 6 Months		Mean Change		P value
	Mean	SD	Mean	SD	Mean	SD	
Group I	5.34	0.977	4.03	1.179	1.30	0.656	0.001 (Sig)
Group II	5.87	1.000	3.93	1.127	1.94	0.467	
Group III	5.76	1.075	4.80	1.171	0.96	0.430	
	Baseline		At 9 Months		Mean Change		
Group I	5.34	0.977	2.52	1.163	2.82	0.934	0.001 (Significant)
Group II	5.87	1.000	2.58	1.040	3.29	0.655	
Group III	5.76	1.075	3.50	1.241	2.26	0.579	

One Way ANOVA with p value less than 0.05 is significant

Intergroup Comparison of Width of Keratinized Gingiva Between Control Group and Test Group

The Mean Width of Keratinized Gingiva was 3.56 at baseline and 4.56 at 6 months time interval in the Group I. In the Group II the Mean Width of Keratinized Gingiva was 3.76 at the baseline and 5.02 at 6 month. In the Group III the Mean Width of Keratinized Gingiva was 3.14 at the baseline and 3.80 at 6 month. The mean change in the Width of Keratinized Gingiva from baseline to 6 months was 1.00 in the group I.1.26 in the Group II and 0.66 in the Group III. The change in the Width of Keratinized Gingiva was highest in the Group II followed by Group I and least in the Group III. The post hoc analysis revealed that the intergroup comparison between Group I and Group II, between Group I and Group III, Group II and Group III was statistically significant. The Mean Width of Keratinized Gingiva was 3.56 at baseline and 5.86 at 9 months time interval in the Group I. In the Group II the Mean Width of Keratinized Gingiva was 3.76 at the baseline and 6.90 at 9 months. In the Group III the Mean Width of Keratinized Gingiva was 3.14 at the baseline and 5.02 at 9 month. The mean change in the Width of Keratinized Gingiva from baseline to 9 months was 2.30 in the group I.3.14 in the Group II and 1.87 in the Group III. The change in the Width of Keratinized Gingiva was highest in the Group II followed by Group I and least in the Group III. The post hoc analysis revealed that the intergroup comparison between Group I and Group II, between Group I and Group III, Group II and Group III was statistically significant

	Baseline		**At 6 Months**		**Mean Change**		**P value**
	Mean	SD	Mean	SD	Mean	SD	
Group I	3.56	0.483	4.56	.79433	1.00	0.748	0.001 (Significant)
Group II	3.76	0.617	5.02	.67238	1.26	0.826	
Group III	3.14	0.610	3.80	.75731	0.66	0.589	
	Baseline		At 9 Months		Mean Change		
Group I	3.56	0.483	5.86	.48058	2.30	0.672	0.001 (Significant)
Group II	3.76	0.617	6.90	.43095	3.14	0.724	
Group III	3.14	0.610	5.02	.38396	1.87	0.720	

One Way ANOVA with p value less than 0.05 is significant

Intergroup Comparison of Radiographic Bone Defect Between Control Group and Test Group

The mean Radiographic Bone defect in the Group I at 6 months was 4.65, in the Group II was 3.70 and in the Group III, the mean defect was 5.20. The intergroup comparison between the three groups was statistically significant when analyzed using One Way ANOVA. The post hoc analysis revealed statistically significant difference between Group I and Group II, Group I and Group III, Group II and Group III

The mean Radiographic Bone defect in the Group I at 9 months was 3.40, in the Group II was 2.41 and in the Group

III, the mean defect was 4.56. The intergroup comparison between the three groups was statistically significant when analyzed using One Way ANOVA. The post hoc analysis revealed statistically significant difference between Group I and Group II, Group I and Group III, Group II and Group III

		At 6 Months			P value
		Mean	SD	Std Error	
6 Months	Group I	4.65	0.949	1, 231	0.001
	Group II	3.7	1.096	1, 121	(Sig)
	Group III	5.2	1.03	0.961	
		At 9 Months			
		Mean	SD	Std Error	P value
9 Months	Group I	3.4	0.874	0.967	0.001
	Group II	2.41	0.792	0.854	(Sig)
	Group III	4.56	0.657	0.542	

Independent t test with p value less than 0.05 is significant

3. Discussion

The present study aimed to compare the clinical and radiographic efficacy of platelet - rich fibrin (PRF) alone and in combination with demineralized bone matrix (DBM) in the management of intrabony periodontal defects. The results demonstrated that the combination of PRF and DBM was superior in improving periodontal regeneration outcomes, including reductions in probing pocket depth (PPD), clinical attachment level (CAL) gains, width of keratinized gingiva, and radiographic bone defect fill. These findings have important implications for the treatment of periodontal diseases and underline the potential of using combination therapies to enhance tissue regeneration.

Periodontal disease leads to the destruction of tooth - supporting tissues, resulting in defects such as intrabony lesions. Regenerating the lost periodontal structures, including bone, cementum, and the periodontal ligament, is challenging. Traditional surgical interventions have shown limited potential for regeneration, which has led to the exploration of various adjunctive therapies, such as growth factors and bone grafts.

PRF, a second - generation platelet concentrate, has emerged as a promising biomaterial due to its ability to release growth factors over an extended period, promoting cell proliferation, angiogenesis, and wound healing. Several studies have shown that PRF alone can improve clinical outcomes in the treatment of intrabony defects, with its autologous origin offering advantages such as reduced antigenicity and cost - effectiveness. In our study, the PRF group (Group I) exhibited significant improvements in all evaluated clinical parameters, which is consistent with existing literature on PRF's efficacy in periodontal regeneration.

However, PRF alone may have limitations in its regenerative potential, especially in cases of large or complex defects. This limitation has driven interest in combining PRF with bone graft materials, such as DBM, to enhance its regenerative capacity.
The combination of PRF and DBM in Group II produced superior results compared to PRF alone (Group I) and open flap debridement (Group III). DBM is a widely used bone graft material due to its osteoinductive and osteoconductive properties. It contains bone morphogenetic proteins (BMPs) and other growth factors that facilitate new bone formation. By combining PRF, which provides a fibrin scaffold and promotes soft tissue healing, with DBM, a potent inducer of bone regeneration, a synergistic effect is achieved, enhancing both soft and hard tissue regeneration.

Our results showed that Group II achieved the greatest reduction in PPD, the highest CAL gains, and the most substantial radiographic bone defect fill. These findings align with previous studies that have highlighted the efficacy of combining PRF with various bone graft materials. For example, Shah et al. (2015) demonstrated that PRF combined with demineralized freeze - dried bone allograft (DFDBA) resulted in significantly better periodontal regeneration outcomes than PRF alone. Similarly, Alshoiby et al. (2023) found that injectable PRF combined with DBM outperformed DBM alone in patients with intrabony defects.

The enhanced outcomes observed in Group II can be attributed to the complementary actions of PRF and DBM. While PRF enhances soft tissue healing and stabilizes the graft material, DBM provides the necessary scaffold for bone regeneration and the release of osteogenic factors. The combination of these two biomaterials supports early - stage wound healing and accelerates bone formation, ultimately leading to improved clinical and radiographic outcomes.

The control group (Group III), which received open flap debridement (OFD) without any additional regenerative materials, showed the least improvement in all clinical parameters. Although OFD is an effective procedure for reducing bacterial load and promoting soft tissue healing, it lacks the regenerative potential provided by biomaterials such as PRF and DBM. This is reflected in the lower PPD reduction, CAL gains, and radiographic bone fill observed in Group III.

The comparison between Group III and the other two groups underscores the importance of incorporating regenerative materials into periodontal therapy. While OFD can provide satisfactory results in terms of pocket reduction, it may not be sufficient for cases where periodontal regeneration is the goal. The significant differences between Group III and the test groups (Group I and Group II) highlight the limitations of conventional surgical approaches in promoting tissue regeneration, particularly in patients with advanced periodontal defects.

The findings of this study have significant clinical implications for the management of intrabony periodontal defects. The combination of PRF and DBM offers a promising treatment option for clinicians seeking to optimize periodontal regeneration. By combining the biologic properties of PRF with the osteogenic potential of DBM, this approach can enhance both soft and hard tissue healing, leading to better clinical outcomes.

The use of autologous PRF also offers several practical advantages, including its ease of preparation, cost - effectiveness, and safety profile. As a completely autologous material, PRF eliminates the risk of immune reactions or

disease transmission, making it an attractive option for patients and clinicians alike. When combined with DBM, a well - established bone graft material with a long clinical track record, the combination therapy becomes a potent tool for periodontal regeneration.

Given the superior results observed in Group II, we recommend that clinicians consider incorporating PRF and DBM combination therapy into their treatment protocols for patients with intrabony defects. This approach can help achieve better PPD reduction, CAL gain, and bone regeneration, ultimately improving the long - term stability of periodontal tissues.

Despite the promising results of this study, several limitations should be considered. The relatively small sample size and single - center design may limit the generalizability of the findings. Additionally, the follow - up period of 9 months may not be sufficient to fully assess the long - term stability of the regenerative outcomes. Future studies with larger sample sizes, multicenter designs, and longer follow - up periods are needed to validate these findings and further explore the potential of PRF and DBM combination therapy.

Moreover, the underlying mechanisms of action of PRF and DBM in periodontal regeneration remain an area of interest. Investigating how these biomaterials interact at the cellular and molecular levels could provide valuable insights into optimizing treatment protocols and developing new regenerative strategies. Comparative studies evaluating different formulations of PRF and DBM, as well as their delivery methods, may also help refine the clinical application of these biomaterials.

4. Conclusion

In conclusion, this study demonstrates that the combination of PRF and DBM is more effective than PRF alone or OFD in promoting periodontal regeneration in patients with intrabony defects. The synergistic effects of PRF and DBM offer a powerful tool for enhancing both soft and hard tissue healing, leading to better clinical and radiographic outcomes. While further research is needed to validate these findings and explore their long - term implications, the results of this study suggest that PRF and DBM combination therapy should be considered a valuable option in periodontal regeneration protocols.

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