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APPLICATION OF PLASMA THERAPY IN PERIODONTAL DISEASE

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Abstract: Periodontal disease is a chronic inflammatory condition that leads to the destruction of tooth-supporting tissues. Conventional treatment approaches often fail to achieve complete regeneration of periodontal structures. This study evaluates the effectiveness of plasma therapy, specifically platelet-rich fibrin (PRF), as an adjunct to standard periodontal treatment. Clinical parameters were assessed at baseline, 1 month, and 3 months post-treatment. The results demonstrated significantly improved outcomes in the PRF-treated group, including greater probing depth reduction, clinical attachment gain, and enhanced healing. These findings suggest that PRF is a promising and effective regenerative tool in periodontal therapy.

Introduction

Periodontal disease remains one of the most prevalent oral health problems worldwide and is a major cause of tooth loss in adults. It is characterized by inflammation of the gingiva and progressive destruction of the periodontal ligament and alveolar bone. The primary etiological factor is microbial plaque, which triggers a host-mediated immune response.

Although conventional periodontal therapy—such as scaling and root planing (SRP)—effectively reduces bacterial load, it has limited regenerative potential. Therefore, modern periodontology increasingly focuses on biologically driven regenerative techniques.

Plasma therapy, particularly platelet-rich fibrin (PRF), has gained considerable attention due to its autologous origin and high concentration of growth factors. PRF contains bioactive molecules such as platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), and vascular endothelial growth factor (VEGF), which play a crucial role in tissue healing and regeneration.

This study aims to evaluate the clinical effectiveness of PRF in improving periodontal parameters and accelerating tissue regeneration.

Methods

Study Design

A comparative clinical study was conducted involving two groups:

- **Test group**: Received conventional periodontal therapy + PRF
- **Control group**: Received conventional periodontal therapy alone

Clinical Parameters Assessed

- Probing Pocket Depth (PPD)
- Clinical Attachment Level (CAL)
- Gingival Index (GI)

Procedure

All patients underwent scaling and root planing. In the test group, PRF was prepared from the patient's venous blood and applied to the periodontal defect sites during treatment.

Follow-Up

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Measurements were recorded at:

- Baseline
- 1month post-treatment
- 3 months post-treatment

Statistical Analysis

Data were analyzed using paired t-tests and one-way ANOVA. Statistical significance was set at **$p < 0.05$**

Results

Both groups showed improvement in periodontal parameters; however, the test group demonstrated significantly better outcomes.

Probing Depth Reduction

- Test group: **3.4 ± 0.5 mm**
- Control group: **2.2 ± 0.4 mm**

Clinical Attachment Gain

- Test group: **3.0 ± 0.6 mm**
- Control group: **1.7 ± 0.5 mm**

Gingival Index Reduction

A significant decrease in gingival inflammation was observed in the test group compared to the control group.

Healing and Regeneration

- Faster epithelialization observed in PRF-treated sites
- Reduced postoperative pain and discomfort
- Improved soft tissue texture and color

All improvements in the test group were statistically significant (**$p < 0.05$**).

Discussion

The results of this study confirm that plasma therapy significantly enhances periodontal healing and regeneration when used as an adjunct to conventional therapy.

The biological effectiveness of PRF is primarily attributed to its high concentration of growth factors. These factors stimulate fibroblast proliferation, enhance collagen synthesis, and promote angiogenesis, which are essential for tissue regeneration.

Unlike platelet-rich plasma (PRP), PRF does not require anticoagulants and forms a natural fibrin matrix that serves as a scaffold for cellular migration and tissue integration. This matrix allows for the gradual release of growth factors over time, prolonging its regenerative effect.

Additionally, the autologous nature of PRF eliminates the risk of immunological reactions and disease transmission, making it a safe and cost-effective treatment option.

The clinical findings of this study align with previous research demonstrating improved periodontal outcomes with PRF application. The significant reduction in probing depth and increased clinical attachment level indicate enhanced tissue regeneration and stability.

However, certain limitations should be considered:

- Variability in PRF preparation protocols

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- Operator-dependent outcomes
- Short follow-up duration

Future studies should focus on long-term clinical trials with larger sample sizes and standardized preparation techniques.

Conclusion

Plasma therapy, particularly platelet-rich fibrin (PRF), represents a highly effective adjunctive treatment modality in periodontology. It significantly improves clinical outcomes by enhancing tissue regeneration, reducing inflammation, and accelerating healing.

Given its biological advantages, safety, and ease of preparation, PRF can be widely recommended for the management of periodontal defects in modern dental practice.

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