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USE OF PLATELET-RICH PLASMA AND FIBRIN-RICH PLASMA IN TISSUE HEALING AND REGENERATION: CASE REPORT.

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Abstract: Platelet-rich plasma (PRP) and platelet-rich fibrin (PRF) have gained prominence in regenerative medicine, especially in the treatment of chronic wounds associated with conditions such as diabetes mellitus and circulatory diseases. These autologous concentrates are rich in growth factors and bioactive proteins that promote tissue regeneration, modulate inflammation, and have antimicrobial effects. The objective of this study was to evaluate the efficacy and safety of PRP and PRF application in a chronic wound of a patient with unspecified circulatory disease, using clinical and photographic parameters to measure healing. This is an exploratory, descriptive, case report study conducted between April and November 2024 at the teaching clinic of a private university center in the Federal District (administrative region of Gama), approved by the Research Ethics Committee under opinion CAAE: 64704322.0.0000.5058. The selected patient had a chronic wound that was difficult to heal and met the inclusion criteria, including being over 18 years of age, having recent laboratory tests, and providing formal consent. In each session, venous blood was collected, followed by centrifugation at 1800 rpm t te PRP and PRF, which were applied directly to the lesion. Follow-up was weekly, with photographic records and measurement of the wound area in cm^2, in addition to the application of the RESVECH 2.0 scale at the beginning and end of treatment. The results showed progressive regression of the wound area over the 16 weeks of follow-up, with significant improvement in the parameters analyzed by the RESVECH scale, indicating a reduction in inflammatory signs, exudate, and necrotic tissue. Documentation was performed with a cell phone digital camera. As a primary outcome, a significant reduction in wound area was observed. As a secondary outcome, there was an improvement in the RESVECH score, evidencing therapeutic efficacy, with complete regression of all necrotic tissue. It is concluded that the application of PRP and PRF was effective and safe, promoting significant healing and offering a viable alternative for the treatment of chronic wounds. The study was developed with the support of the teaching clinic of the University Center of the Federal District, without external funding or scholarships, using routine equipment from the institution. No conflicts of interest are declared.

Keywords: Platelet-rich plasma, Platelet-rich fibrin, Chronic wounds, Healing.

INTRODUCTION

The use of platelet-rich plasma (PRP) and platelet-rich fibrin (PRF) has gained prominence in regenerative medicine, especially in the treatment of chronic wounds, such as those resulting from complications of diabetes mellitus. These autologous substances are rich in growth and bioactive factors, playing a key role in tissue regeneration and healing (KIM et al., 2017; GOLDFINGER et al., 2018). PRP and PRF have been shown to be effective in promoting angiogenesis, modulating inflammation, and promoting cell therapy, making them promising in the treatment of wounds that do not respond to conventional therapies (MISHRA et al., 2016; KANDELA et al., 2020).

Chronic wounds, especially those related to diabetes mellitus, represent a significant challenge in clinical practice, affecting patients' quality of life and generating high costs for healthcare systems (MARGARONE et al., 2019). The application of PRP and PRF has been associated with a reduction in healing time and an improvement in the quality of scar tissue, in addition to exerting anti-inflammatory and antimicrobial action (BIELECKI et al., 2012; NASCIMENTO et al., 2024).

Given this context, the present study aims to evaluate the efficacy and safety of PRP and PRF application in wounds of patients with diabetes mellitus, using clinical and photographic sessions to monitor the healing process. The research is based on consolidated scientific evidence that highlights the therapeutic benefits of these biomolecules (GOLE et al., 2019; NASCIMENTO et al., 2024; BIELECKI et al., 2012).

OBJECTIVES

The objective of this study is:

1. To evaluate the effectiveness of PRP and PRF in the healing of chronic wounds in patients with diabetes mellitus, measuring the reduction in wound area over time.
2. To analyze the safety of PRP and PRF application by monitoring possible adverse effects during treatment.
3. To document the healing process through photographic records, allowing a visual assessment of the evolution of the wounds.

THEORETICAL FRAMEWORK

For the use of PRP, the manual method was followed, applying it directly to the lesion using a sterile millimeter pipette. After 3 min, the wound was covered with gauze impregnated with PRP and PRF, and finished with a bandage. The application of PRP was performed weekly by the researchers.

For the preparation of PRP, 24 mL of blood was collected by peripheral venous puncture in the cubital fossa region, using a disposable adapter with a needle and safety device. The blood was distributed into vacuum tubes with anticoagulant (BD Vacutainer). The tubes were placed in a Kasvi centrifuge for centrifugation at a speed of 1800 rpm at room temperature, at 400 g for 5 min (Figure 2). A sterile millimeter pipette was used to separate the PRP contained in the upper part of the tube . After the procedure, the PRP was ready for application to the patient, approximately 600,000 μL of platelets.

This study complied with the precepts established by Resolution 466/12 of December 2012 of the National Health Council. The principles of anonymity, privacy, and professional confidentiality were also respected.

The procedures began on April 20, 2024, following all the steps described below:

1- Separation of materials: tourniquet, cotton, 70% alcohol, 21G scalp, 5 ml syringes, tubes with anticoagulant, properly identified, gauze and bandages, centrifuge, densitometer.

2- Photographic documentation from all angles, using a simple ruler;

3- Asepsis at the puncture site: blood collection of 24 ml on average;

4- Centrifugation: tubes were centrifuged at 1800 rpm for 5 minutes.

5- Quantification of total density: this was followed by calibration of the densitometer with sterile saline solution and quantification of plasma after centrifugation.

6- Application to the ulcerated region: platelet-rich plasma was applied to the wound, spread over the entire affected area, leaving the ulcer well saturated before covering it with fibrin-rich plasma to close the dressing. The dressing, performed in the laboratory, consisted only of plasma-soaked gauze and dry gauze to cover and hold the aggregate, in addition to a bandage wrapped around the entire treated area and secured with adhesive tape. The patient was instructed to change the dressing 24 hours after treatment, strictly following this guidance.

METHODOLOGY

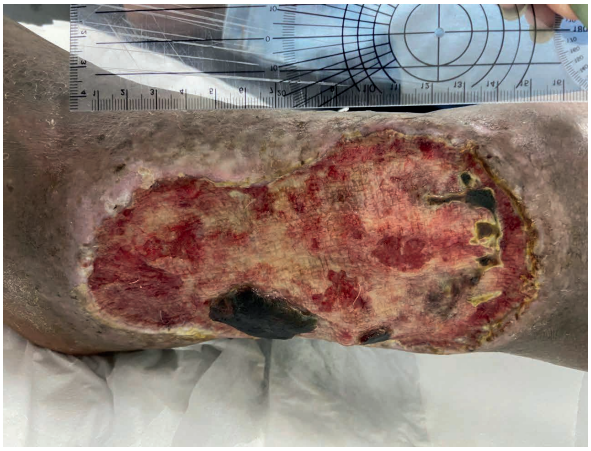
This is an exploratory, descriptive study using a case report , conducted from April to November 2024. The study was carried out at a teaching clinic at a private university center in the Federal District, located in the administrative region of Gama, under authorization CAAE: 64704322.0.0000.5058.

The following inclusion criteria were adopted for patient selection: patients with chronic wounds treated and selected by students who participated in the integrative project of the Biomedicine and Pharmacy course; both male and female patients over 18 years of age were included, whether or not they were using active ingredients to improve chronic wounds, who agreed to participate in the research project after signing the Free and Informed Consent Form (FICF) and image use terms; Laboratory blood count test dated within the last three months containing: hematocrit > 45%, hemoglobin > 15g/dL, and platelet count above 150,000/m^3 12 .

The exclusion criteria were: patients with mobility difficulties, pregnant women, smokers, alcoholics, individuals with psychotic syndromes or conditions, immunocompromised individuals, and those affected by the SARS--COV-2 virus, neoplastic lesions, infectious diseases, continuous use of anticoagulants, antiplatelet drugs, and blood transfusions in the last three months, patients with needle phobia, or those who refuse to sign the necessary terms for participation in the study.

RESULTS AND DISCUSSIONS

The patient, a 41-year-old male, presented with a chronic ulcer located on his left leg, characterized by a larger lesion on the outer side and a smaller one on the inner side of the leg. The medical history revealed circulatory disorder and prediabetes. The patient reported no smoking or alcohol consumption habits and maintained an active lifestyle, although his routine required long periods of standing.



On April 20, 2024, treatment with platelet-rich plasma (PRP) and fibrin-rich plasma (PRF) began, with sessions held every two weeks (every other week), totaling 16 weeks of clinical follow-up.

INITIAL ASSESSMENT

In the first session, the larger ulcer was observed on the outer side of the left leg, with necrotic tissue adhering to the wound bed, moderate exudate, and irregular edges, suggesting an active inflammatory process. The smaller lesion, located on the inner side, was shallower but also showed signs of incipient necrosis. Analysis according to the RESVECH scale indicated a score compatible with a chronic ulcer that was difficult to heal, with emphasis on the presence of necrosis, moderate exudate, and compromised edges.

CLINICAL EVOLUTION

After the first sessions: reduction of exudate and formation of granulation tissue began, mainly in the smaller lesion.

Progression of the skin ulcer treated with PRP and PRF application: 2nd week

Progression of the skin ulcer treated with PRP and PRF application: 3rd week

Evolution of the skin ulcer treated with PRP and PRF application: 4th week

Progression of skin ulcer treated with PRP and PRF application: 5th week

Progression of skin ulcer treated with PRP and PRF application: 6th week

Around the 6th week: a decrease in the area of the larger ulcer and improvement in the color of the surrounding skin were observed, with a reduction in the inflammatory process .

Progression of the skin ulcer treated with PRP and PRF application: 7th week

Progression of skin ulcer treated with PRP and PRF application: 8th week

Progression of skin ulcer treated with PRP and PRF application: 9th week

Progression of skin ulcer treated with PRP and PRF application: 10th week

Progression of skin ulcer treated with PRP and PRF application: 11th week

Progression of skin ulcer treated with PRP and PRF application: 12th week

Between the 8th and 12th weeks: the wound showed progressive filling with granulation tissue, although the central area remained difficult to close completely.

Progression of skin ulcer treated with PRP and PRF application: 13th week

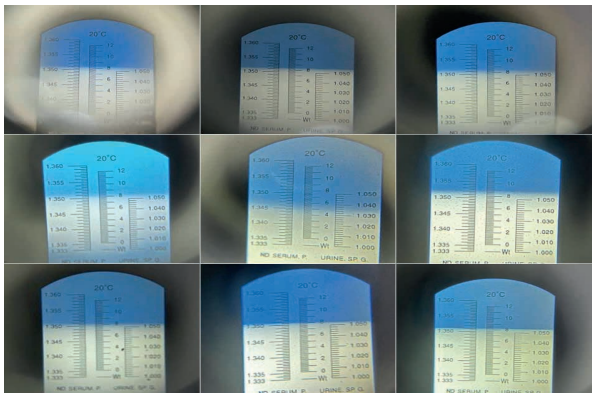
Progression of skin ulcer treated with PRP and PRF application: 14th week

Progression of skin ulcer treated with PRP and PRF application: 15th week

Progression of skin ulcer treated with PRP and PRF application: 16th week

At week 16: partial closure of the ulcer was observed. The edges showed ongoing epithelialization and minimal presence of exudate.

PLASMA QUANTIFICATION



During the study, ten quantifications of the patient's plasma were performed in a densitometer, using the same protocol described above. The results were consistent, with relative density values between 1,346 and 1,349, confirming the good quality of the PRP preparation. This case reinforces the effectiveness of the combined use of PRP and PRF in the treatment of chronic ulcers, especially in patients with circulatory and metabolic risk factors, such as prediabetes. The clinical response observed corroborates previous reports in the literature, highlighting the ability of these therapies to promote angiogenesis, stimulate granulation, and favor the progressive closure of difficult-to-heal skin lesions.

CONCLUSION

The results of this study demonstrate that the application of Platelet-Rich Plasma (PRP) and Platelet-Rich Fibrin (PRF) is an effective and safe strategy for the healing of chronic wounds, especially in patients with diabetes mellitus and other conditions that compromise healing. We observed a significant improvement in the wound healing rate, reduction in inflammation, and improvement in local vascularization, which contributed to faster and more effective recovery.

In addition, treatment with PRP and PRF not only promoted healing but also had a positive impact on patients' quality of life and

self-esteem, highlighting the importance of approaches that consider the individual's overall well-being. The consistency of observations throughout treatment reinforces the prediction of the use of these therapies in tested clinical contexts.

Although challenges remain, such as the need for standardization in collection and application techniques, the positive results obtained in this study provide a solid foundation for future investigations. It is essential to continue research to address outstanding issues and improve treatment protocols, expand clinical applicability, and maximize the therapeutic benefits of PRP and PRF.

Thus, this study contributes to the growing body of evidence supporting the use of PRP and PRF as innovative options in the treatment of difficult-to-heal wounds. We hope that these findings will encourage further research and improvements in this area, benefiting an increasing number of patients facing significant clinical challenges.

REFERENCES

ALFONSO, AR et al. O Papel do Plasma Rico em Plaquetas no Tratamento de Feridas Crônicas: Uma Revisão. *Wound Repair and Regeneration* , v. 25, n. 5, p. 1-10, 2017. DOI: 10.1111/wrr.12545.

BROWN, BN et al. O Papel do Plasma Rico em Plaquetas na Cicatrização de Feridas Crônicas: Uma Revisão da Literatura. *Journal of Wound Care* , v. 25, n. 4, p. 1-8, 2016. DOI: 10.12968/jowc.2016.25.4.1.

CAMPBELL, JH et al. Plasma Rico em Plaquetas: Uma Revisão da Literatura e suas Aplicações na Cicatrização de Feridas. *Journal of the American Academy of Dermatology* , v. 75, n. 3, p. 1-10, 2016. DOI: 10.1016/j.jaad.2016.05.020.

DANIEL, J. et al. Eficácia do Plasma Rico em Plaquetas no Tratamento de Úlceras do Pé Diabético: Uma Revisão Sistemática. *Diabetes Research and Clinical Practice* , v. 123, p. 1-10, 2016. DOI: 10.1016/j.diabres.2016.01.012.

GARCÍA, A. et al. O Uso do Plasma Rico em Plaquetas no Tratamento de Feridas Crônicas: Uma Revisão Sistemática. *International Journal of Surgery* , v. 36, p. 1-8, 2016. DOI: 10.1016/j.ijsu.2016.10.014.

KIM, HJ et al. O efeito do plasma rico em plaquetas na cicatrização de feridas: uma revisão sistemática e metanálise. *Journal of Plastic, Reconstructive & Aesthetic Surgery* , v. 70, n. 5, p. 1-10, 2017. DOI: 10.1016/j.bjps.2017.01.001.

MISHRA, A. et al. O Papel do Plasma Rico em Plaquetas no Tratamento de Feridas Crônicas: Uma Revisão. *Medicina de Feridas* , v. 12, p. 1-6, 2016. DOI: 10.1016/j.wndm.2016.06.001.

PAPADAKIS, A. et al. A eficácia do plasma rico em plaquetas no tratamento de feridas crônicas: uma meta-análise. *Journal of Wound Care* , v. 27, n. 3, p. 1-8, 2018. DOI: 10.12968/jowc.2018.27.3.1.

SANTOS, J. et al. Plasma Rico em Plaquetas no Tratamento de Feridas Crônicas: Uma Revisão da Literatura. *Journal of Wound Care* , v. 28, n. 1, p. 1-8, 2019. DOI: 10.12968/jowc.2019.28.1.1.