Hindawi
Dermatologic Therapy
Volume 2023, Article ID 9040608, 4 pages
https://doi.org/10.1155/2023/9040608

Research Article

Platelet-Rich Fibrin as an Effective Method of Skin Revitalization

Lidia Majewska

ESME Clinic, Kraków, Poland

Correspondence should be addressed to Lidia Majewska; drlmajewska@gmail.com

Received 4 October 2022; Revised 6 March 2023; Accepted 23 March 2023; Published 19 April 2023

Academic Editor: Snejina G. Vassileva

The objective of this retrospective study was to verify with the use of high-frequency ultrasonography whether Platelet-Rich Fibrin (PRF) can increase skin density and become an effective method of skin revitalization as well as to determine an optimal procedure protocol for the use of Platelet-Rich Fibrin to revitalize skin of the periorbital region. Ten patients (women, age 32–45) were assigned for the observation. They reported thinning and wrinkles of the skin in the periorbital area. For each individual two vials (18 mL) of peripheral blood were collected and placed in preprogrammed centrifuge (60*g*, 3 minutes). After centrifugation injectable-PRF (i-PRF, 2 mL) was collected and injected intradermally in the periorbital area, using the mesotherapy technique with 4 mm 30 G needles. The patients underwent four procedures in one month intervals. A high-frequency ultrasound device was used to measure skin density. Skin density analyses were performed before PRF administration, a month after the second and a month after the third procedure in the crow's feet area. The results demonstrated an increase in skin density in all patients after just one procedure: on average it was 1.66 times higher compared to the baseline after the second and 5.08 times higher after the third treatment which was visualized using the DUB SkinScanner imaging. The enrolled patients' satisfaction with their facial skin appearance was measured with the visual analogue scale (VAS). Digital photographs were taken before the first treatment and a month after the last treatment. The VAS assessment results were as follows: the average score before the treatment was 4 and the average score after the treatment was 8.5, indicating a significant increase in patient satisfaction. i-PRF seems to be a promising treatment modality for skin rejuvenation in the periorbital area and might be a solution for those seeking natural methods. Although the results of this observation are very promising, there is need for larger controlled research to definitely confirm Platelet-Rich Fibrin efficacy in the skin revitalization processes.

1. Introduction

The clinical uses of platelet concentrates were first described and covered in detail in the late 1990s mainly by Marx [1]. Platelet-Rich Plasma (PRP) therapy is a medical treatment that involves using a concentration of a patient's own blood platelets to promote healing and tissue regeneration [2]. While PRP has shown promise in treating various conditions in different fields of medicine and dentistry, it does have some limitations.

As explained in previous publications [3]: "one of the limitations of PRP that were reported were the presence of external anticoagulant." This is because it can inhibit the clotting process and the release of growth factors. The clotting process is crucial in PRP therapy because it helps to concentrate the platelets and their growth factors in the desired area. If an anticoagulant is present, the platelets may not clot properly, leading to a reduced concentration of growth factors and less effective healing. To address this limitation, some PRP therapies use activating factors, such as calcium, to promote clotting. While this can help overcome the anticoagulant limitation, it also leads to another limitation: the sudden release of nearly 95% of growth factors immediately following activation. This means that the therapeutic effects of PRP may be short-lived, as the growth factors are quickly released and may not remain in the area long enough to promote optimal healing and stimulation [3].

These limitations led to the development of second-generation platelet concentrates without anticoagulant. This formulation was named Platelet-Rich Fibrin or PRF. The fibrin matrix traps the cells and allows for slow release of

growth factors over time. The three-dimensional fibrin matrix provides a scaffold and serves as a reservoir of platelets, so growth factors may be released even up to 14 days after preparation [4]. Some previous studies [5, 6] have shown that decreasing the centrifugal speed to 200g and increasing the duration of spin can increase the number of leukocytes and platelets in the PRF, which improves the quality of the product. Other publication [7] showed that a liquid PRF could be produced by further reducing the centrifugation time and speed (60g for 3 min). Authors named it i-PRF or injectable PRF as it could be easily injected before forming a clot.

2. Materials and Methods

The objective of this retrospective analysis was to demonstrate with the use of high-frequency ultrasonography, how the use of i-PRF can increase facial skin density.

Ten patients of our clinic (women, age 32–45) were assigned for observation. The procedure is routinely performed in our clinic in patients willing to improve the quality of their skin using natural methods. The chosen group of patients reported thinning and wrinkles of the skin in the periorbital area. For each individual, 2 vials of peripheral blood (18 mL) were collected and placed immediately in preprogrammed centrifuge (60g, 3 minutes). After centrifugation i-PRF (2 mL) was collected and injected intradermally in the periorbital area, using the mesotherapy technique with 4 mm 30 G needles. The patients underwent four procedures in one month intervals. The reported side effects were minimal and transient and included mild bruising and slight pain at the site of injection, which diminished after 24 hours.

A high-frequency ultrasound device, DUB SkinScanner, was used to measure skin density. It is a high-definition imaging system used to perform noninvasive skin analysis.

Skin density analyses were performed before PRF administration, a month after second and a month after third procedure in the crow's feet area.

3. Results

The one-way ANOVA was used to analyze the results in Table 1 in order to compare the means of skin density between the initial skin density, after the 2nd and after the 3rd treatment.

The statistical analysis, which produced a F value of 108.515235 (F crit: 3.35413083) and a P value of 1.2386E-13, reinforces that i-PRF increases skin density, and that consistency of the treatments is favorable for optimization of the results (as seen by the increase in mean skin density values between groups).

The results have demonstrated an increase in skin density in all patients after just one procedure: on average, it was 1.66 times higher compared to the baseline after the second and 5.08 times higher after the third treatment (Table 1) which was visualized using the DUB SkinScanner imaging (Figures 1(a) and 1(b)).

Table 1: Progressive skin density throughout the experiment.

Initial skin density	Post 2nd treatment skin density	Post 3rd treatment skin density
10	17	55
8	13	65
11	15	63
12	14	69
7	10	52
14	33	77
26	42	51
18	25	69
9	15	56
7	18	63

The enrolled patients' satisfaction with their facial skin appearance was measured with the visual analogue scale (VAS) at the baseline and a month after the last (4th) treatment. Digital photographs were taken before the treatment and a month after the last procedure (Figures 2(a) and 2(b)).

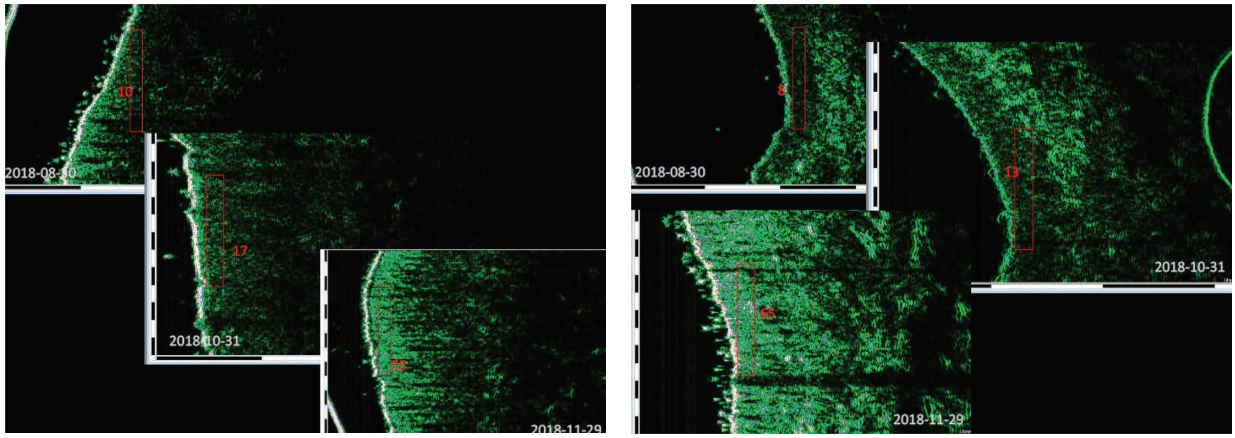
The VAS assessment results, where 0 indicates extreme dissatisfaction and 10 maximum satisfaction were as follows: the average score before treatment was 4 and the average score after treatment was 8.5, indicating a significant increase in patient satisfaction with the appearance of their facial skin following the treatment completion.

4. Discussion

The purpose of this paper is to provide an aesthetically pleasing and noninvasive alternative to address skin rejuvenation of the periorbital area. The periocular region appears to have its own set of complications when using nonpermanent soft tissue fillers like hyaluronic acid (HA) products. HA fillers in this area may cause immediate and delayed complications such as lower eyelid oedema or the Tyndall effect [8]. Since the number of aesthetic medicine noninvasive treatments in periorbital area is growing, so is the prevalence of complications.

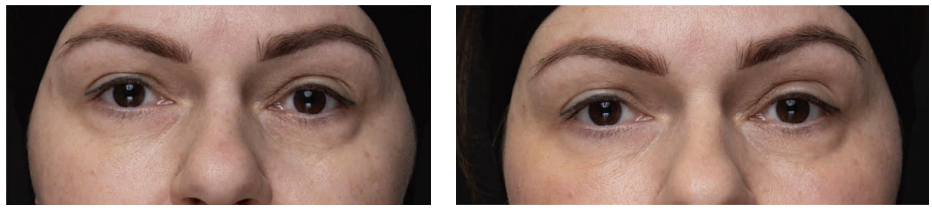
i-PRF is a promising treatment modality for skin rejuvenation in the periorbital area. PRF products can be used as an antiaging treatment and for improving skin tone and texture.

Because of the shorter centrifugation time and lower speed two-to three-fold increase in platelets and 1.5-fold increase in leukocyte concentration can be obtained in i-PRF [9]. In the studies i-PRF showed higher cell migration and collagen 1 expression when compared to PRP. Although both PRP and i-PRF significantly increased cell mRNA levels of platelet-derived growth factor, it was observed that transforming growth factor beta, collagen 1, and fibronectin mRNA levels were all significantly higher in case of the liquid-PRF. Lastly, i-PRF-induced collagen matrix synthesis to higher extent when compared to PRP [9]. Hence, PRF could offer superior results in skin rejuvenation than the conventional PRP. In addition, i-PRF does not cause long-lasting complications such as swelling which are often observed after the use of HA fillers.



(a) (b)

Figure 1: (a, b) US images of the periorbital area, at the baseline (2018-08-10), a month after second procedure (2018-10-31) and a month after third procedure (2018-11-29). Acoustic density of the dermis marked red.



(a) (b)

Figure 2: Skin quality change in the periorbital area, (a)-before the treatment, (b)-a month after completing the last procedure.

The use of high-frequency ultrasound in assessing the results of therapeutic treatments becomes more and more prevalent. There is a growing popularity of using high-frequency ultrasound to assess skin condition. Ultrasound images clearly show the results of injection treatments and are an objective tool for measuring skin density and thickness. High resolution ultrasounds will be used more often not only to examine skin disorders and skin diseases but also to evaluate the results of aesthetic treatments [10].

The limitations of this study are: the small number of participants (10 subjects) and the study population itself, specifically not including male participants. The study design with no control group might also be considered a downside. Furthermore, this study does not take into consideration patients' baseline status, as no scales were used to assess volume deficiency, skin condition, and previously performed aesthetic procedures. To provide further detail, future studies should focus on the results of injectable-PRF injections relative to baseline severity, volume deficiency, and skin condition. While this analysis reflects the predominantly female patient population for i-PRF injections encountered in daily practice, a male population would allow comparison of outcomes between genders, strengthening the statistical analysis. However, all additional data: ultrasound scans and the visual analogue scale (VAS) measured at the baseline and a month postfinal treatment showed a significant change in values which strengthens the claim made in the study.

5. Conclusion

Injectable-PRF (i-PRF) injection seems to be a cost-effective, safe, well-tolerated, and minimally invasive technique effectively improving skin condition and producing aesthetic correction of facial wrinkles in the periorbital area and might be a solution for those seeking natural methods. Although the results of this observation are very promising, there is need for larger controlled research to definitely confirm Platelet-Rich Fibrin efficacy in the skin revitalization processes.

Data Availability

The data used to support the study are available from the corresponding author upon request.

Ethical Approval

The authors declare that all procedures were performed in adherence to the Declaration of Helsinki, in accordance with regional laws and good clinical practice for studies in human subjects.

Consent

All patients have signed a consent form for the procedure and gave written informed consent for the publication of their image in the journal.

Conflicts of Interest

The authors declare that there are no conflicts of interests and that the manuscript has not been previously sent to or published in any journal.

References

[1] R. E. Marx, "Platelet-rich plasma (PRP): what is PRP and what is not PRP?" *Implant Dentistry*, vol. 10, no. 4, pp. 225–228, 2001.

[2] R. E. Marx, E. R. Carlson, R. M. Eichstaedt, S. R. Schimmele, J. E. Strauss, and K. R. Georgeff, "Platelet-rich plasma: growth factor enhancement for bone grafts," *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology & Endodontics*, vol. 85, no. 6, pp. 638–646, 1998.

[3] S. Dashore, K. Chouhan, S. Nanda, and A. Sharma, "Platelet -rich fibrin, preparation and use in dermatology," *Indian Dermatol Online J*, vol. 12, no. 7, pp. S55–S65, 2021.

[4] R. J. Miron, M. Bishara, and J. Choukroun, "Basics of platelet-rich fibrin therapy," *Dentistry Today*, vol. 36, no. 4, pp. 74–76, 2017.

[5] J. Choukroun and S. Ghanaati, "Reduction of relative centrifugation force within injectable platelet-rich-fibrin (PRF) concentrates advances patients' own inflammatory cells, platelets and growth factors: the first introduction to the low speed centrifugation concept," *European Journal of Trauma and Emergency Surgery*, vol. 44, no. 1, pp. 87–95, 2018.

[6] M. Fujioka-Kobayashi, R. J. Miron, M. Hernandez, U. Kandalam, Y. Zhang, and J. Choukroun, "Optimized platelet-rich fibrin with the low-speed concept: growth factor release, biocompatibility, and cellular response," *Journal of Periodontology*, vol. 88, no. 1, pp. 112–121, 2017.

[7] R. J. Miron and Y. Zhang, "Autologous liquid platelet rich fibrin: a novel drug delivery system," *Acta Biomaterialia*, vol. 75, pp. 35–51, 2018.

[8] J. Anido, J. M. Fernández, I. Genol, N. Ribé, and G. Pérez Sevilla, "Recommendations for the treatment of tear trough deformity with cross-linked hyaluronic acid filler," *Journal of Cosmetic Dermatology*, vol. 20, pp. 6–17, 2020.

[9] E. Kobayashi, L. Flückiger, M. Fujioka-Kobayashi et al., "Comparative release of growth factors from PRP, PRF, and advanced-PRF," *Clinical Oral Investigations*, vol. 20, no. 9, pp. 2353–2360, 2016.

[10] R. Kleinerman, T. B. Whang, R. L. Bard, and E. S. Marmur, "Ultrasound in dermatology: principles and applications," *Journal of the American Academy of Dermatology*, vol. 67, no. 3, pp. 478–487, 2012.