Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/22187
DOI URL: http://dx.doi.org/10.21474/IJAR01/22187

RESEARCH ARTICLE

SUCCESSFUL TREATMENT OF LASER-INDUCED HYPOPIGMENTATION WITH PLATELET-RICH PLASMA CASE REPORT

Emily Garelick[1], Adriana Lombardi[2] and Caleb Findley[3]

1. Philadelphia College of Osteopathic Medicine, Philadelphia, PA, USA.
2. Skin Cancer and Cosmetic Surgery Center of NJ, Edison, NJ, USA.
3. Philadelphia College of Osteopathic Medicine Suwanee, GA, USA.

Manuscript Info

Manuscript History
Received: 14 September 2025
Final Accepted: 16 October 2025
Published: November 2025

Key words:-
Laser hair removal, hypopigmentation, platelet-rich plasma, cosmetic dermatology, case report

Abstract

Introduction: Platelet-rich plasma (PRP) has become an increasingly popular treatment that extracts plasma enriched with a high concentrati on of platelets and growth factors from the patient's blood to improve cosmetic and functional outcomes. This versatile treatment is useful in treating alopecia, psoriasis, hyperpigmentation, vitiligo, and improving skin rejuvenation. By processing a patient's blood, PRP allows for platelets and growth factors to be reintroduced into the skin, which can promote healing, tissue regeneration, and in this case, a restoration of skin pigmentation.

Case presentation: This case report demonstrates the use of PRP therapy on a 28-year-old Caucasian female with no significant past medical history suffering from hypopigmentation following laser hair removal. After failed topical corticosteroid treatment, three sessions of PRP were performed, spaced 6 weeks apart, resulting in almost complete clearance of hypopigmentation.

Conclusion: The positive outcome observed in this patient suggests that PRP may be a promising treatment option for various types of hypopigmentation, potentially offering a non-invasive and effective approach for patients suffering from this condition.

Introduction:-

Platelet-rich plasma (PRP) is a treatment modality derived from a patient's own blood, enriched with a high concentration of platelets and growth factors. Its use began in the 1980s for various medical conditions, including orthopedic injuries, infertility, erectile dysfunction, and regenerative medicine [1]. In the field of dermatology, PRP has gained popularity and is now used for hair growth, psoriasis, skin rejuvenation, hyperpigmentation, and vitiligo [1]. Its regenerative properties through the release of growth factors allow for stimulation of cell differentiation, proliferation, and tissue repair which has been proven beneficial in treating various skin conditions.

Vitiligo treatment with PRP is an idea that has been studied more recently, indicating that PRP has the ability to release cytokines and growth factors, allowing for cell differentiation, proliferation, and regeneration of cells [2].

Corresponding Author:- Emily Garelick
Address:- Philadelphia College of Osteopathic Medicine, Philadelphia, PA, USA.

This has proven successful in helping with repigmentation and improving healing rates when combined with narrow ultraviolet B and transplantation of epidermal cells [3]. These findings have sparked interest in PRP's broader applications in pigmentary disorders. One area that remains underexplored is the use of PRP in treating laser-induced hypopigmentation. Laser therapies, though effective for certain dermatologic concerns, present with the risk of post-laser pigmentary changes. Here, we present the case of a 28-year-old female who had improvement in laser-induced hypopigmentation after PRP injections.

Case Report:

A 28-year-old Caucasian female with no significant past medical history presented to the office with a two-month history of post-inflammatory hypopigmentation status post-laser hair removal (LHR). As demonstrated in Figure 1 a, circular hypopigmentation spots were located on the bilateral lower legs spanning from the knee to the ankle. After the initial laser hair removal two months ago, the patient reported scabbing, followed by the appearance of circular hypopigmentation patches. The hypopigmentation patches were determined to be moderate in severity, covering 15% body surface area. The LHR was performed in the winter. The patient was not tan at the time of the procedure, and she avoided sunlight following the treatment. The patient documented that she has no personal history of vitiligo, other pigmentation disorders, or autoimmune disease.

At her first visit, which the patient reported to be two months after her laser hair removal, she was prescribed triamcinolone acetonide 0.1% topical cream along with daily use of Aquaphor. She was also counseled on skincare, including avoiding sun exposure and using sunscreen. Despite using the steroids in a 2-week on, 2-week off regimen for two months, there was minimal improvement, so the treatment was discontinued. PRP therapy was initiated two weeks after discontinuation of the steroids. Before each PRP treatment, the bilateral pretibial regions were anesthetized with 7% tetracaine, and 23% lidocaine in addition to ice for pain control. During the first treatment, 22cc of blood was drawn, centrifuged, and divided into 4, 3cc syringes for injection into the bilateral lower legs. Following treatment, the patient was informed to take precautions against sun exposure. Including avoiding the application of sunscreen to the legs for 12 hours post-procedure and withholding regular skin care regimen with topical moisturizer for 2-3 days. Also, avoiding alcohol-based toners for 10-14 days post-procedure.

Six weeks later, the hypopigmentation was significantly improved at patient follow-up, and the second treatment was initiated. The third was done an additional six weeks later, completing her recommended three sessions of PRP. By the conclusion of the three treatments, the patient exhibited considerable improvement as demonstrated in Figure 1 b, with hypopigmentation nearly entirely resolved in the lower legs.

Figure 1. Before (A) image of circular hypopigmentation patches of the bilateral lower extremities of a 28-year-old Caucasian female 2 months post laser hair removal. After (B) images of the bilateral lower extremities of the same 28-year-old Caucasian female demonstrating repigmentation following three sessions of PRP.

Discussion:-

PRP therapy is a versatile treatment with cosmetic and functional applications extending beyond the most commonly studied treatments. PRP therapy was initially used in the 1970s in hematology for patients suffering from thrombocytopenia [4]. Its use expanded in the 1980s and 1990s for surgical procedures in reconstruction plastic surgery [4]. As medicine has progressed, PRP has been introduced into many specialties including orthopedics, cardiology, sports injury, gynecology, urology, and dermatology [4]. Over the last decade, PRP has been an upcoming aesthetic treatment modality, specifically to combat facial aging, targeting wrinkles, open pores, and pigmentation [5]. PRP therapy uses centrifugated blood with a high concentration of platelets and their growth factors in a small volume of plasma. Growth factors are secreted from alpha granules inside the platelet cells [6]. About 10 minutes after injection, alpha granules release the growth factors [6]. Platelet cells continue to make and release growth factors over the next week after treatment [6]. The release of these growth factors has been documented to improve bone fracture healing, injuries of muscles, articular cartilage lesions, and peripheral nerve injuries [6]. Additionally, it has the ability to improve the healing of wounds, alopecia, inflammatory disorders, and skin rejuvenation [6].

Regarding skin pigmentation, PRP has been reported to be effective in treating hypopigmentation by preventing apoptosis of melanocytes [6]. After injection of PRP, there is a stimulation of Akt which inhibits the degradation of beta-catenin, ultimately stimulating the proliferation of melanocytes [6]. Additionally, PRP helps to strengthen intercellular adhesions with the help of growth factors that stimulate the proliferation of keratinocytes and fibroblasts [6]. Antiinflammatory effects of PRP include the downregulation of cytokines, including the release of interleukin-1, interferon-gamma, and tumor necrosis factor-alpha [6]. Melanocytic proliferation, intercellular adhesion strengthening, and antiinflammatory effects contribute to repigmentation.

While PRP therapy has been increasingly studied and applied in the context of vitiligo [1], limited data remains regarding its efficacy in repigmentation for other skin conditions. Vitiligo is one of the primary areas where PRP therapy has shown promise. However, there is an opportunity for a broader exploration of the use of PRP in the context of repigmentation. While some small-scale studies suggest that PRP may be beneficial in forms of post-inflammatory hypopigmentation [7], burns [8], and scars [9], there is a lack of comprehensive clinical trials to determine its efficacy. This case demonstrates the potential that PRP therapy has for the use of repigmentation in a unique dermatologic condition. As PRP therapy continues to evolve as a treatment for additional dermatologic concerns, additional studies are needed to investigate its potential further.

Conclusion:-

This case report highlights a relatively unexplored application of PRP therapy for patients suffering from laser-induced hypopigmentation, which is notoriously challenging to treat. In this case, a 28-year-old Caucasian female with no significant past medical history demonstrated significant repigmentation after undergoing three sessions of PRP in six-week intervals. The positive outcome observed in this patient suggests that PRP could offer a viable treatment solution for treating other cases of laser-induced hypopigmentation as well as other causes of hypopigmentation, including those caused by trauma, burns, and other skin disorders. Given the promising results observed in this case, additional case reports and further clinical studies are necessary to explore the potential positive effect that PRP can have in treating hypopigmentation.

Patient Perspective:

The patient initially presented to the office two months after undergoing laser hair removal at another practice. She expressed concerns due to her previous experience, as she had never encountered issues with hypopigmentation before and was uncertain whether any effective treatment options were available. After a trial of topical corticosteroids, which proved unsuccessful, the patient became frustrated and sought an alternative treatment approach. She was open to trying PRP therapy, as the appearance of her legs was of significant importance to her. The patient tolerated the PRP procedure well during the office visit and adhered to the scheduled follow-up appointments for the subsequent two treatments. She expressed a high level of satisfaction with the outcome of the treatment.

Author contributions:

E.G contributed to writing the manuscript draft and preparing Figure 1. E.G., A.L., and C.F. reviewed and edited final drafts of the manuscript. All authors reviewed and approved the final manuscript.

Funding None.
Data availability No sets of data were created or analyzed.

Declarations:
Conflict of interest None.
Consent to publish Patient signed written informed consent and agreed to submission of the case report, photographs, and their clinical results.

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