DOI: 10.21088/jd.2582.3582 10125.1

RFP Journal of Dermatology
Volume 10 Number 1, January - June 2025

CASE REPORT

Role of Autologous Platelet Rich Plasma in Uptake of Split Skin Graft Site

Preethee U.[1], Ravi Kumar Chittoria[2], Amrutha J.S.[3], Sriram V.S.[4]

HOW TO CITE THIS ARTICLE:

Preethee U., Ravi Kumar Chittoria, *et al.* Role of Autologous Platelet Rich Plasma in Uptake of Split Skin Graft Site. RFP Jr of Drea 2025; 10(1): 07-10.

ABSTRACT

Skin grafting is a time-honored surgical technique that has been widely utilized for wound coverage and reconstruction. Depending on the clinical scenario and the requirements of the defect, skin grafts can be classified into different types, such as partial-thickness and full-thickness grafts, based on the amount of dermis included along with the epidermis. Despite being a well-established procedure, several factors can influence the success of graft uptake, including graft immobility, wound bed nutrition, and prevention of infection. Various techniques and adjuncts have been developed over time to improve graft take rates and overall healing outcomes. In this article, we report a case of post-burn raw area successfully covered using a split-thickness skin graft (SSG). The graft take was further enhanced by the application of autologous platelet-rich plasma (APRP), which acted as a biological adhesive and promoted early healing through the release of growth factors.

KEYWORDS

• Autologous platelet-rich plasma • Split-Thickness Skin Graft

INTRODUCTION

Autologous platelet-rich plasma (PRP), as the name implies, is a concentration of the patient's platelets suspended in a small volume of plasma. It is rich in growth factors and functions as a fibrin sealant, offering multiple beneficial properties. One of its significant applications is in skin grafting, where it not only acts as a biological adhesive but also enhances graft take by promoting angiogenesis and delivering growth factors to the wound bed.

AUTHOR'S AFFILIATION:

[1] Junior Resident, Department of Surgery, JIPMER, Puducherry 605006, India.

[2] Professor and Associate Dean (Academic), Head of IT Wing and Telemedicine, Department of Plastic Surgery and Telemedicine, JIPMER, Puducherry 605006, India.

[3] Senior Resident, Department of Plastic Surgery, JIPMER, Puducherry 605006, India.

[4] Senior Resident, Department of Plastic Surgery, JIPMER, Puducherry 605006, India.

CORRESPONDING AUTHOR:

Ravi Kumar Chittoria, Professor and Associate Dean (Academic), Head of IT Wing and Telemedicine, Department of Plastic Surgery and Telemedicine, JIPMER, Puducherry 605006, India.

E-mail: drchittoria@yahoo.com

➢ **Received:** 25-04-2025 ➢ **Accepted:** 12-05-2025

Skin grafting remains the gold standard for managing raw areas. Depending on the clinical need, either partial-thickness or full-thickness grafts may be used. The success or "take" of the graft depends on several factors, including the nutritional status of the wound bed and the immobilization of the graft. To improve graft take, techniques such as edge-to-edge suturing of the graft to the wound bed and the use of bolster dressings for additional immobilization have been described.

In this case report, we describe the use of autologous platelet-rich plasma as an adjunctive measure to enhance the take of a split-thickness skin graft.

MATERIALS AND METHODS

This study was conducted in the Department of Plastic Surgery, in a tertiary care hospital in Puducherry. The patient was an 11-year-old boy with a history of electrical burns to his face and bilateral feet in March 2025, after which he sustained mixed second-degree burns involving the face, anterior neck, and dorsum of bilateral feet, accounting for 15% of TBSA (*Figure 1*). He underwent serial hydrojet-assisted debridement and regenerative techniques. He underwent split skin grafting (SSG) for his bilateral feet. One such technique is Autologous platelet-rich plasma therapy.

The steps of Autologous platelet-rich plasma (*Figure 2 a,b*) preparation.

- 10 ml of the patient's heparinised venous blood was taken
- Centrifugation was doneat 3000 rpm for 10 min.
- The upper layer of the three layers was taken and recentrifuged at 4000 rpm for 10 min.
- After this step, the content had been separated into two layers.
- The bottom layer of the plasma was rich in platelets and was aspirated using 18 g needle and was used to inject into the skin graft site of the lower limb.

Immobilization of the lower limbs was done in the form of external splinting. Post procedure, the first look of the graft was done on the 5th postoperative day, and sequential dressings were done.

Figure 1: Burns sustained to bilateral feet and face

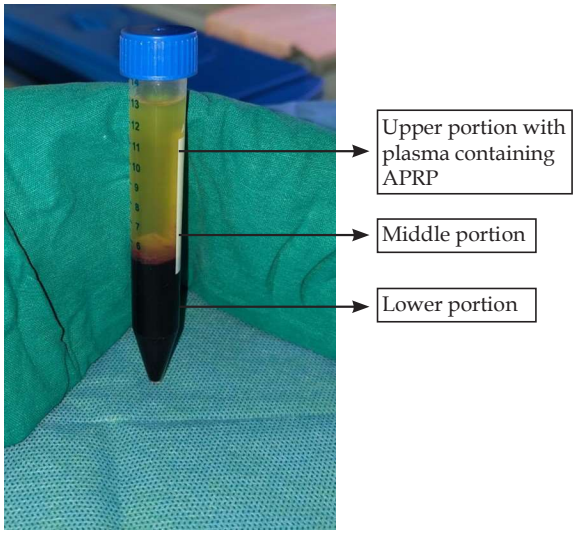

Figure 2: Patient blood sample after centrifugation for the separation of APRP

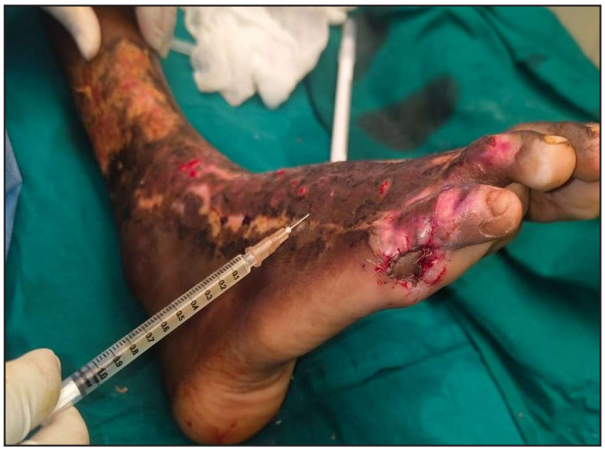

Figure 3: APRP applied to the SSG site

RESULTS

Graft take was good on Post Operative Day 7

DISCUSSION

Autologous platelet-rich plasma (APRP) is a biological product defined as the plasma fraction of the patient's blood containing a

platelet concentration above baseline levels[1] APRP is enriched with platelets as well as growth factors such as platelet-derived growth factors, chemokines, and clotting factors. Platelet-rich plasma (PRP) is also known as platelet-rich growth factors (GFs), platelet-rich fibrin (PRF) matrix, PRF, and platelet concentrate. APRP contains several growth factors (e.g., vascular endothelial growth factor (EGF), platelet-derived growth factor (PDGF) that are capable of stimulating angiogenesis, increasing fibroblast cell differentiation, and promoting soft tissue healing.[2] PDGF and EGF are the main growth factors involved in fibroblast migration, proliferation, and collagen synthesis.[3] Increased concentrations of these growth factors are likely the reason for the accelerated soft tissue wound healing, which is suggested to be at least 2–3 times faster than that of normal.[4]

APRP is increasingly used in dermatology; i.e., in tissue regeneration, wound healing, scar revision, skin rejuvenating effects, and alopecia. They stimulate human dermal fibroblast proliferation, increase type I collagen synthesis, induce soft-tissue augmentation, and activate new blood vessels and adipose tissue formation.[5,6] It is used in the improvement of burn scars, postsurgical scars, and acne scars. Skin grafting remains the cornerstone in wound management. A critical aspect of its success is the 'take' of the graft, which occurs in three distinct stages

- Stage of imbibition
- Stage of inosculation
- Stage of revascularization

APRP aids in bridging the stages of skin graft take. It functions as a tissue sealant and drug delivery system, with the platelets initiating wound repair by releasing locally acting growth factors via granules degranulation.[7] The application of APRP to split-thickness skin graft (STSG) recipient sites has recently been described, with proposed benefits including immediate graft anchorage and enhanced inosculation through exposure to a nutrient-rich, growth factor-laden plasma medium[8] Studies conducted on burn patients have demonstrated that PRP is a safe and effective method for skin graft fixation due to its adhesive properties. Its use has shown superior outcomes compared to traditional methods such as sutures, staples, or tissue glue, not only reducing operative time but also eliminating the need for suture or staple removal in the postoperative period. A previous study by Puttirutvong[9] evaluated the healing times of meshed full-thickness skin grafts versus split-thickness skin grafts (STSGs) of 0.015-inch thickness in diabetic patients and reported a mean healing time of 20.1 ± 7.3 days for the STSG group. The primary factors negatively impacting graft take were hematoma or seroma formation and infection. In a separate study, Vijayaraghavan *et al*. demonstrated that wounds treated with autologous platelet-rich plasma (APRP) therapy alone healed within 4 to 8 weeks, while those managed with a combination of APRP and split-thickness skin grafts or flap coverage achieved healing in 3 to 6 weeks.

CONCLUSION

APRP is an autologous, easily available, and easy to prepare, safe biological fluid with excellent wound healing properties which,when used, can augment the take of split skin grafts. We suggest a large volume randomized controlled study be conducted to validate the routine use of APRP for augmenting the take of split skin grafts.

Conflicts of interest: Nil

REFERENCES

1. Alves R., Grimalt R. Randomized placebo controlled, double-blind, half-head study toassess theef cacyof platelet-richplasma on the treatment of androgenetic alopecia. Dermatol Surg. 2016; 42: 491–7.
2. Andia I., Abate M. Platelet-rich plasma: underlying biology and clinical correlates. Regen Med. 2013; 8: 645–58.
3. Thimmanahalli G., Kumar M. Ef cacy of autologous platelet rich plasma over conventional mechanical xation methods in split thickness skin grafting. Int Surg J. 2018; 6: 108.
4. Schade V.L., Roukis T.S. Use of platelet-rich plasma with split-thickness skin grafts in the high-risk patient. Foot Ankle Spec. 2008; 1: 155 9.
5. Sánchez-González D.J., Méndez-Bolaina E., Trejo Bahena N.I. Platelet-rich plasma peptides: Key for regeneration. Int J Pept. 2012; 2012: 532519. doi: 10.1155/2012/532519. Epub 2012 Feb 22.
6. Anitua E., Andia I., Ardanza B., Nurden P., Nurden AT. Autologous platelets as a source of proteins for healing and tissue regeneration.

Thromb Haemost 2004; 91: 4-15.

7. Salazar-Álvarez A.E., Riera-del-Moral L.F., García-Arranz M., Alvarez-García J, Concepción-Rodriguez N.A., Riera-de-Cubas L. Use of platelet-rich plasma in the healing of chronic ulcers of the lower extremity. Actas Dermosifiliogr. 2014 Jul-Aug; 105(6): 597-604.

8. Actas Dermosifiliogr 2014; 105: 597-604. Picard F., Hersant B., Bosc R., Meningaud JP: Should we use platelet-rich plasma as an adjunct therapy to treat "acute wounds", "burns", and "laser therapies": A review and a proposal of a quality criteria checklist for further studies. Wound Repair Regen 2015; 23: 163-170.

9. Gibran N., Luterman A., Herndon D., Lozano D., Greenhalgh D.G., Grubbs L, *et al.* Comparison of fibrin sealant and staples for attaching split thickness autologous sheet grafts in patients with deep partial- or full-thickness burn wounds: a phase 1/2 clinical study. J Burn Care Res. 2007; 28: 401–8. 10.

10. Puttirutvong P. Meshed skin graft versus split thickness skin graft in diabetic ulcer coverage. J Med Assoc Thai. 2004; 87: 66–72.

11. Vijayaraghavan N., Mohapatra D.P., Friji M.T., Arjun A., Bibilash B.S., Pandey S., *et al.* Role of autologous platelet rich plasma (APRP) in wound healing. J Soc Wound Care Res. 2014; 7: 23–8.