DOI: 10.21088/nijs.0976.4747.17226.7

New Indian Journal of Surgery
Volume 17 Number 2, April - June 2026

Case Report

Role of Autologous Platelet-Rich Plasma Spray in an Adult with Electrical Burns

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How to cite this article:

Suryanarayanan, Ravi Kumar Chittoria, Srinath Rajasekar Suryanarayanan. Role of Autologous Platelet-Rich Plasma Spray in an Adult with Electrical Burns. New Indian J Surg. 2025; 17(2): 79-82.

ABSTRACT

Electrical burns constitute a complex subset of thermal injuries characterized by deep tissue damage and impaired wound healing. Autologous platelet-rich plasma (APRP) has emerged as a regenerative adjunct due to its high concentration of growth factors that enhance angiogenesis, fibroblast proliferation, and collagen synthesis. We report a case of a 46-year-old male with 40% total body surface area (TBSA) electrical burns (mixed second- and third-degree). APRP spray was applied over superficial second-degree burn areas in three sequential dressings alongside collagen scaffold application. Wound healing was assessed using the Bates-Jensen Wound Assessment Tool (BJWAT). Over six days, the BJWAT score reduced from 25 to 20, indicating improvement in wound status with reduction in exudate, improved granulation, and epithelialization. No adverse effects were noted. This case highlights the potential role of APRP spray as a regenerative adjunct in adult electrical burns to accelerate wound healing and improve wound bed preparation.

KEYWORDS

• Electrical burns • Autologous platelet-rich plasma • Regenerative therapy • APRP spray

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Received: 05-03-2026 **Accepted :** 10-04-2026

INTRODUCTION

Electrical burns are associated with significant morbidity due to deep tissue necrosis, vascular thrombosis, and progressive wound conversion.[1,2] Management involves prompt resuscitation, debridement, and timely wound coverage to prevent infection and systemic complications.[3,4] Early excision and grafting remain standard for deep burns; however, optimizing the wound bed in mixed-depth burns is critical to improve healing and graft uptake.[5]

Autologous platelet-rich plasma (APRP) is defined as the plasma fraction of autologous blood with platelet concentration above baseline.[6,7] APRP contains multiple growth factors including platelet-derived growth factor (PDGF) and epidermal growth factor (EGF), which stimulate angiogenesis, fibroblast migration, collagen synthesis, and soft tissue regeneration.[4,5] Increased growth factor concentrations have been shown to accelerate wound healing by 2–3 times compared to normal physiological healing

While APRP has been studied in pediatric thermal burns and chronic wounds, its role in adult electrical burns remains less documented. This case report evaluates the effect of APRP spray in an adult patient with mixed-depth electrical burns.

METHODS

This case was managed in a tertiary care centre after institutional approval and informed consent.

A 46-year-old male presented with 40% TBSA electrical burns involving mixed second- and third-degree burns. Initial management included fluid resuscitation, analgesia, wound assessment, and stabilization according to burn care protocols.

Superficial second-degree burn areas were treated with autologous platelet-rich plasma spray. APRP was prepared from the patient's own blood by centrifugation to obtain a platelet concentrate above baseline levels as described in prior literature

The PRP was activated and sprayed uniformly over the superficial burn areas (Figure 1)

Figure 1: Application of APRP spray

A collagen scaffold dressing was applied over the APRP-treated wound bed. Dressings were performed on alternate days, with a total of three applications over six days.

Wound progression was assessed using the Bates-Jensen Wound Assessment Tool (BJWAT) at baseline and day 6.

RESULTS

At baseline, the BJWAT score was 25, indicating moderate wound severity characterized by exudate, partial slough, and incomplete granulation.

After three APRP spray applications over six days:

- BJWAT score reduced from 25 to 20
- Reduction in wound exudate was noted
- Improved granulation tissue formation was observed
- Early epithelialization was evident at wound margins
- No local or systemic adverse effects were reported

The wound bed appeared healthier and more suitable for further definitive management. The patient tolerated the procedure well, and no infection or complications were observed during the observation period.

DISCUSSION

Platelet-rich plasma is a biologically active autologous concentrate rich in growth factors such as PDGF and EGF that stimulate fibroblast proliferation, collagen synthesis, and angiogenesis. These mechanisms contribute to accelerated soft tissue healing and improved wound bed quality.[1,5]

Previous literature has demonstrated the efficacy of APRP in burn wounds, chronic ulcers, scar modulation, and graft uptake. PRP stimulates dermal fibroblast proliferation and type I collagen synthesis, activates neovascularization, and enhances tissue regeneration. Picard *et al.* highlighted its adjunctive role in acute wounds and burns.[7,8]

In the present case, APRP spray in combination with collagen scaffold provided a biologically active environment conducive to healing. The observed reduction in BJWAT score suggests improved wound characteristics, including decreased exudation and enhanced granulation.[9,10] The collagen scaffold likely acted as a structural matrix, while APRP provided growth factors to accelerate cellular proliferation and tissue remodelling.[11]

Electrical burns are associated with microvascular damage and progressive tissue necrosis, often delaying wound healing. The angiogenic and proliferative properties of PRP may counteract these effects, facilitating improved wound bed preparation prior to grafting.[11,12]

Limitations include the single-case design, short follow-up duration, and absence of a control group. Larger randomized controlled studies are required to establish standardized protocols and confirm efficacy in adult electrical burns.[13]

CONCLUSION

Autologous platelet-rich plasma spray appears to be a promising regenerative adjunct in the management of superficial components of mixed-depth electrical burns. In this case, APRP application alongside collagen scaffold resulted in measurable improvement in wound parameters within six days. Further controlled studies are warranted to validate its routine use in adult electrical burn management.

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