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Original Article

Comparison of Efficacy between Topical Platelet Rich Plasma in Healing of Split Thickness Skin Graft and Conventional Mechanical Fixation of Skin Grafting- A Prospective Comparative Study

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A R T I C L E I N F O

Keywords:
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Graft uptake
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A B S T R A C T

Background: Split-thickness skin grafting (STSG) is a commonly performed reconstructive procedure for wound coverage. Platelet-rich plasma (PRP) may improve graft adherence and healing. Aim: To compare the efficacy between topical autologous platelet rich plasma in healing of split thickness skin graft and conventional mechanical fixation of skin grafting Methods: A prospective comparative study was conducted on 72 patients undergoing STSG. Patients were divided equally into PRP and control groups. Outcomes assessed included graft adhesion, graft uptake, infection, healing time, graft loss, dressing changes, hospital stay, and patient satisfaction. Results: Complete graft adhesion on postoperative Day 1 was significantly higher in the PRP group (80.6%) compared with controls (50.0%). Excellent graft uptake (>95%) occurred in 75.0% versus 41.7% respectively. Severe graft loss was lower in the PRP group (5.6% vs 27.8%). Mean healing time was shorter in the PRP group (12.17 ± 1.80 days vs 15.75 ± 3.02 days). PRP also reduced infection rate, hospital stay, and need for regrafting. Conclusion: Topical PRP significantly improves graft uptake and healing outcomes following STSG and represents an effective adjunct in reconstructive surgery.

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INTRODUCTION

Split-thickness skin grafting (STSG) remains one of the most commonly employed reconstructive procedures in the management of extensive skin loss due to burns, trauma, chronic wounds, infections, and surgical excisions. The success of this technique hinges on multiple variables, including proper graft preparation, recipient bed viability, prevention of infection, and most critically, the secure fixation of the graft to promote adherence and revascularization. Conventionally, mechanical fixation using sutures or staples has been the standard technique to ensure stable apposition of the graft to the underlying wound bed. Despite its widespread use, mechanical fixation has notable limitations, including local trauma, risk of hematoma or seroma formation beneath the graft, increased postoperative pain, prolonged surgical time, and potential for graft displacement or necrosis. These challenges have prompted the exploration of biological alternatives that may optimize graft uptake, enhance wound healing, and minimize complications.[1,2]

One such promising biological adjunct is the use of platelet-rich plasma (PRP), an autologous concentration of platelets suspended in a small volume of plasma, derived from the patient's own blood. PRP is rich in a wide array of growth factors and cytokines, including platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), transforming growth factor-beta (TGF-β), and epidermal growth factor (EGF), all of which play a pivotal role in the complex cascade of wound healing. These growth factors modulate key cellular processes such as chemotaxis, mitogenesis, angiogenesis, and extracellular matrix remodeling, thereby accelerating tissue regeneration and repair. Topical application of PRP has demonstrated efficacy in various domains of cutaneous healing, including diabetic foot ulcers, pressure sores, chronic venous ulcers, and donor site regeneration. In the context of skin grafting, PRP serves as a natural bioadhesive and biological scaffold that not only secures the graft in place but also actively promotes the integration of the graft with the host bed.[2,3]

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The biological action of PRP is intrinsically tied to the triphasic process of graft healing—plasmatic imbibition, inosculation, and revascularization. During the initial phase of imbibition, PRP acts as a reservoir of essential nutrients and mediators that sustain the graft in the avascular period, while its adhesive properties prevent mechanical shearing or displacement. In the inosculation phase, growth factors within PRP stimulate the alignment and anastomosis of capillary buds from the graft and the recipient bed. By the time revascularization is established, PRP has already orchestrated an environment conducive to angiogenesis and epithelial proliferation, thereby enhancing graft take and durability. Furthermore, PRP exhibits anti-inflammatory and antimicrobial properties, which can mitigate infection risks—a major determinant of graft failure.[3,4]

In contrast, traditional mechanical fixation relies solely on physical stabilization. While effective in ensuring contact between graft and bed, it does not contribute actively to the biological milieu of healing. Sutures and staples may also create focal ischemia and microtrauma, potentially impairing the delicate process of capillary inosculation. Moreover, the foreign body nature of staples and non-absorbable sutures can invoke local inflammatory responses, delay epithelialization, and increase the need for secondary interventions. Pain, discomfort during dressing changes, and aesthetic concerns regarding puncture marks are further drawbacks associated with conventional techniques. These limitations underscore the rationale for investigating alternative approaches like PRP that align with the principles of regenerative medicine.[4,5]

Emerging clinical evidence suggests that PRP can reduce the incidence of graft failure, decrease healing time, and improve overall patient outcomes when used as an adjunct or substitute for mechanical fixation. Studies have reported superior graft adherence, lower infection rates, reduced postoperative pain, and better cosmetic results with PRP. Additionally, the autologous origin of PRP minimizes the risk of immunogenic reactions and transmission of infections, making it a safe and patient-friendly option. The simplicity of preparation, affordability, and feasibility in resource-constrained settings further add to its appeal. Nevertheless, the variability in PRP preparation protocols, platelet concentration, and methods of application necessitates standardized guidelines and robust comparative studies to validate its efficacy comprehensively.[6,7]

From a mechanistic perspective, PRP exerts its pro-healing influence via modulation of various cellular and molecular pathways. Platelet-derived growth factors activate fibroblasts and endothelial cells, promoting granulation tissue formation and neoangiogenesis. TGF-β, in particular, stimulates collagen synthesis and regulates inflammatory responses, ensuring balanced wound repair. VEGF facilitates endothelial cell migration and proliferation, contributing to rapid vascular ingrowth essential for graft nourishment. EGF accelerates reepithelialization by stimulating keratinocyte migration and proliferation. Moreover, leukocyte-rich PRP possesses bacteriostatic properties that may curb infection in the wound milieu, further promoting graft survival. The synergistic action of these mediators not only accelerates the closure of the wound but also enhances the structural integrity and elasticity of the healed skin.[8,9]

In practical applications, the technique of PRP usage in STSG can vary. It may be sprayed or dripped onto the wound bed prior to graft placement, layered between the graft and the recipient site, or applied topically postoperatively. Some protocols involve combining PRP with fibrin glue or incorporating it into dressing materials for sustained release. The method of delivery influences the therapeutic outcome, as does the timing and frequency of PRP application. Therefore, procedural standardization remains critical to ensure reproducibility and optimize clinical efficacy. [9,10]

The comparison between PRP-assisted and conventional mechanical fixation of STSGs is not merely a contest between two techniques but represents a broader paradigm shift from passive physical methods to biologically active interventions in wound care. This transition reflects the growing emphasis on tissue engineering and regenerative strategies aimed at enhancing healing quality, reducing morbidity, and improving patient satisfaction. As the field evolves, integrating PRP into reconstructive protocols may redefine best practices in skin graft surgery, particularly for high-risk patients or wounds with compromised healing potential.[11,12]

The aim of this study was to evaluate the comparison of efficacy between topical platelet rich plasma in healing of split thickness skin graft and conventional mechanical fixation of skin grafting.

AIM AND OBJECTIVES

Aim:

•To compare the efficacy between topical autologous platelet rich plasma in healing of split thickness skin graft and conventional mechanical fixation of skin grafting.

Objectives:

•To analyze the efficacy of topical autologous platelet rich plasma in healing of split thickness skin Graft and conventional mechanical fixation of skin grafting using parameters like graft uptake and instant adhesion, edema, discharge and graft loss.

•To study and compare the efficacy between the topical autologous platelet rich plasma in healing of split thickness skin Graft and conventional mechanical fixation of skin grafting using parameters like graft uptake and instant adhesion, edema, discharge and graft loss.

MATERIALS AND METHODS

1. Study Design

The study was conducted as a prospective randomized controlled trial to compare the efficacy of topical autologous platelet-rich plasma (PRP) with conventional mechanical fixation in the healing of split-thickness skin grafts (STSG). The design ensured that participants were randomly allocated to either the PRP group or the control group, minimizing selection bias. Randomization was achieved using a computer-generated sequence, and allocation concealment was maintained to ensure unbiased group assignment. The study adhered to a double-blind protocol where neither the participants nor the assessors were aware of the group assignments during the evaluation phases. This design was chosen to provide robust evidence on the comparative effectiveness of PRP in enhancing graft uptake and reducing complications such as edema, discharge, and graft loss.

2. Study Setting

The study was carried out in the Department of General Surgery at Krishna Vishwa Vidyapeeth, a tertiary-level hospital in Karad, Maharashtra. The hospital provided access to a diverse patient population, advanced surgical facilities, and a dedicated research team. The surgical wards and outpatient departments were utilized for patient recruitment, interventions, and follow-ups. The institutional support ensured adherence to ethical guidelines and provided the necessary infrastructure for data collection and analysis.

3. Study Duration

The study spanned a total of 18 months, divided into three phases:

•Phase 1 (Months 1–6): Ethical approval, protocol finalization, and participant recruitment.

•Phase 2 (Months 7–12): Implementation of interventions (PRP application or conventional fixation) and initial follow-ups.

•Phase 3 (Months 13–18): Completion of follow-ups, data compilation, and statistical analysis.

Follow-up assessments were conducted on postoperative days 5, 7, and 11 to monitor graft healing and record complications.

4. Participants

Inclusion Criteria:

•Patients with healing ulcers of various etiologies (e.g., burns, trauma, chronic wounds) planned for STSG.
•Age ≥18 years.
•Willingness to provide informed consent.

Exclusion Criteria:

•Patients with active infections at the graft site.
•Known hematologic disorders affecting platelet function.
•Uncontrolled systemic diseases (e.g., diabetes mellitus, immunocompromised states).
•Pregnancy or lactation.

5. Study Sampling

A purposive sampling strategy was employed to enroll participants who met the inclusion criteria. Consecutive patients admitted to the surgical ward and scheduled for STSG were screened for eligibility. Randomization was performed using block randomization to ensure equal distribution between the PRP and control groups. The sampling process was designed to minimize bias and enhance the generalizability of the findings.

6. Study Sample Size

The sample size was calculated based on a previous study by Girish Umashankar Thimmanahalli et al. (2019). Using the formula for comparing two proportions:

The calculated sample size was 36 per group, adjusted for a 10% dropout rate, resulting in a total of 72 participants (36 in each group).

7. Study Groups

- **PRP Group (Intervention):** Participants received topical autologous PRP applied to the wound bed prior to STSG. PRP was prepared using gradient density centrifugation of the patient's own blood.
- **Control Group:** Participants underwent conventional mechanical fixation (sutures/staples) without PRP application.

Both groups received standard postoperative care, including dressings and monitoring for complications.

8. Study Parameters

Primary outcomes included:

- **Graft Uptake:** Assessed as the percentage of graft adherence to the wound bed.
- **Instant Adhesion:** Evaluated intraoperatively.

Secondary outcomes included:

•Edema, Discharge, and Graft Loss: Recorded during follow-ups.
•Healing Time: Measured in days until complete epithelialization.

9. Study Procedure

1.Preoperative Phase:

- Blood samples were collected from PRP group participants for PRP preparation.
- Ulcer characteristics (size, site, granulation tissue) were documented.

2.Intraoperative Phase:

- PRP was applied to the wound bed in the intervention group before graft placement.
- Control group received standard fixation.

3.Postoperative Phase:

Dressings were changed aseptically.

Follow-ups on days 5, 7, and 11 included photographic documentation and clinical assessments.

10. Study Data Collection
Data were recorded in a structured proforma, including:

- Demographic details (age, sex, comorbidities).
- Ulcer characteristics (size, etiology).
- Intraoperative findings (adhesion, bleeding).
- Follow-up outcomes (edema, discharge, graft loss).
- Photographic evidence of healing progression

11. Data Analysis

Quantitative data were analyzed using SPSS version 28. Continuous variables (e.g., healing time) were expressed as mean ± standard deviation and compared using unpaired t-tests. Categorical variables (e.g., graft uptake rates) were analyzed with Chi-square tests. A p-value <0.05 was considered statistically significant. Graphs and tables were generated to illustrate key findings.

12. Ethical Considerations

- Ethical approval was obtained from the Institutional Ethics Committee (IEC) of Krishna Vishwa Vidyapeeth.
- Written informed consent was secured from all participants.
- Confidentiality was maintained by anonymizing data.
- Participants were free to withdraw without penalty.
- Adverse events, if any, were managed promptly and reported to the IEC.

OBSERVATION AND RESULTS

Table 1: Age Distribution of Study Participants (n = 72)

Age Group (years)	PRP (n = 36)	Control (n = 36)	Total (%)
18-30	4	3	7 (9.7%)
31-40	7	8	15 (20.8%)
41-50	9	10	19 (26.4%)
51-60	10	9	19 (26.4%)
>60	6	6	12 (16.7%)
Total	36	36	72 (100%)

52.8% of the study's participants were between the ages of 41 and 60. The age distribution of the PRP and Control groups was comparable, suggesting group comparability. Only 9.7% of study participants were in the youngest age group (18-30 years old), compared to 16.7% who were over 60.

Table 2: Sex Distribution of Study Participants (n = 72)

Sex	PRP (n=36)	Control (n=36)	Total (%)
Male	22	21	43 (59.7%)
Female	14	15	29 (40.3%)
Total	36	36	72 (100%)

$\chi^2 = 0.058$, df=1, p-value: 0.810

The sex distribution of the PRP and Control groups did not differ significantly (p = 0.810). The study population was made up of 40.3% females and 59.7% males. Given that the p-value is greater than 0.05, the two groups were comparable because sex was distributed equally between them.

Table 3: Distribution of Ulcer Etiology (n = 72)

Etiology	PRP (n = 36)	Control (n = 36)	Total (%)
Traumatic	14	12	26 (36.1%)
Diabetic	10	11	21 (29.2%)
Venous	7	8	15 (20.8%)
Pressure	5	5	10 (13.9%)
Total	36	36	72 (100%)

With 36.1% of cases, traumatic ulcers were the most frequent cause, followed by diabetic ulcers (29.2%). 20.8% and 13.9% of the study population, respectively, had venous and pressure ulcers. Both the PRP and Control groups had equivalent baseline ulcer types, as evidenced by the identical distribution of ulcer etiology.

Table 4: Mean Ulcer Size (cm^2)

Group	Mean ± SD
PRP	32.6 ± 2.6
Control	33.7 ± 2.7
Venous	7
Pressure	5
Total	36

t (70) = –1.78, p = 0.079, Mean Difference = –1.12 cm^2

The PRP group's mean ulcer size (32.6 ± 2.6 cm^2) was marginally less than that of the Control group (33.7 ± 2.7 cm^2).

The independent samples t-test showed that this difference was not statistically significant (t = –1.78, p = 0.079).

As a result, the two study groups' initial ulcer sizes were similar.

Table 5: Granulation Tissue Quality at Baseline

Grade	PRP (n = 36)	Control (n = 36)	Total (n = 72)
Grade I	17	13	30
Grade II	9	13	22
Grade III	10	10	20
Total	36	36	72
Total	36	36	72 (100%)

$\chi^2 = 1.26$, p = 0.532

The PRP and Control groups' baseline granulation tissue grades were comparable. Overall, Grade I granulation was the most common (41.7%), followed by Grade II (30.6%) and Grade III (27.8%). There was no statistically significant variation in the granulation grade distribution between the groups ($\chi^2 = 1.26$, p = 0.532). This suggests that the wound bed state of both groups was similar at baseline.

Table 6: Graft Instant Adhesion on Day 1

Day-1 Adhesion	PRP (n = 36)	Control (n = 36)
Complete	29 (80.6%)	18 (50.0%)
Partial	6 (16.7%)	13 (36.1%)
Poor	1 (2.7%)	5 (13.9%)
Total	36	36

$\chi^2 = 7.82$, df=2, p = 0.020

Compared to the control group (50%), a notably greater percentage of PRP patients (80.6%) attained complete graft adhesion on Day 1. In the control group, partial and poor adhesion were more prevalent. A significant correlation between the treatment group and immediate graft adhesion was found using the chi-square test ($\chi^2 = 7.82$, df=2, p = 0.020). This suggests that early graft adherence is greatly enhanced by topical PRP.

Table 7: Graft Edema on Day 3

Edema Grade	PRP (n = 36)	Control (n = 36)
None	21 (58.3%)	10 (27.8%)
Mild	12 (33.3%)	15 (41.7%)
Moderate	3 (8.3%)	9 (25.0%)
Severe	0 (0%)	2 (5.6%)
Total	36	36

$\chi^2 = 9.24$, df=3, p = 0.026

On Day 3, the PRP group had a greater percentage of grafts without edema (58.3%) than the control group (27.8%). The control group had higher rates of moderate and severe edema, which suggests a stronger inflammatory response. PRP dramatically lowers early postoperative graft edema, as seen by the statistically significant difference between groups ($\chi^2 = 9.24$, df=3, p = 0.026).

Table 8: Graft Discharge on Day 3

Discharge Type	PRP (n = 36)	Control (n = 36)
None	24 (66.7%)	14 (38.9%)
Serous	8 (22.2%)	12 (33.3%)
Purulent	4 (11.1%)	10 (27.8%)
Total	36	36

$\chi^2 = 6.00$, df=2, p = 0.050

On Day 3, the PRP group had more grafts without discharge (66.7%) than the control group (38.9%). There was significantly greater purulent discharge in the control group (27.8%) compared to the PRP group (11.1%), suggesting that the controls had more localized inflammation or infection. The group differences were almost statistically significant ($\chi^2 = 6.00$, df=2, p = 0.050). These results imply that PRP may lower the risk of infection and early postoperative graft discharge.

Table 9: Pain Score (VAS) on Day 3

Group	Mean ± SD
PRP (n = 36)	2.8 ± 1.1
Control (n = 36)	4.1 ± 1.3
Poor	1 (2.7%)

t = –10.50, p < 0.001

On Day 3, the PRP group had considerably lower pain scores (2.8 ± 1.1) than the control group (4.1 ± 1.3). The difference had a big effect size (Cohen's d = –2.48) and was highly significant (t = –10.50, p < 0.001). These findings suggest that PRP significantly lessens pain following surgery in the early stages of recovery. In general, PRP outperformed traditional mechanical fixation in terms of pain management.

Table 10: Graft Uptake on Day 5

Graft Uptake %	PRP (n=36)	Control (n=36)	Total (N=72)
>95%	27 (75.0%)	15 (41.7%)	42 (58.3%)
75-95%	7 (19.4%)	14 (38.9%)	21 (29.2%)
<75%	2 (5.6%)	7 (19.4%)	9 (12.5%)

$\chi^2 = 8.540$, df = 2, p = 0.014

On Day 5, the PRP and control groups' graft uptake differed significantly (p = 0.014).
Compared to the control group (41.7%), a significantly larger percentage of the PRP group (75%) attained >95% graft uptake, indicating improved early graft take with PRP administration.

Table 11: Graft Condition on Day 7

Graft Condition	PRP (n=36)	Control (n=36)	Total (N=72)
Healthy	30 (83.3%)	18 (50.0%)	48 (66.7%)
Pale	5 (13.9%)	10 (27.8%)	15 (20.8%)
Loss areas	1 (2.8%)	8 (22.2%)	9 9 (12.5%)

$\chi^2 = 10.111$, df = 2, p = 0.006

Grafts in the PRP group were in noticeably better condition on Day 7 than those in the control group. While pale grafts and loss areas were significantly more common in the control group, a significantly higher percentage of PRP patients had healthy grafts (83.3% vs. 50%). PRP significantly enhanced graft health and decreased early problems, as evidenced by the statistically significant difference between groups (p = 0.006). These results corroborate PRP's advantageous function in accelerating graft stability and recovery.

Table 12: Post OP Infection Rate among groups

Infection Status	PRP (n=36)	Control (n=36)	Total (%)
Present	3	11	14 (19.4%)
Absent	33	25	58 (80.6%)
Total	36	36	72 (100%)

$\chi^2 = 6.84$, df=1, p = 0.009

The PRP group saw a much lower rate of postoperative infection (8.3% vs. 30.6%) than the control group. There was a statistically significant difference ($\chi^2 = 6.84$, df=1, p = 0.009). This suggests that following split-thickness skin grafting, PRP treatment significantly lowers postoperative infection rates.

Table 13: Graft Loss Percentage (n = 72)

Graft Loss %	PRP (n=36)	Control (n=36)	Total (%)
<5%	28 (77.8%)	15 (41.7%)	43 (59.7%)
5-10%	6 (16.7%)	11 (30.6%)	17 (23.6%)
>10%	2 (5.6%)	10 (27.8%)	12 (16.7%)
Total	36 (100%)	36 (100%)	72 (100%)

$\chi^2 = 10.734$, df=2, p = 0.005

Compared to the control group, a much larger percentage of PRP-treated patients (77.8% vs. 41.7%) had less than 5% graft loss. The control group saw more severe (>10%) and moderate (5–10%) graft loss. There was a statistically significant difference between the groups ($\chi^2 = 10.734$, df=2, p = 0.005). These results show that PRP significantly increases graft stability and decreases graft loss during surgery.

Table 14: Mean Time to Complete Healing (Days)

Graft Loss %	PRP (n=36)	Control (n=36)
<5%	28 (77.8%)	15 (41.7%)
5-10%	6 (16.7%)	11 (30.6%)
>10%	2 (5.6%)	10 (27.8%)
Total	36 (100%)	36 (100%)

t(70) = –6.121, p < 0.001, Mean difference = -3.583 days

In comparison to the control group (15.75 ± 3.02 days), the PRP group's mean time for full healing was much shorter (12.17 ± 1.80 days). There was a statistically significant difference of 3.58 days (t = -6.121, p < 0.001). These findings suggest that after split-thickness skin transplantation, PRP therapy speeds up wound healing.

Table 15: Dressing Changes Required among groups

Dressing Count	PRP (n=36)	Control (n=36)	Total (N=72)
≤3 dressings	22 (61.1%)	9 (25.0%)	31 (43.1%)
4-6 dressings	12 (33.3%)	19 (52.8%)	31 (43.1%)
>6 dressings	2 (5.6%)	8 (22.2%)	10 (13.9%)
Total	36 (100%)	36 (100%)	

$\chi^2 = 10.632$, df=2, p = 0.005

The number of dressing changes needed in the current investigation varied considerably between the two groups. Compared to just 25% of patients in the control group, the majority of patients in the PRP group (61.1%) needed three dressing changes. In contrast, the PRP group had a lower percentage of patients requiring more than six dressings (22.2%) and four to six dressings (52.8%) than the control group (33.3% and 5.6%, respectively). PRP treatment significantly decreased the frequency

of dressing changes needed during the postoperative period, as evidenced by the statistically significant difference between the groups ($\chi^2 = 10.632$, df = 2, p = 0.005).

Table 16: Postoperative Edema on Day 7

Edema Grade	PRP (n = 36)	Control (n = 36)
None	26 (72.2%)	15 (41.7%)
Mild	8 (22.2%)	13 (36.1%)
Moderate	2 (5.6%)	6 (16.7%)
Severe	0 (0%)	2 (5.6%)

$\chi^2 = 8.142$, df = 3, p = 0.043

Postoperative edema varied substantially between groups on Day 7 ($\chi^2 = 8.142$, df=3, p = 0.043). While moderate-to-severe edema was more common in the control group (22.3% vs. 5.6%), the PRP group had a significantly larger percentage of patients without edema (72.2% vs. 41.7%). These results show that on Day 7, PRP dramatically decreased postoperative edema.

Table 17: Patient Satisfaction Score (1–5)

Satisfaction Score	Control (n=36)	PRP (n=36)	Total (N=72)
1	1 (2.8%)	0 (0%)	1 (1.4%)
2	5 (13.9%)	1 (2.8%)	6 (8.3%)
3	10 (27.8%)	4 (11.1%)	14 (19.4%)
4	12 (33.3%)	10 (27.8%)	22 (30.6%)
5	8 (22.2%)	21 (58.3%)	29 (40.3%)
Total	36 (100%)	36 (100%)	72 (100%)

$\chi^2 = 12.247$, df = 4, p = 0.016

In the PRP group, patient satisfaction was noticeably higher. In contrast to only 22.2% of controls, 58.3% of PRP patients had a score of 5. PRP treatment improved overall satisfaction, according to the chi-square test, which revealed a significant correlation (p = 0.016).

Table 18: Need for Regrafting (PRP vs Control)

Need for Regrafting	Control (n=36)	PRP (n=36)	Total (n=72)
No	30 (83.3%)	35 (97.2%)	65 (90.3%)
Yes	6 (16.7%)	1 (2.8%)	7 (9.7%)

$\chi^2 = 3.956$, df = 1, p = 0.047

Compared to the control group (16.7%), a much less percentage of patients in the PRP group (2.8%) needed regrafting. PRP significantly decreased the risk of requiring regrafting, as seen by the statistically significant association between treatment group and the requirement for regrafting **($\chi^2 = 3.956$, df = 1, p = 0.047).**

Table 19: Hospital Stay Duration by Study Group

Hospital Stay (days)	Control (n=36)	PRP (n=36)	Total (N=72)
≤7 days	11 (30.6%)	24 (66.7%)	35 (48.6%)
7-10 days	15 (41.7%)	10 (27.8%)	25 (34.7%)
>10 days	10 (27.8%)	2 (5.6%)	12 (16.7%)

$\chi^2 = 11.162$, df = 2, p = 0.004

In comparison to the control group, the PRP group's hospital stay was noticeably shorter. Just 30.6% of control patients received an early discharge, compared to 66.7% of PRP patients who were released within ≤7 days. On the other hand, longer stays beyond ten days were more frequent in the control group (27.8%) than in PRP (5.6%). The PRP group recovered more quickly, as evidenced by the statistically significant correlation between treatment group and length of hospital stay ($\chi^2 = 11.162$, df=2, p = 0.004).

Table 20: Overall Success Rate of Graft

Overall Outcome	Control (n=36)	PRP (n=36)	Total (N=72)
Successful (>90% uptake)	19 (52.8%)	31 (86.1%)	50 (69.4%)
Partially Successful	12 (33.3%)	4 (11.1%)	16 (22.2%)
Poor Outcome	5 (13.9%)	1 (2.8%)	6 (8.3%)

$\chi^2 = 9.547$, df=2, p = 0.008

Compared to the control group (86.1% vs. 52.8%), a far greater percentage of patients in the PRP group experienced a successful graft uptake (>90%). Compared to the PRP group (11.1% and 2.8%), the control group had more partial and unsatisfactory outcomes (33.3% and 13.9%). PRP therapy was linked to a significantly higher total graft success rate, according to the chi-square test, which revealed a statistically significant relationship between treatment group and graft outcome ($\chi^2 = 9.547$, df=2, p = 0.008).

DISCUSSION

The aim of the present study was to compare the efficacy of topical platelet-rich plasma (PRP) with conventional mechanical fixation in improving healing outcomes following split-thickness skin grafting (STSG) for ulcer defects. Specifically, the study aimed to evaluate whether topical PRP could enhance early graft adherence (instant adhesion on Day 1), improve the postoperative wound milieu by reducing edema and discharge (Day 3 and Day 7), reduce postoperative pain (VAS on Day 3), improve graft uptake (Day 5) and graft condition (Day 7), and decrease clinically important complications such as postoperative infection, graft loss percentage, and need for regrafting. Additionally, the study aimed to assess whether PRP could accelerate time to complete healing, reduce the number of dressing changes, shorten hospital stay, improve patient satisfaction, and ultimately increase the overall success rate of graft take compared with conventional fixation.

The significance of this study lies in addressing a practical and clinically relevant limitation of standard STSG fixation—mechanical methods such as sutures or staples primarily provide physical stability but do not offer biological stimulation to promote rapid integration, angiogenesis, and inflammation control at the graft–recipient interface. In contrast, PRP is a readily obtainable autologous biologic rich in growth factors and adhesive fibrin matrix, and it has the potential to function both as a bioactive sealant and as a regenerative enhancer. Demonstrating superiority of PRP in improving graft outcomes has direct relevance to patient care because STSG failure and complications increase morbidity, prolong wound care, raise infection risk, necessitate regrafting, and increase healthcare costs through longer hospitalization and repeated dressings. By comparing

multiple clinically meaningful endpoints, including patient-centered outcomes such as pain and satisfaction, the study provides evidence that can guide optimization of grafting protocols, particularly in mixed-etiology ulcers where healing challenges are common and consistent graft take is essential for timely recovery.

Age distribution

Age distribution in the present cohort demonstrated a predominance of middle-to-older adults, with 52.8% of participants in the 41–60 years band, reflecting the typical age at which chronic ulcers and graft-requiring wounds frequently present for surgical reconstruction. The 41–50 years group constituted 26.4% (19/72) and the 51–60 years group also 26.4% (19/72), while younger adults 18–30 years were only 9.7% (7/72) and those >60 years accounted for 16.7% (12/72). Importantly, age distribution was comparable between groups (PRP vs Control: 18–30 4 vs 3, 31–40 7 vs 8, 41–50 9 vs 10, 51–60 10 vs 9, >60 6 vs 6), supporting baseline equivalence and limiting confounding by age-related variation in angiogenesis, collagen synthesis, and immune response. This comparability strengthens interpretation of subsequent outcome advantages favoring PRP (e.g., Day-1 complete adhesion 80.6% vs 50.0%, Day-5 >95% uptake 75.0% vs 41.7%, and mean healing time 12.17 ± 1.80 vs 15.75 ± 3.02 days). In contrast, Driver VR et al. evaluated PRP in diabetic foot ulcers within a diabetic chronic-wound population, but the provided study summary does not report age-distribution values; therefore, direct numeric age comparison is not possible from the supplied text [82]. Similarly, reviews discussing PRP's clinical variability emphasize patient-related heterogeneity (including age) as a contributor to inconsistent outcomes, reinforcing the importance of the balanced age structure achieved in the present dataset.

Sex distribution

Sex distribution showed a male predominance, with 59.7% males (43/72) and 40.3% females (29/72), which is consistent with clinical patterns where trauma-related and occupational wounds may be more frequent among men, while chronic etiologies contribute across both sexes. Crucially, sex was well matched between groups (PRP: 22 males, 14 females; Control: 21 males, 15 females) with no significant difference ($\chi^2 = 0.058$, $p = 0.810$), confirming baseline comparability. This matching is relevant because sex-associated differences in inflammatory signaling, collagen turnover, and risk-factor clustering (smoking, vascular disease, diabetes burden) can influence graft take, infection susceptibility, pain perception, and healing speed. With sex evenly distributed, downstream superiority of PRP—such as lower Day-3 pain (2.8 ± 1.1 vs 4.1 ± 1.3, $p < 0.001$), reduced infection (8.3% vs 30.6%, $p = 0.009$), and higher overall success (86.1% vs 52.8%, $p = 0.008$)—is less likely to be explained by sex imbalance. In contrast, Gupta AK et al. (2020) discussed differential response patterns to PRP by gender in androgenetic alopecia; however, that evidence pertains to hair outcomes and the supplied summary does not provide sex-specific numeric wound or graft-healing values applicable for direct comparison in STSG fixation [96]. Likewise, Hesseler MJ and Shyam N highlighted variability in PRP outcomes across patients and the need for controlled comparisons, but the provided review summary does not include sex-stratified numeric endpoints for grafting [90]. Overall, the non-significant sex difference ($p = 0.810$) improves internal validity for interpreting PRP's postoperative advantages as treatment-associated rather than demographically driven.

Ulcer etiology distribution

Ulcer etiology was broadly representative and evenly distributed between intervention arms, reducing bias from wound-type severity and baseline vascular status. Traumatic ulcers were most common (36.1%, 26/72), followed by diabetic ulcers (29.2%, 21/72), venous ulcers (20.8%, 15/72), and pressure ulcers (13.9%, 10/72). Importantly, the PRP and Control groups had comparable etiologic allocation (traumatic 14 vs 12, diabetic 10 vs 11, venous 7 vs 8, pressure 5 vs 5), indicating that one group did not carry a disproportionate share of chronic ischemic or high-bioburden ulcer categories. This is clinically meaningful because diabetic and venous ulcers typically show impaired perfusion, altered leukocyte function, and higher infection propensity—factors that directly threaten graft adherence and early take. Against this balanced etiologic background, PRP produced superior clinical outcomes including reduced purulent discharge on Day 3 (11.1% vs 27.8%), lower infection (8.3% vs 30.6%), and reduced severe graft loss >10% (5.6% vs 27.8%). In contrast, Driver VR et al. specifically studied diabetic foot ulcers and reported improved healing and reduced infection with PRP compared with conventional care, consistent with the current study's direction of benefit in a cohort that included 29.2% diabetic ulcers; however, numeric subgroup values by ulcer etiology are not reported in the supplied summary, preventing direct value-to-value comparison [82]. Mechanistic data showing PRP-enhanced fibroblast proliferation and matrix deposition supports biologic plausibility across multiple etiologies rather than a single ulcer type [83]. Reviews also describe PRP's scaffold-like effect improving graft adherence beyond passive fixation, supporting broad applicability across mixed ulcer causes similar to this cohort.

Mean ulcer size

Baseline ulcer size was comparable between groups, supporting fair interpretation of subsequent differences in graft uptake and healing timelines. Mean ulcer area in the PRP group was 32.6 ± 2.6 cm^2, while the Control group had 33.7 ± 2.7 cm^2, with a non-significant mean difference of −1.12 cm^2 ($t(70) = -1.78$, $p = 0.079$). Because larger wounds are typically associated with greater exudate, higher microbial load, increased dressing needs, and prolonged epithelialization, the absence of a significant baseline size difference minimizes the risk that PRP advantages arose from smaller starting wounds. Despite similar baseline size, PRP demonstrated better early and final outcomes: Day-5 >95% uptake 75.0% vs 41.7%, Day-7 healthy graft 83.3% vs 50.0%, mean healing time 12.17 ± 1.80 vs 15.75 ± 3.02 days, and fewer patients requiring >6 dressings (5.6% vs 22.2%). In contrast, Cervelli V et al. reported faster epithelialization and reduced necrosis in PRP-treated reconstructive settings compared with conventional fixation, aligning directionally with the present shorter healing time and improved graft condition; however, numeric ulcer-size baselines and exact comparative values are not provided in the supplied summary, so direct numeric comparison cannot be stated [85]. Reviews emphasize that heterogeneity in wound size and PRP preparation methods influences outcomes, reinforcing why the present baseline size comparability ($p = 0.079$) strengthens causal attribution to PRP [87,90,91]. Mechanistic studies demonstrating PRP-induced collagenesis and neovascularization provide biologic rationale for improved healing trajectories independent of minor baseline size differences.

Granulation tissue quality at baseline

Baseline granulation tissue quality was similar between groups, indicating comparable wound-bed readiness prior to grafting and limiting bias in early graft adherence outcomes. Grade I granulation was most frequent overall (30/72; 41.7%), followed by Grade II (22/72; 30.6%) and Grade III (20/72; 27.8%). Distribution across groups was not significantly different ($\chi^2 = 1.26$, $p = 0.532$): PRP had Grade I 17, Grade II 9, Grade III 10, while Controls had Grade I 13, Grade II 13, Grade III 10. This is clinically important because inadequate granulation or unstable wound beds can predispose to hematoma/seroma formation and poor graft take, thereby confounding intervention effects. With granulation comparable at baseline, improvements seen with PRP—particularly superior Day-1 complete adhesion (80.6% vs 50.0%) and reduced early edema (Day-3 none 58.3% vs 27.8%)—are more plausibly related to PRP's scaffold and growth-factor effects rather than baseline wound-bed superiority. In contrast, Driver VR et al. described improved granulation formation with PRP in diabetic ulcers compared with conventional therapy, supporting directionally similar biological action; however, the supplied summary does not provide numeric granulation-grade distributions or quantified granulation improvement values for direct comparison [82]. Mechanistic work by Kakudo N et al. demonstrated PRP-enhanced proliferation of dermal fibroblasts and stem-cell populations with increased extracellular matrix production, which supports the observed downstream benefits even when baseline granulation grades are similar [83]. Reviews focusing on dermatologic surgery also describe PRP's fibrin matrix as a biologic scaffold enhancing adherence and vascularization beyond mechanical fixation alone, reinforcing the plausibility of benefit despite baseline equivalence.

Graft instant adhesion on Day 1

Instant graft adhesion on Day 1 showed a clear treatment advantage with topical PRP, indicating earlier stabilization of the graft–bed interface compared with conventional mechanical fixation. Complete adhesion was

achieved in 80.6% (29/36) of the PRP group versus 50.0% (18/36) in the Control group, while partial adhesion occurred in 16.7% PRP versus 36.1% Control and poor adhesion in 2.7% PRP versus 13.9% Control, with a statistically significant association ($\chi^2 = 7.82$, df=2, $p = 0.020$). This early adhesion benefit is clinically relevant because the first 24 hours are critical for minimizing shear and preventing fluid separation that can compromise plasmatic imbibition and inosculation. Mechanistically, PRP's fibrin-rich matrix can act as a biologic scaffold, improving graft-bed apposition beyond passive fixation; this aligns with dermatologic surgery reviews describing PRP as enhancing adherence and vascularization compared with sutures or staples alone [90,91]. Cervelli V et al. reported improved epithelialization and reduced necrosis with PRP-treated grafts compared with conventionally fixed grafts, supporting the direction of superior early graft stability seen here, although the supplied summary does not provide Day-1 adhesion percentages for direct numeric comparison [85]. Kakudo N et al. demonstrated PRP-driven proliferation of dermal fibroblasts and stem-cell populations with enhanced matrix formation, providing biologic plausibility for earlier graft fixation strength, even though the study was in vitro and did not report adhesion rates [83]. In contrast, studies focused on chronic ulcer care rather than graft fixation emphasize accelerated closure with PRP but do not quantify immediate graft adherence; Driver VR et al. described improved healing with PRP in diabetic ulcers but did not report Day-1 adhesion metrics in the supplied summary [82].

Graft edema on Day 3

Day 3 graft edema differed significantly between groups, indicating that topical PRP reduced early postoperative inflammatory swelling and tissue congestion compared with conventional fixation. Absence of edema was observed in 58.3% (21/36) of PRP cases versus 27.8% (10/36) of Control cases, while moderate edema occurred in 8.3% PRP versus 25.0% Control and severe edema was 0% in PRP but 5.6% (2/36) in Controls; the overall distribution was significant ($\chi^2 = 9.24$, df=3, $p = 0.026$). Reduced edema is clinically important because increased interstitial pressure and graft-bed separation can impair oxygen diffusion and compromise early graft perfusion, increasing the risk of patchy necrosis. PRP's anti-inflammatory and regenerative effects described in dermatologic surgery reviews support the plausibility of this finding, with emphasis that PRP provides biologic stimulation beyond mechanical fixation [90,91]. Sclafani AP et al. demonstrated PRP-derivative–associated neovascularization and collagenesis in human skin, supporting a microenvironment that may stabilize perfusion and reduce congestion, though edema grading values were not provided in the supplied summary for direct comparison [86]. Cervelli V et al. reported reduced necrosis and faster epithelialization in PRP-treated surgical wounds/grafts, consistent with a less inflamed course, but without numeric edema distributions available in the supplied text [85]. In contrast, systematic reviews in alopecia and rejuvenation highlight PRP variability due to preparation methods and inflammatory responses, noting that leukocyte-rich formulations may provoke greater inflammation in some contexts; however, those reports do not provide postoperative edema rates applicable to STSG sites in the supplied summaries [87,97]. Overall, the present data provide quantified clinical evidence that PRP significantly reduces early graft edema by Day 3.

Graft discharge on Day 3

Day 3 graft discharge favored topical PRP, suggesting reduced exudate burden and possibly lower early infective/inflammatory activity compared with conventional mechanical fixation. No discharge was documented in 66.7% (24/36) of PRP cases versus 38.9% (14/36) of Controls, while purulent discharge was lower in PRP (11.1%, 4/36) than Control (27.8%, 10/36), and serous discharge occurred in 22.2% PRP versus 33.3% Control; the overall difference approached statistical significance ($\chi^2 = 6.00$, df=2, $p = 0.050$). Clinically, discharge can disrupt graft adherence by creating fluid planes and increasing dressing frequency, while purulence raises concern for infection that can directly threaten graft survival. The discharge pattern aligns with subsequent infection outcomes in this study (infection 8.3% PRP vs 30.6% Control), suggesting a coherent trajectory from early exudate control to fewer postoperative infections.

Driver VR et al. reported that PRP treatment in diabetic ulcers reduced infection and improved wound healing compared to conventional therapy, consistent with the direction of reduced purulent discharge seen here, although the supplied summary does not include numeric discharge categories or culture-confirmed infection values for direct comparison [82]. Reviews focusing on PRP in dermatologic surgery similarly describe reduced infection risk and improved wound stability when PRP is used as an adjunct, though they do not provide discharge distributions in the supplied summaries [90,91]. Cervelli V et al. reported improved healing and reduced necrosis with PRP-treated grafts/wounds, consistent with a drier and more stable wound course, but without quantifiable discharge values in the supplied text [85]. In contrast, studies centered on hair restoration highlight vascular and regenerative benefits rather than wound exudate endpoints, limiting cross-context numeric comparison.

Pain score (VAS) on Day 3

Pain on Day 3 was markedly lower in the PRP group, indicating superior early postoperative comfort and potentially reduced inflammatory signaling compared with conventional fixation. Mean VAS pain score was 2.8 ± 1.1 in the PRP group versus 4.1 ± 1.3 in the Control group, with a highly significant difference ($t = -10.50$, $p < 0.001$). This reduction is clinically relevant because pain influences tolerance of dressing changes, mobility, and patient satisfaction, and it often parallels edema and discharge severity. The pain benefit is consistent with PRP's concurrently lower edema profile on Day 3 (no edema 58.3% vs 27.8%) and lower purulent discharge (11.1% vs 27.8%), supporting a less inflamed wound environment. Reviews addressing PRP in dermatologic applications note potential reductions in postoperative discomfort and improved healing experience, though the supplied summaries do not provide numeric VAS comparisons for STSG settings [90,91].

Alves and Grimalt discussed PRP's clinical benefits in dermatology and noted improved postoperative outcomes, but without pain scale values in the supplied summary [91]. Mechanistic support is provided by Kakudo N et al., who demonstrated PRP-enhanced fibroblast and stem-cell proliferation with extracellular matrix activity, suggesting accelerated stabilization that could reduce nociceptive stimulation, though pain endpoints were not reported [83]. In contrast, hair-focused meta-analyses and reviews emphasize improvements in hair density and thickness with PRP rather than surgical pain outcomes, limiting direct quantitative comparison with STSG pain scales [88,94]. Therefore, the current dataset provides direct numeric evidence that topical PRP substantially reduces early postoperative pain after STSG compared with conventional fixation.

Graft uptake on Day 5

Day 5 graft uptake showed significantly improved early take with topical PRP compared with conventional fixation, supporting enhanced early integration and viability. Uptake >95% occurred in 75.0% (27/36) of PRP cases versus 41.7% (15/36) in Controls, while uptake <75% was reduced to 5.6% (2/36) in PRP compared with 19.4% (7/36) in Controls; the overall distribution was statistically significant ($\chi^2 = 8.540$, df=2, $p = 0.014$). This result aligns with the earlier Day-1 adhesion advantage (complete adhesion 80.6% vs 50.0%), suggesting that improved early fixation translated into superior biological take by the first postoperative week. Cervelli V et al. reported faster epithelialization and better graft outcomes in PRP-treated cases than in conventional fixation, supporting the direction of improved uptake observed here, although the supplied summary does not provide Day-5 uptake percentage categories for direct numeric comparison [85]. Hesseler and Shyam reviewed PRP applications in dermatologic surgery and stated that PRP reduced graft loss and improved vascularization in split-thickness graft healing compared with suturing/stapling, consistent with the present improvement in high-uptake rates, though numeric uptake values are not presented in the supplied summary [90]. Mechanistically, Sclafani AP et al. demonstrated PRP-derivative–associated neovascularization and collagenesis, supporting improved graft-host integration processes relevant to early take [86]. In contrast, studies focused on alopecia demonstrate PRP-induced vascularization and regenerative signaling but report hair density endpoints rather than graft uptake categories, limiting direct value-to-value comparison [88,89]. Overall, the Day 5 data provide direct quantitative evidence that PRP significantly improves early graft uptake after STSG.

Graft condition on Day 7

Day 7 graft condition demonstrated markedly better clinical viability in the PRP group, indicating that early gains in adhesion and uptake translated into superior graft stability by the end of the first postoperative

week. A healthy graft appearance was observed in 83.3% (30/36) of PRP cases compared with 50.0% (18/36) in Controls, while pale grafts were more frequent in Controls (27.8%, 10/36) than PRP (13.9%, 5/36), and loss areas—a direct indicator of partial graft failure—were substantially higher in Controls (22.2%, 8/36) than PRP (2.8%, 1/36). The distribution difference was statistically significant (χ^2 = 10.111, df=2, p = 0.006), supporting a genuine treatment effect rather than random variation. Clinically, the "pale" and "loss area" patterns in the Control group suggest more frequent perfusion compromise and evolving necrosis, which are consistent with the lower Day 5 high-uptake rate in Controls (>95% uptake 41.7% vs 75.0% in PRP). Cervelli V et al. reported PRP-treated grafts had faster epithelialization and reduced necrosis compared with conventional fixation, aligning directionally with the higher proportion of healthy grafts and fewer loss areas observed here, although the supplied summary does not provide Day 7 category percentages for direct numeric comparison [85]. Sclafani AP et al. demonstrated PRP-derivative–associated neovascularization and collagenesis in human skin, supporting a biologic basis for improved graft color and stability at Day 7, though graft-condition distributions were not reported [86]. In contrast, alopecia-centered PRP meta-analyses report vascularization-linked benefits but do not provide graft viability endpoints applicable for numerical cross-comparison.

Postoperative infection rate

Postoperative infection was significantly lower in the PRP group, underscoring PRP's clinically meaningful role in reducing one of the most important threats to graft survival. Infection was present in 8.3% (3/36) of PRP participants compared with 30.6% (11/36) in Controls, with a significant group difference (χ^2 = 6.84, df=1, p = 0.009). This reduction aligns with earlier signals of improved wound milieu in PRP, including higher no-discharge rates on Day 3 (66.7% vs 38.9%) and lower purulent discharge (11.1% vs 27.8%), suggesting that PRP may reduce bioburden and support faster sealing and vascularization of the graft–bed interface. Driver VR et al. (2008) reported that PRP treatment improved healing and reduced infection in diabetic foot ulcers compared with conventional wound care, consistent with the direction of the present finding; however, the supplied summary does not provide numeric infection percentages to permit direct value-to-value comparison [82]. Hesseler MJ and Shyam N (2019) reviewed PRP applications in dermatologic surgery and noted that PRP reduced graft loss and infection risk in contexts including split-thickness graft healing compared with conventional fixation, supporting concordance with the present infection reduction, but without quantified infection rates in the supplied summary [90]. Mechanistically, PRP delivers growth factors that promote angiogenesis and tissue repair, which can improve oxygenation and immune cell function locally, thereby limiting infection susceptibility; this concept is supported by in vitro proliferative effects of PRP on fibroblasts and matrix synthesis [83] and by PRP-derivative–induced neovascularization in human skin [86]. In contrast, PRP studies in hair restoration focus on follicular outcomes and do not provide postoperative wound infection endpoints for numeric comparison.

Graft loss percentage

Graft loss percentage was significantly reduced in the PRP group, indicating improved graft survival and a shift away from clinically burdensome moderate-to-severe losses. Minimal loss <5% occurred in 77.8% (28/36) of PRP cases compared with 41.7% (15/36) in Controls, while moderate loss 5–10% was lower in PRP (16.7%, 6/36) than Controls (30.6%, 11/36), and severe loss >10% was markedly reduced in PRP (5.6%, 2/36) compared with Controls (27.8%, 10/36). The distribution difference was statistically significant (χ^2 = 10.734, df=2, p = 0.005), showing that PRP not only improved average outcomes but also reduced the frequency of high-loss events. This pattern is clinically coherent with superior Day 1 adhesion (complete adhesion 80.6% vs 50.0%) and Day 5 high uptake (>95% 75.0% vs 41.7%), as improved early apposition and integration reduce dead space, exudate accumulation, and ischemic compromise that predispose to graft sloughing.

Hesseler MJ and Shyam N (2019) reported in their review that PRP reduced graft loss and improved vascularization in split-thickness graft healing compared with conventional suturing or stapling, consistent with the present reduction in >10% loss, although the supplied summary does not provide numeric loss distributions for direct comparison [22]. Cervelli V et al. similarly reported reduced necrosis and improved outcomes with PRP in reconstructive contexts, directionally matching the reduced severe graft loss observed here but without quantified percentages in the supplied summary [17]. Mechanistic support is provided by PRP-induced fibroblast proliferation and extracellular matrix formation [15] and PRP-derivative–associated collagenesis and neovascularization [18]. In contrast, alopecia meta-analyses emphasize hair density endpoints rather than graft loss, limiting numerical cross-study comparison.

Mean time to complete healing

Mean time to complete healing was significantly shorter with PRP, indicating accelerated recovery and more efficient wound closure following STSG. The PRP group achieved complete healing in 12.17 ± 1.80 days compared with 15.75 ± 3.02 days in Controls, yielding a mean difference of −3.583 days with high statistical significance (t(70) = −6.121, p < 0.001). Clinically, a reduction of approximately 3.6 days can translate into decreased dressing burden, lower nosocomial exposure, and earlier return to function. This faster healing is internally consistent with reduced infection (PRP 8.3% vs Control 30.6%) and reduced graft loss severity (>10% loss 5.6% vs 27.8%), both of which typically prolong epithelialization and require extended wound care. Driver VR et al. (2008) reported that PRP accelerated wound closure in diabetic foot ulcers relative to conventional care, supporting the direction of the present healing-time benefit, though the supplied summary does not provide exact mean healing days to enable numeric comparison [14].

Cervelli V et al. (2012) reported faster epithelialization in PRP-treated graft/wound contexts compared with conventional fixation, aligning directionally with the present data, but again without numerical epithelialization times in the supplied summary [17]. Mechanistic studies support biologic plausibility: PRP enhances fibroblast proliferation and extracellular matrix deposition [15] and promotes neovascularization and collagenesis in human skin [18], processes that are central to graft maturation and epithelial closure. In contrast, alopecia-focused PRP meta-analyses emphasize durability of hair outcomes and do not provide surgical healing-time endpoints suitable for numerical cross-context comparison.

Dressing changes required

Dressing requirement was significantly reduced in the PRP group, indicating lower postoperative care burden and more stable wound conditions compared with conventional fixation. In PRP, 61.1% (22/36) required ≤3 dressings, whereas only 25.0% (9/36) of Controls achieved the same low dressing frequency. The Control group more frequently required 4–6 dressings (52.8%, 19/36) compared with PRP (33.3%, 12/36), and high dressing burden >6 dressings was substantially greater in Controls (22.2%, 8/36) than PRP (5.6%, 2/36). The difference was statistically significant (χ^2 = 10.632, df=2, p = 0.005). Clinically, frequent dressing changes reflect greater exudate, inflammation, infection, or partial graft loss—issues that were consistently more common in Controls (Day 3 purulent discharge 27.8% vs 11.1%, infection 30.6% vs 8.3%, >10% graft loss 27.8% vs 5.6%). Reduced dressing frequency in PRP also aligns with faster healing (12.17 vs 15.75 days) and shorter hospital stay patterns seen elsewhere in the study.

Reviews of PRP in dermatologic surgery describe improved wound stability and reduced complication burden with PRP compared with standard fixation approaches, supporting the plausibility of reduced dressing needs, although numeric dressing counts are not provided in the supplied summaries [22,23]. Cervelli V et al. reported improved epithelialization and reduced necrosis with PRP use, consistent with less prolonged wound care, but without quantified dressing changes in the supplied summary [16]. In contrast, hair-related PRP studies prioritize follicular outcomes and do not provide wound-care resource endpoints

Postoperative edema on Day 7

Postoperative edema on Day 7 remained significantly lower in the PRP group, indicating that the early anti-inflammatory and stabilizing effects of PRP persisted through the first postoperative week rather than being limited to the immediate post-grafting period. Absence of edema was

recorded in 72.2% (26/36) of PRP patients compared with 41.7% (15/36) in the Control group, while mild edema occurred in 22.2% PRP versus 36.1% Control, and moderate edema was 5.6% (2/36) in PRP compared with 16.7% (6/36) in Controls; severe edema again appeared only in Controls (5.6%, 2/36) and not in PRP (0%). The between-group distribution was statistically significant (χ^2 = 8.142, df=3, p = 0.043). Clinically, persistent edema can impair perfusion, increase tissue tension, worsen pain, and predispose to edge maceration or partial graft loss, thereby prolonging healing and increasing dressing needs—outcomes that were also worse in the Control arm. This Day 7 edema advantage is coherent with the PRP group's higher Day 7 healthy graft status (83.3% vs 50.0%) and lower graft loss severity (>10% loss 5.6% vs 27.8%). In contrast, Sclafani AP et al. documented PRP-derivative–induced neovascularization and collagenesis in human skin, supporting a microenvironment conducive to reduced congestion and better tissue stability, although edema grading values were not provided in the supplied summary for direct numeric comparison [86]. Similarly, Cervelli V et al. reported reduced necrosis and improved epithelialization with PRP in surgical wound/graft contexts, aligning directionally with sustained edema reduction but without quantified Day 7 edema categories [16]. Reviews also describe PRP's anti-inflammatory effects and improved graft-bed integration compared with mechanical fixation alone, supporting the plausibility of this sustained edema benefit.

Patient satisfaction score

Patient satisfaction scores were significantly higher in the PRP group, demonstrating that the clinical advantages of PRP translated into superior patient-perceived outcomes. The highest satisfaction score of 5 was reported by 58.3% (21/36) of PRP patients compared with 22.2% (8/36) of Controls, while scores clustered lower in Controls, including score 2 in 13.9% of Controls versus 2.8% in PRP and score 3 in 27.8% Controls versus 11.1% PRP; the overall distribution differed significantly (χ^2 = 12.247, df=4, p = 0.016). This pattern is clinically consistent with PRP's lower Day 3 pain (2.8 ± 1.1 vs 4.1 ± 1.3), reduced infection (8.3% vs 30.6%), fewer dressing changes (≤3 dressings 61.1% vs 25.0%), and shorter hospitalization (≤7 days 66.7% vs 30.6%), all of which directly influence comfort, inconvenience, and perceived recovery speed. In contrast, Elghblawi's review highlighted PRP as a promising minimally invasive therapy in dermatology and noted improved patient outcomes in several settings, but did not provide satisfaction-score distributions applicable to STSG recovery in the supplied summary [19]. Likewise, Gupta AK et al. meta-analyses in androgenetic alopecia reported improved patient satisfaction with PRP compared with placebo or conventional therapies; however, those satisfaction endpoints relate to hair restoration and do not provide numeric post-surgical satisfaction scales for grafting in the supplied summary [88,94]. Reviews addressing PRP in dermatologic surgery describe improved wound stability and reduced complications, indirectly supporting higher satisfaction, but without quantified satisfaction scales in the supplied text [22, 23]. Thus, the present study contributes direct patient-reported evidence that PRP improves subjective recovery experience alongside objective graft outcomes.

Need for regrafting

Need for regrafting was significantly lower in the PRP group, indicating that topical PRP reduced clinically meaningful graft failure requiring repeat operative intervention. Regrafting was required in 2.8% (1/36) of PRP cases compared with 16.7% (6/36) in the Control group, with a statistically significant association (χ^2 = 3.956, df=1, p = 0.047). Regrafting is typically driven by infection, extensive graft loss, or nonviable graft beds, and the Control group's higher rates of postoperative infection (30.6%), severe graft loss >10% (27.8%), and Day 7 loss areas (22.2%) provide a coherent explanation for the greater need for regrafting in that arm. Conversely, PRP's improved early adhesion (Day 1 complete adhesion 80.6% vs 50.0%) and Day 5 high uptake (>95% 75.0% vs 41.7%) likely reduced the cascade leading to large-area failure. In contrast, Hesseler MJ and Shyam N reviewed PRP applications in dermatologic surgery and stated that PRP reduced graft loss and improved vascularization in split-thickness graft healing compared with conventional suturing or stapling, which would be expected to reduce regrafting; however, regrafting rates were not quantified in the supplied summary for direct numeric comparison [22]. Cervelli V et al. similarly reported improved graft outcomes and reduced necrosis with PRP, supporting directionally fewer failures that might require regrafting, but without numeric regrafting values in the supplied text [17]. Mechanistic studies demonstrating PRP-induced cellular proliferation and matrix support provide plausible biologic basis for reduced graft failure severity [14,18]. Overall, the observed reduction from 16.7% to 2.8% highlights PRP's practical value in preventing major failure endpoints.

Hospital stay duration was significantly shorter in the PRP group, reflecting faster recovery and fewer postoperative complications. Discharge within ≤7 days occurred in 66.7% (24/36) of PRP patients compared with 30.6% (11/36) in Controls, while stays of >10 days were more frequent in Controls (27.8%, 10/36) than PRP (5.6%, 2/36); intermediate stays of 7–10 days were also higher in Controls (41.7%) compared with PRP (27.8%). The distribution difference was statistically significant (χ^2 = 11.162, df=2, p = 0.004). Clinically, prolonged hospital stay after STSG commonly results from infection, repeated dressing needs, graft loss, and delayed epithelialization. The Control group had higher infection (30.6% vs 8.3%), greater severe graft loss (>10% 27.8% vs 5.6%), and greater high dressing burden (>6 dressings 22.2% vs 5.6%), which plausibly contributed to longer admissions. Conversely, PRP accelerated healing (mean 12.17 ± 1.80 days vs 15.75 ± 3.02 days) and improved early stability, supporting earlier discharge. In contrast, Driver VR et al. emphasized that PRP accelerated wound closure and reduced infection in diabetic ulcers, which would be expected to reduce healthcare utilization, but the supplied summary does not report hospital stay values for direct numerical comparison [13]. Reviews discussing PRP in dermatologic surgery highlight reduced complication rates and improved healing efficiency compared with conventional approaches, aligning with the present shorter hospitalization but without quantified lengths of stay in the supplied summaries [22, 23]. Therefore, the present dataset provides clear health-system–relevant evidence that PRP reduces inpatient duration following STSG.

Overall success rate of graft

Overall graft success rate strongly favored PRP, integrating multiple clinical advantages into a single, practice-relevant endpoint. Successful outcome defined as >90% uptake was achieved in 86.1% (31/36) of PRP cases compared with 52.8% (19/36) in Controls, while partially successful outcomes were 11.1% (4/36) in PRP versus 33.3% (12/36) in Controls, and poor outcomes were reduced to 2.8% (1/36) in PRP compared with 13.9% (5/36) in Controls; this distribution was statistically significant (χ^2 = 9.547, df=2, p = 0.008). The success advantage is internally consistent with the PRP group's superior early adhesion (Day 1 complete adhesion 80.6%), reduced inflammatory markers (Day 3 no edema 58.3%; Day 7 no edema 72.2%), lower infection (8.3%), reduced severe graft loss (>10% 5.6%), fewer dressings, and shorter hospital stay. In contrast, Hesseler MJ and Shyam N reviewed PRP in dermatologic surgery and concluded that PRP improves vascularization and reduces graft loss compared with conventional fixation, which supports the direction of increased success observed here, though the supplied summary does not provide numeric "success" rates for direct comparison [90]. Cervelli V et al. similarly described better outcomes and reduced necrosis with PRP-treated grafts, consistent with higher success rates but without quantified uptake thresholds in the supplied summary [85]. Mechanistic evidence demonstrating PRP-driven collagenesis, neovascularization, and cellular proliferation provides biologic plausibility for this marked success shift [15,18]. Overall, the present data provide quantified evidence that topical PRP meaningfully increases the probability of a successful graft outcome compared with conventional mechanical fixation alone.

Strengths of the study

The study has several important strengths that enhance the credibility and clinical relevance of the findings. First, the comparative two-group structure with equal allocation (PRP n=36; Control n=36) allows direct assessment of topical PRP against conventional mechanical fixation under similar conditions, improving interpretability of treatment-related differences. Second, baseline comparability was well demonstrated across key confounders including age distribution, sex distribution, ulcer etiology, ulcer size, and baseline granulation tissue grade, reducing selection bias

and strengthening internal validity for outcome comparisons. Third, outcome assessment covered a comprehensive timeline that captured both early and later clinically meaningful endpoints—Day 1 adhesion, Day 3 edema/discharge/pain, Day 5 uptake, Day 7 graft condition and edema, infection rate, graft loss percentage, healing time, dressing frequency, satisfaction, regrafting need, hospital stay, and overall success—thereby providing a robust multidimensional understanding of PRP's effect rather than relying on a single endpoint. Fourth, the study used objective categorical grading (adhesion, edema, discharge, graft condition, graft uptake and loss categories) and quantitative continuous measures (ulcer size, healing time, pain scores), enabling both clinical clarity and statistical comparison. Fifth, the findings showed consistent benefit with PRP across multiple interlinked domains (reduced inflammation, infection, graft loss, and care burden with improved uptake, healing, satisfaction, and success), supporting biological plausibility and reducing the chance that results represent isolated statistical artifacts. Finally, the outcomes are directly applicable to routine surgical practice because the endpoints are practical and patient-centered, including pain, dressing changes, regrafting need, hospital stay, and satisfaction, which matter to both clinicians and healthcare systems. Overall, these methodological and outcome-related strengths support topical PRP as a meaningful adjunct in STSG healing and provide a strong foundation for translation of findings into clinical protocols.

Implications

The study carries important clinical and health-system implications for optimizing split-thickness skin graft outcomes in ulcer management. The consistent superiority of topical PRP over conventional mechanical fixation across early adhesion, edema/discharge control, pain reduction, improved graft uptake and condition, lower infection and graft loss, faster healing, fewer dressing changes, reduced regrafting, shorter hospitalization, and higher overall success suggests that PRP can shift postoperative care from complication-driven management toward faster, more predictable recovery. Clinically, improved Day-1 adhesion and higher Day-5 uptake indicate that PRP can enhance early graft stability, potentially lowering the likelihood of graft-bed separation and subsequent necrosis. Reduced infection and graft loss imply fewer adverse events that typically prolong care, increase antibiotic exposure, and lead to repeat procedures. From a patient perspective, lower pain scores and higher satisfaction indicate a better postoperative experience, which may improve compliance with immobilization and wound-care instructions. From a service delivery perspective, fewer dressing changes and shorter hospital stay indicate reduced resource utilization, including nursing time, dressing material consumption, inpatient bed occupancy, and procedural load associated with regrafting. These implications are especially relevant in settings with high patient volume and limited surgical beds, where interventions that shorten hospitalization and reduce complications can improve throughput and overall efficiency. The findings also suggest that PRP may be particularly valuable in mixed-etiology ulcer populations, including traumatic, diabetic, venous, and pressure ulcers, where baseline biological healing challenges exist. Overall, the study supports adopting topical PRP as a practical adjunct to mechanical fixation in STSG, not as a replacement for secure immobilization but as a biologically active enhancer that improves healing quality and reduces postoperative burden.

Recommendations

Based on the observed benefits, incorporation of topical PRP into STSG practice can be recommended in a structured and protocol-driven manner. PRP may be used as an adjunct applied directly to the wound bed and/or graft interface at the time of graft placement, followed by standard immobilization using staples/sutures/tie-over dressing as required. Careful patient selection should prioritize ulcer cases at higher risk for graft complications, such as diabetic ulcers, larger wounds, or wounds with higher bioburden risk, while still allowing application across varied etiologies given the broad benefit observed. Standardization of PRP preparation, platelet concentration targets, activation method, and application technique should be implemented within the institution to ensure reproducibility and reduce outcome variability. Postoperative monitoring should continue to include structured assessment of adhesion, edema, discharge, pain, uptake, and graft condition at defined time points, enabling early identification of problems. Infection-prevention protocols should remain unchanged, but PRP may allow more confident early discharge planning in stable patients and may reduce the need for prolonged inpatient dressing care. Education of surgical teams and wound-care nurses should accompany implementation so that application technique and dressing strategy remain consistent. Documentation templates should include PRP details (volume used, site of application, preparation method) so outcomes can be audited. Cost-benefit assessment is recommended at departmental level to quantify savings from reduced dressings, fewer regraftings, and shorter hospital stay versus PRP preparation costs. Overall, topical PRP can be recommended as an adjunctive intervention to improve graft take, accelerate healing, and reduce postoperative morbidity, provided its use is standardized and integrated into an evidence-based perioperative wound-care pathway.

Limitations

Despite clear differences between groups, several limitations should be considered when interpreting the study. The sample size, although adequate to show significant differences in many outcomes, remains modest and may limit precision for less frequent endpoints or subgroup analysis by ulcer etiology (traumatic, diabetic, venous, pressure). The study design details regarding randomization method, allocation concealment, and blinding are not specified here; absence of blinding could introduce observer bias, especially for subjective or semi-quantitative assessments such as adhesion grading, edema grading, discharge categorization, graft condition, and satisfaction scoring. Variability in surgical technique, graft thickness, donor site factors, and fixation technique within the "conventional" arm (e.g., staples versus sutures) could influence outcomes if not strictly standardized. PRP itself is a biologically variable product; platelet concentration, leukocyte content, activation technique, and time from preparation to application can differ between patients and operators, potentially affecting reproducibility and external validity if protocols are not uniform. The follow-up window largely focuses on early outcomes up to healing and early satisfaction; long-term outcomes such as scar quality, pigmentation, contracture, durability of graft coverage, and functional outcomes were not addressed, limiting conclusions about longer-term superiority. The study also does not include detailed cost analysis, which is important for widespread adoption, especially in resource-constrained settings. Finally, potential confounders such as glycemic control, nutritional status, smoking, anemia, and peripheral vascular disease severity are not presented here; these factors could influence healing and infection risk and may require adjustment in future analyses.

Future scope

Future work can build on these findings by strengthening methodological rigor, expanding generalizability, and exploring long-term and mechanistic outcomes. Larger multicenter trials with robust randomization and assessor blinding are needed to confirm efficacy across diverse patient populations and institutional practices. Stratified analyses should evaluate whether PRP provides differential benefit by ulcer etiology (especially diabetic and venous ulcers), ulcer size categories, age groups, and comorbidity profiles, enabling tailored clinical indications. Standardization research is essential to determine optimal PRP preparation parameters, including platelet concentration range, leukocyte-rich versus leukocyte-poor formulations, activation method, dose (volume per cm^2), and timing of application. Comparative studies could test PRP alone versus PRP plus standard fixation versus advanced dressings to determine the most efficient combination approach. Long-term follow-up should incorporate scar quality scales, graft pliability, pigmentation match, contracture rates, sensory recovery, and patient-reported quality of life to evaluate durable benefit beyond early healing. Health-economic evaluation should quantify total cost impact, balancing PRP preparation costs against savings from reduced dressings, fewer infections, less regrafting, and shorter hospital stay. Translational studies examining biomarkers of inflammation, angiogenesis, and microbial burden at the graft site could clarify the biological pathways through which PRP improves outcomes and identify predictors of response. Finally, development of institutional protocols and training modules, followed by implementation studies, can assess real-world feasibility, compliance, and scalability of PRP-assisted STSG pathways in routine surgical practice.

SUMMARY

•**Sample size:** Total 72 participants; PRP = 36, Control = 36.

•**Age distribution:** Majority 41–60 years = 52.8%; groups comparable across age bands (e.g., 41–50: 9 vs 10, 51–60: 10 vs 9, >60: 6 vs 6).

•**Sex distribution:** Male 59.7% (43/72), Female 40.3% (29/72); comparable between groups ($\chi^2 = 0.058$, p = 0.810).

•**Ulcer etiology (overall):** Traumatic 36.1%, Diabetic 29.2%, Venous 20.8%, Pressure 13.9%; distribution comparable between groups.

•**Baseline ulcer size:** PRP 32.6 ± 2.6 cm^2 vs Control 33.7 ± 2.7 cm^2; not significant (t = –1.78, p = 0.079).

•**Baseline granulation grade:** Grade I 41.7%, Grade II 30.6%, Grade III 27.8%; comparable ($\chi^2 = 1.26$, p = 0.532).

•**Day 1 graft adhesion:** Complete adhesion PRP 80.6% vs Control 50.0%; significant ($\chi^2 = 7.82$, p = 0.020).

•**Day 3 edema:** No edema PRP 58.3% vs Control 27.8%; significant ($\chi^2 = 9.24$, p = 0.026).

•**Day 3 discharge:** No discharge PRP 66.7% vs Control 38.9%; purulent discharge PRP 11.1% vs Control 27.8%; borderline significance ($\chi^2 = 6.00$, p = 0.050).

•Day 3 pain (VAS): PRP 2.8 ± 1.1 vs Control 4.1 ± 1.3; highly significant (t = –10.50, p < 0.001).

•Day 5 graft uptake: >95% uptake PRP 75.0% vs Control 41.7%; significant ($\chi^2 = 8.540$, p = 0.014).

•Day 7 graft condition: Healthy graft PRP 83.3% vs Control 50.0%; loss areas PRP 2.8% vs Control 22.2%; significant ($\chi^2 = 10.111$, p = 0.006).

•Post-op infection: PRP 8.3% (3/36) vs Control 30.6% (11/36); significant ($\chi^2 = 6.84$, p = 0.009).

•Graft loss %: <5% loss PRP 77.8% vs Control 41.7%; >10% loss PRP 5.6% vs Control 27.8%; significant ($\chi^2 = 10.734$, p = 0.005).

•Time to complete healing: PRP 12.17 ± 1.80 days vs Control 15.75 ± 3.02 days; significant (t = –6.121, p < 0.001); mean difference –3.583 days.

•Dressing changes: ≤3 dressings PRP 61.1% vs Control 25.0%; >6 dressings PRP 5.6% vs Control 22.2%; significant ($\chi^2 = 10.632$, p = 0.005).

•Day 7 edema: No edema PRP 72.2% vs Control 41.7%; significant ($\chi^2 = 8.142$, p = 0.043).

•Patient satisfaction: Score 5 PRP 58.3% vs Control 22.2%; significant ($\chi^2 = 12.247$, p = 0.016).

•Need for regrafting: PRP 2.8% vs Control 16.7%; significant ($\chi^2 = 3.956$, p = 0.047).

•Hospital stay: ≤7 days PRP 66.7% vs Control 30.6%; >10 days PRP 5.6% vs Control 27.8%; significant ($\chi^2 = 11.162$, p = 0.004).

•Overall success (>90% uptake): PRP 86.1% vs Control 52.8%; significant ($\chi^2 = 9.547$, p = 0.008).

CONCLUSION

The present study compared topical platelet-rich plasma (PRP) with conventional mechanical fixation for split-thickness skin grafting (STSG) in 72 participants equally distributed into PRP (n=36) and Control (n=36) groups, and demonstrated that topical PRP consistently improved early graft stability, reduced inflammatory and infective complications, accelerated healing, reduced postoperative care burden, improved patient satisfaction, shortened hospital stay, and increased overall graft success. Interpretation of these findings is strengthened by the clear baseline comparability between groups: the cohort was predominantly middle-aged to older adults with 52.8% in the 41–60 years band, and age distribution across strata was similar between arms; sex distribution was balanced between groups with an overall male predominance (59.7%) and no significant difference (p = 0.810); ulcer etiologies were similarly distributed with traumatic ulcers comprising 36.1%, diabetic ulcers 29.2%, venous ulcers 20.8%, and pressure ulcers 13.9%; baseline ulcer size was comparable (PRP 32.6 ± 2.6 cm^2 vs Control 33.7 ± 2.7 cm^2, p = 0.079); and baseline granulation tissue grade distribution did not differ significantly (p = 0.532). With these equivalent starting conditions, the postoperative differences favoring PRP are clinically meaningful. The earliest benefit was seen in Day 1 graft adhesion, where complete adhesion was achieved in 80.6% of PRP cases compared with 50.0% in Controls (p = 0.020), indicating superior immediate graft-bed apposition and stability in the PRP arm. This early advantage was followed by significantly improved inflammatory profiles: on Day 3, absence of edema was more frequent with PRP (58.3%) than Control (27.8%) with a significant difference (p = 0.026), and discharge patterns favored PRP with more grafts showing no discharge (66.7% vs 38.9%) and fewer showing purulent discharge (11.1% vs 27.8%), reaching borderline statistical significance (p = 0.050). Patient experience was also substantially better in the PRP group, reflected by significantly lower Day 3 pain scores (VAS 2.8 ± 1.1 vs 4.1 ± 1.3, p < 0.001), which is consistent with reduced edema and discharge and indicates improved early postoperative comfort. These early differences translated into improved objective measures of graft take. On Day 5, a significantly higher proportion of PRP participants achieved >95% graft uptake (75.0%) compared with Controls (41.7%, p = 0.014), demonstrating improved early integration. By Day 7, graft quality remained significantly superior in the PRP arm, where 83.3% of grafts were clinically healthy compared with 50.0% in Controls, and loss areas were markedly lower (2.8% vs 22.2%, p = 0.006). Importantly, PRP significantly reduced major postoperative complications. Postoperative infection rate was much lower with PRP (8.3%) than with conventional fixation (30.6%, p = 0.009), and graft loss severity was substantially reduced: minimal loss <5% was achieved in 77.8% of PRP compared to 41.7% of Controls, while severe loss >10% was uncommon in PRP (5.6%) but frequent in Controls (27.8%, p = 0.005). These improvements in stability and complication control produced a clear advantage in recovery efficiency: time to complete healing was significantly shorter with PRP (12.17 ± 1.80 days) compared with Controls (15.75 ± 3.02 days, p < 0.001), indicating an average acceleration of healing by approximately 3.58 days. Correspondingly, postoperative care burden was reduced in the PRP group, where 61.1% required ≤3 dressing changes compared with 25.0% of Controls, and only 5.6% required >6 dressings compared with 22.2% of Controls (p = 0.005). Edema reduction persisted to Day 7, with absence of edema in 72.2% of PRP versus 41.7% of Controls (p = 0.043), indicating sustained improvement in wound milieu. These clinical improvements translated into better patient-reported outcomes: the highest satisfaction score of 5 was reported by 58.3% of PRP patients compared with 22.2% of Controls (p = 0.016), reflecting combined benefits in comfort, fewer complications, faster healing, and reduced care intensity. The PRP arm also showed a significantly reduced need for regrafting (2.8%) compared with Controls (16.7%, p = 0.047), demonstrating that PRP not only improved partial endpoints but also prevented major failures requiring repeat intervention. Health-system impact was evident in reduced hospitalization: discharge within ≤7 days occurred in 66.7% of PRP compared with 30.6% of Controls, while stays >10 days were far less frequent in PRP (5.6%) than Control (27.8%, p = 0.004). Finally, when outcomes were summarized as overall graft success defined by >90% uptake, PRP achieved a markedly higher success rate (86.1%) compared to conventional fixation (52.8%, p = 0.008), with fewer partially successful and poor outcomes in the PRP group. Taken together, the study supports the conclusion that topical PRP is an effective adjunct to mechanical fixation in STSG, producing superior early graft adhesion, reduced postoperative edema and discharge, significantly less pain, improved graft uptake and clinical condition, lower infection rates, reduced graft loss, faster healing, fewer dressing changes, higher satisfaction, lower regrafting requirement, shorter hospital stay, and higher overall success compared with conventional fixation alone in a mixed-etiology ulcer population.

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