



## Comparison of Fixation and Uptake of Split Skin Graft Using Autologous Platelet Rich Plasma with Conventional Method for Ulcer

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### ABSTRACT

Platelet Rich Plasma contains a major Growth factor and has adhesive and healing properties. PRP promotes angiogenesis, collagen synthesis, and wound healing. The main aim of this study is to compare the efficacy of SSG fixation using autologous platelet-rich plasma with the conventional method like suturing. In this study, patients who were admitted with a diagnosis of "ulcer" in the General Surgery department in SRM medical college hospital and research centre were included and would be taken as subjects for this study. It is a randomized, controlled study with a sample size of 60. Thirty people were put in the autologous PRP group, and another 30 people were put in the suture group. Instant graft uptake of SSG to the ulcer was statistically significant in the PRP group. The seroma formation, the number of dressings and the period of hospital stay were comparatively increased in the suture group than in the PRP. The usage of PRP is secure and efficient in healing ulcer. It has been discovered to be very advantageous in many ways for both the patient and the surgeon. Based on what we found, we recommend using autologous PRP on wounds before resurfacing to help them heal better and faster than suturing.

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### INTRODUCTION

Platelet rich plasma (PRP) is renowned for its hemostatic, adhesion, and healing characteristics because the platelets transfer a variety of growth factors to the wound site [1]. Split thickness skin grafts are typically used to cover soft tissue due to their widespread use and simplicity in harvesting. Anchorage, inoculation, and maturity are the

three stages that make up the healing process [2]. An autologous product called platelet-rich plasma (PRP) concentrates a lot of platelets into a small amount of plasma. PRP promotes soft tissue healing, lessens dermal scarring, speeds up endothelium, epithelial, and epidermal regeneration stimulates angiogenesis, boosts collagen synthesis, and improves the hemostatic response to injury [3].

After aggregation, platelets release the contents of their granules and exude intercellular mediators and cytokines that had been held in the cytoplasmic pool. Additionally, Tissue regeneration is caused by the stimulation of cell migration, angiogenesis, and proliferation.

The injection of autologous platelet-rich plasma (PRP) to the sites of split-thickness skin graft (SSG) is anticipated to provide fast skin graft anchoring in addition to inoculating the SSG with nutrient-rich blood media. When injected into SSG recipient sites, PRP tends to enhance primary healing and minimize healing duration. This is most likely because growth

factors lessen the force of shear and make the wound environment better [4].

Autologous PRP replicates the last stages of the coagulation cascade, which aids in achieving sustained hemostasis. It results in immediate graft bed adherence, preventing seroma collection under the graft or excessive shear [5-7].

Chronic wounds may not have enough growth factors because they are not being made or released as much, or because they are being broken down too quickly [8]. PRP can reverse this delay in healing. The goal of my study is to compare the efficiency of platelet rich plasma with traditional methods for resurfacing surgical wound beds in terms of fixing and absorbing split thickness skin grafts [9].

### Aims and Objectives

To compare the effectiveness in fixation of split skin graft using platelet rich plasma with the conventional method in resurfacing surgical wound beds.

### Objectives

To study

1. Timing of first look after surgery
2. Percentage of graft uptake
3. Frequency of dressing
4. Infection in recipient site
5. Length of stay after Surgery

## MATERIALS & METHODS

### Type of Study

Randomized Control Trial

### Study Period

January 2021 - June 2022 (18 months)

### Study Population and Sample Size

Patients who got admitted with a diagnosis of "ULCER" in the General Surgery department at SRM medical college and hospital would be taken as a subject for our study with 60 sample size, 30 in two groups [10].

### Inclusion Criteria

1. Patient over the 18 years of age
2. Chronic non healing ulcers
3. Burn wounds
4. Post traumatic ulcers

### Exclusion Criteria

1. Patients with positive HIV, HbsAg and HCV status.
2. Individuals with abnormal coagulation profiles.
3. Ulcer resulting from excision of skin malignancies

### Materials Used

1. Patient clinical history and follow up forms
2. Informed consent forms in the Tamil language.
3. Platelet rich plasma
4. 20G venflon
5. Two 10ml syringes
6. 10ml becaines
7. Anticoagulant(CPD-A)
8. Suture material/Skin stapler
9. Bactigrass

### Statistical Analysis

1. A randomized control study will be undertaken.
2. The continuous variables will be analyzed and presented as mean S.D The categorical variables shall be expressed in percentages after analysis
3. The significance of continuous scale data between two groups shall be determined using the student T test.
4. The Chi square/Fischer's exact test will be used to evaluate the significance of the categorical data analyzed, a P value of less than 0.05 would be taken significantly.
5. SPSS statistical package and Microsoft excel would be used to compute the data.

## RESULT AND ANALYSIS

### Graft Uptake

#### Inference

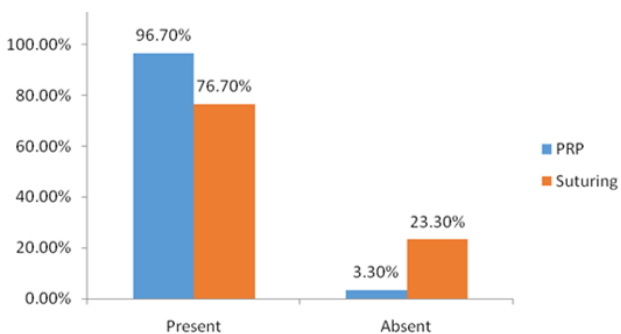
There is an association between Suturing and PRP in graft uptake. Since the significance value is 0.023 which is  $< 0.05$  and the Chi square value is 5.192. This means that there is a strong association in graft uptake between the suturing and PRP groups.

**Table 1: Distribution of PRP and Suturing Group in Graft Uptake**

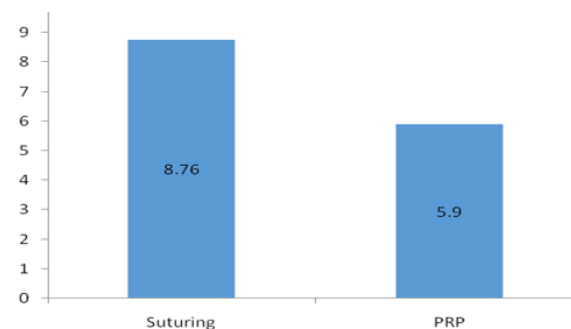
Types	Graft uptake		Chi Square DF, (P Value)
	Present, N=52(13.3%)	Absent, N=8(86.7%)	
PRP	29(96.7%)	1(3.3%)	5.192 1, (0.023)
Suturing	23(76.7%)	7(23.3%)	

**Table 2: Distribution of PRP and Suturing Group in number of Dressing**

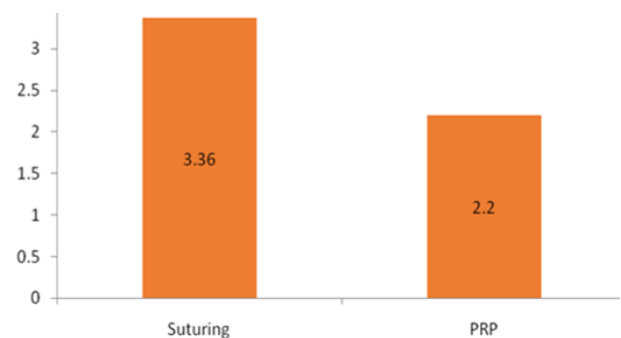
Groups	Median	Mean	SD	95% CI	Mann-Whitney U
No. of dressing					
Suturing	3.0	3.36	0.49	3.18 - 3.54	P < 0.001
PRP	2.0	2.20	0.40	2.04 - 2.35	



**Figure 1: Distribution of PRP and Suturing Group in Graft Uptake**



**Figure 3: Distribution of PRP and Suturing Group in Length of Hospital Stay**



**Figure 2: Distribution of PRP and Suturing Group in the number of Dressing**

We found that 96.7% of graft uptake was present in the PRP group (Table 1, Figure 1).

**Number of Dressings**

**Inference**

On applying the Mann-Whitney U test, No. of dressing in PRP shows statistically significant ( $p < 0.001$ ) when compared with No. of dressing in suturing ( $U = 57, p = 0.000$ ) (Table 2, Figure 2).

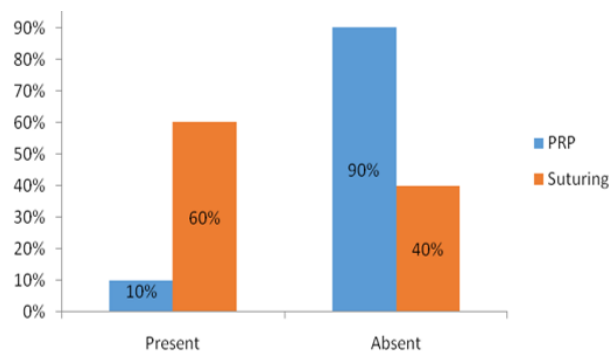
**Length of Hospital Stay**

**Inference**

On applying the Mann-Whitney U test, the Length of hospital stay in PRP shows statistically significant ( $p < 0.05$ ) when compared with the length of hospi-

tal stay in suturing ( $U = 124, p = 0.000$ ) (Table 3, Figure 3).

**Seroma Formation**



**Figure 4: Distribution of PRP and Suturing Group in Seroma Formation**

**Inference**

There is an association between Suturing and PRP in seroma formation. Since the significance value is 0.000 which is  $< 0.01$  and the Chi square value is 16.48.

This means that there is an association in the seroma formation between the suturing and PRP groups.

We found that only 10.3% of seroma formation was present in the PRP group (Table 4, Figure 4).

**Table 3: Distribution of PRP and Suturing Group in Length of Hospital Stay**

	Groups	Median	Mean	SD	95% CI	Mann-Whitney U
Hospital stay	Suturing	9.0	8.76	2.44	7.85 – 9.67	P < 0.001
	PRP	6.0	5.90	0.88	5.56 – 6.23	

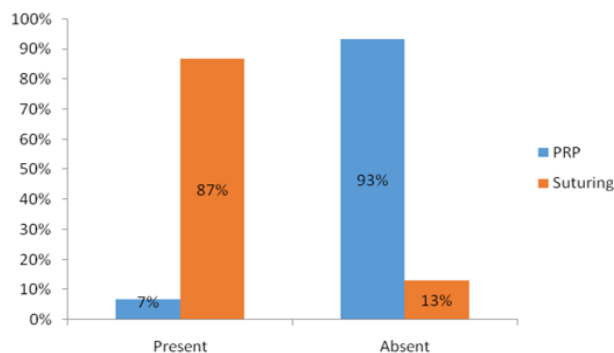
**Table 4: Distribution of PRP and Suturing Group in Seroma formation**

Type	Present	Seroma formation Absent	Chi Square, (P Value)
PRP	3 (10%)	27(90%)	16.48, (0.000)
Suturing	18(60%)	12(40%)	

**Table 5: Distribution of PRP and Suturing Group in Discharge**

Types	Present	Discharge (in days) Absent	Chi Square, (P Value)
PRP	2(7%)	28(93%)	38.57 , (0.000)
Suturing	26(87%)	4(13%)	

**Discharge**



**Figure 5: Distribution of PRP and Suturing Group in discharge**

**Inference**

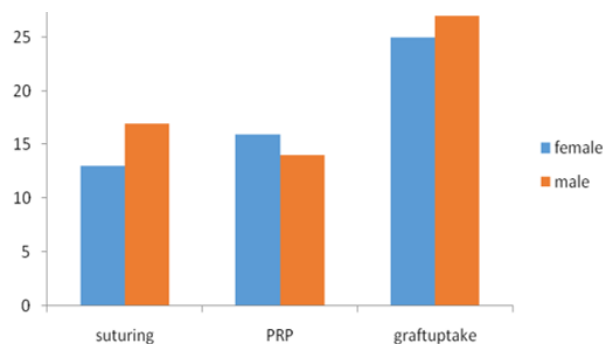
There is an association between Suturing and PRP in discharge. Since the significance value is  $(0.000) < 0.01$  and the Chi square value is 38.571. This means that there is a strong association between the discharge in suturing and PRP groups. We found that only 6.7% of discharge was present in the PRP group (Table 5, Figure 5).

**Sex Distribution**

**Inference**

There is no association in the distribution of genders in PRP and Suturing groups (Table 6, Figure 6).

Among the 60 patients in our study, graft uptake was observed in 29 patients (96%) in the PRP group than in the Suturing group and seroma formation was noted in 3 patients(10%) in PRP but it was obtained in 18 patients (60%)in Suturing groups.26



**Figure 6: Distribution of Genders in PRP and Suturing Group**

patients were discharged within 10 days postoperative period in the PRP group. There is an association between PRP and Suturing groups. PRP application helps in better wound healing than the suturing groups.



**Figure 7: Preoperative, intraoperative and postoperative picture shows better Graft uptake after PRP application**

**Table 6: Distribution of Gender in PRP and Suturing**

Gender Distribution	Suturing	PRP	Total	Chi Square, (P Value)
Female	13(45 %)	16(55%)	29(100%)	0.6007, (0.4383)
Male	17(55%)	14(45%)	31(100%)	

## DISCUSSION

Studies have only employed PRP on specific etiological groups, but in our study, it was proven to be effective in all types of wounds, regardless of the etiology [11]. Recently, Autologous PRP has been characterized and speculated to be used at SSG application sites to provide fast skin graft anchoring and inoculate the SSG with nutrient-rich media [12].

In our study, there was spontaneous adherence of skin graft to ulcer in all 28 patients in the PRP group when compared to Suturing group (Figure 7).

According to Gibran et al.'s post-burn study, PRP is safe and potent for fixing skin grafts because of its specific adhesive capacity and results are better than those obtained by fastening skin grafts to ulcers using non absorbable sutures [13]. This surgical procedure saves both the operative time and the surgeon's time in the effort of removing sutures in the postoperative period.

In the (PRP) test group, we found only 10.3% of seroma collection, compared to 59% of patients in the (conventional method) control group who had seroma collection within a week [14]. PRP releases fibrin production, cytokines and various growth factors which accelerated angiogenesis [15]. Hence the application of PRP stimulates the inosculation stage and increases early circulation thereby reducing seroma collection [16]. In this study, 28 patients from the control group needed dressing 3 to 5 times within 15 days postoperatively [17]. Whereas the frequency of dressing was less in the PRP group. PRP improves healing and reduces infection rates and also a significant improvement in diabetic wounds. The study concluded that the effectiveness of PRP in the management of chronic non-healing ulcers and reduces the infection rates, number of dressings, length of hospital stay. In our study, 92% of patients in the PRP group were discharged within 10 days post operative days. The average length of hospital stay was ten days contrary to 15 days for the control group [18].

In the trial, 60 patients ranging in age from 18 to 70 were admitted. In all of the objective parametric, there was a statistically significant difference ( $p < 0.005$ ) between the PRP and control groups [19].

Regardless of etiology, Autologous PRP offers sig-

nificant potential and practical advantages that enhance the outcome of graft uptake on ulcers. When the ulcer was treated with the patient's own PRP, no adverse effects were noted in this study [20].

## CONCLUSION

In comparison to conventional methods of anchorage, autologous PRP usage ensures instant adherent skin to ulcers. It is efficient in treating these ulcers earlier to prevent seroma formation. Some factors which are altered by surgery are to promote spontaneous healing by the application of platelet-rich plasma on the ulcer before placing the split skin graft. From this study, we found that platelet rich plasma promotes faster wound healing and, thereby, reduces the expenses spent on hospital stays in treating these wounds and ulcers. Moreover, it helps the patient in early recovery and prevents further complications.

This shows that the length of hospital stay in the post-surgery period has come down in the PRP group compared to the control group. According to our literature, the mean post-surgery stay is 10 days. In our study, we found that 86% of patients left the hospital within 10 days after surgery, and 6.7% of the test group got a small infection at the donor site. Based on what we found, we recommend using autologous PRP on wounds before resurfacing to help them heal better and faster as propelled by our study results.

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The authors declare that they have no funding support for this study.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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