

ROLE OF AUTOLOGUS PLATELET CONCENTRATED PLASMA IN TREATMENT OF UNHEALED CUTANEOUS ULCERS

General Surgery

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ABSTRACT

Background : The most prevalent condition impacting people globally is chronic ulcers. Chronic wounds do not heal according to plan or within the anticipated time frame. For the treatment of chronic wounds, plasma-rich plasma is regarded as an advanced therapeutic option. (1) **Objectives of the Study:** The study's objectives were to evaluate the local injection of platelet-rich plasma and its clinical effectiveness against traditional dressings for the treatment of persistent cutaneous ulcers. **Materials and Method:** A prospective interventional trial at Rajshree Medical College Hospital involved 100 patients with unhealed cutaneous ulcers from June 2022 to March 2024. Participants were randomly assigned to two groups: 50 received concentrated autologous platelet plasma injections, while the other 50 received traditional dressings with 10% povidone-iodine. The primary efficacy endpoint was complete ulcer closure, with secondary endpoints including time to closure (via secondary suturing or skin grafting) and reduction in ulcer surface area. Patient monitoring continued until wound closure or discharge, and statistical analysis was conducted using Z-test and Student's T-test, with P-values < 0.05 considered significant. **Results:** The study predominantly involved male patients with ulcerative symptoms, evaluating treatment effectiveness by measuring percentage reductions in ulcer surface area, granulation tissue coverage, and mean time to outcomes like skin grafting or healing by secondary intention. Findings revealed that the group receiving autologous platelet-concentrated plasma injections exhibited significantly better wound contraction and increased granulation tissue formation compared to the traditional dressing group. **Conclusion:** For the treatment of chronic ulcers, local infusion of autologous platelet-concentrated plasma may be a better choice. However, in order to support our findings, we recommend bigger sample sizes for more research.

KEYWORDS

PRP, Chronic Ulcers, Autologous.

INTRODUCTION

An ulcer is defined as a breach in the continuity of skin, epithelium, or mucous membrane caused by the sloughing of inflamed necrotic tissue. Chronic ulcers refer to wounds that either have not healed through an ordered process achieving adequate anatomical and functional integrity or have healed ineffectively, failing to yield suitable outcomes. These chronic wounds present a significant global health challenge due to their limited healing, resulting in a substantial socioeconomic burden. The wound healing process is intricate and dynamic; while acute wounds typically close completely, both acute and chronic wounds may encounter challenges from patient-related factors, such as co-morbidities, and wound-related factors, like infection. Treating wounds with impaired healing can be difficult, as standard care often does not lead to improved outcomes.

Aim & Objectives Of The Study

Aim :

To evaluate the role of local injections using autologous platelet-concentrated plasma in the treatment of non-healing cutaneous ulcers.

OBJECTIVES

To compare the healing power of autologous platelet-concentrated plasma with traditional dressings in the management of nonhealing cutaneous ulcers.

MATERIALS AND METHODS

This prospective, comparative study was conducted over 18 months at Rajshree Medical College and Research Institute, Bareilly, Uttar Pradesh, to compare the effectiveness of traditional 10% povidone-iodine dressing with local injection of platelet-concentrated plasma (PRP) in wound healing. A total of 100 patients with chronic ulcers (Wagner's grade I-III) were included, with 50 patients in each group. Patients were randomly assigned to receive either PRP injections or povidone-iodine dressing, with outcomes monitored over 30 days. PRP was injected weekly for four cycles, while povidone-iodine dressings were applied daily. Ulcer dimensions were recorded weekly,

and healing was assessed as the percentage reduction in ulcer size, calculated by comparing initial and final measurements. The study's primary endpoint was complete ulcer closure, with time to closure via skin grafting or secondary suturing as the secondary endpoint. Exclusion criteria included anemia, uncontrolled diabetes, and ulcers larger than 5 cm in width or grade IV ulcers. Statistical analysis used Fisher's exact test and the Chi-square test, considering a p-value of <0.05 significant. The study was approved by the hospital ethics committee, and all participants provided written consent.

RESULTS

Table 1: Distribution Of Wagner Grade Of Ulcer Between Groups

WAGNER'S ULCER GRADING	Study group	%	Control group	%	Total	Chi square test
I	12	24	7	14	19	$(\chi^2 = 2.83)$ P = .242
II	23	46	31	62	54	
III	15	30	12	24	27	
Total	50	100.0	50	100.0	100	

Table 1 presents the distribution of Wagner grades of ulcers between the Platelet Rich Plasma (PRP) group and the control group. The statistical analysis provided includes a Chi-square test statistic of 2.83 and a corresponding p-value of 0.242 indicates that the difference in the distribution of Wagner grades between the PRP and control groups is not statistically significant at the 0.05 level.

Table 2: Distribution Of Granulation Tissue Between Groups

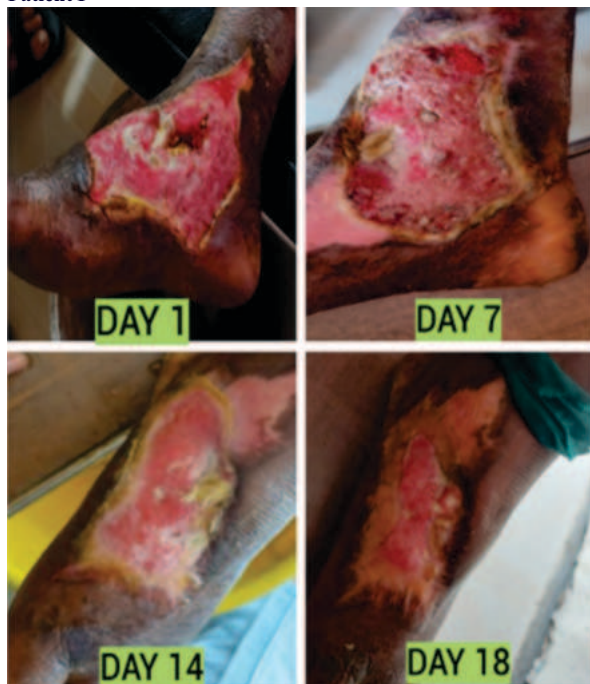
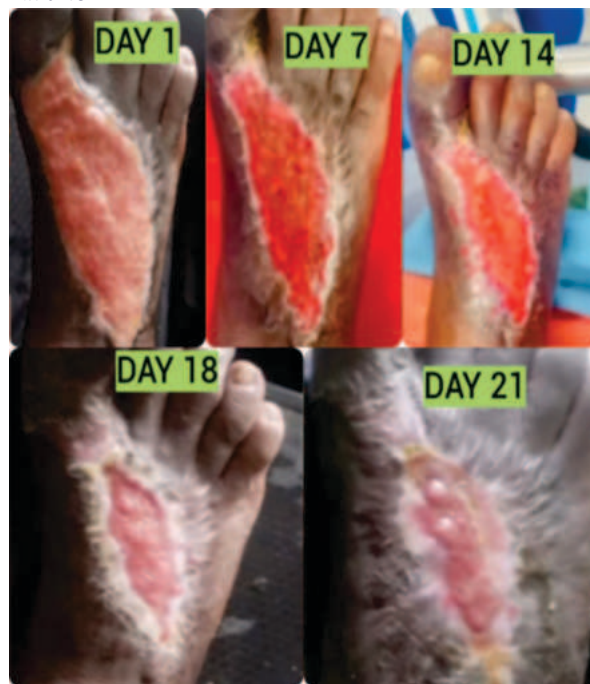
GRANULATION TISSUE	Study group	%	Control group	%	Total	Chi square test
Satisfactory	34	68	19	38	53	$(\chi^2 = 9.03)$ P=0.0026*
Unsatisfactory	16	32	31	62	47	
Total	50	100.0	50	100.0	100	

Table 2 illustrates the distribution of granulation tissue between the Platelet Rich Plasma (PRP) group and the control group. Statistical analysis using a Chi-square test yielded a test statistic of 9.03 and a corresponding p-value of 0.0026. The asterisk (*) next to the p-value indicates statistical significance at the 0.05 level.

Table 3 : Healing Progress Comparison Between Groups

Healing Progress in %	Study Group	%	Control Group	%	Total	Chi square test
10-20	0	0	5	10	5	$\chi^2 = 44.032$ P=0.0001*
20-30	8	16	24	48	32	
30-40	9	18	19	38	28	
40-50	15	30	1	2	16	
50+	18	36	1	2	19	
Total	50	100.0	50	100	100	

Table 3 presents the comparison of healing progress in percentage between the Platelet Rich Plasma (PRP) group and the control group. A Chi-square test was performed to analyze the association between healing progress and treatment group, yielding a test statistic of 44.032 and a p-value of 0.0001, denoted by an asterisk (*), indicating statistical significance at the 0.05 level.

Prp Treated :**Patient 1****Patient 2****Patient 3****DISCUSSION**

Platelet concentrated plasma therapy has garnered considerable attention in recent years as a favorable treatment modality for various medical conditions, including chronic cutaneous ulcers. In the context of the findings presented in the tables (1-3), the application of PRP therapy emerges as a potential contributor to favorable treatment outcomes. The observed higher rates of healing progress, satisfactory granulation tissue formation, and effective management of moderate-severity ulcers among patients receiving PRP therapy underscore its potential clinical efficacy. These results align with the known biological properties of PRP, which contains high concentrations of growth factors and cytokines recognized to encourage the regeneration of tissue and wound healing (Everts et al., 2020).

A group of 100 patients with chronic cutaneous ulcers graded Wagner's I-III were randomly allocated into two groups: the PRP (study) group and the conventional dressing group, each consisting of 50 patients. The Wagner grading system is used to classify the severity of diabetic foot ulcers, with Grade I indicating superficial ulcers and Grade III indicating deep ulcers with extensive tissue involvement (Shah et al., 2022).

Studies have shown that PRP can accelerate wound healing by stimulating cell proliferation, angiogenesis, and tissue regeneration. In a case series involving 24 patients with chronic ulcers, PRP treatment led to wound closure within 8.2 weeks on average, along with reduced pain and improved quality of life (Suthar et al., 2017).

In the PRP group, 24% of participants had Grade I ulcers, 46% had Grade II ulcers, and 30% had Grade III ulcers. In comparison, the control group had 14% Grade I ulcers, 62% Grade II ulcers, and 24% Grade III ulcers. However, the results suggest that there is no significant difference in the severity of ulcers between the PRP group and the control group, as indicated by the Wagner grades (Table 1).

Granulation tissue is crucial in wound healing, representing the early stages of tissue repair and regeneration (Suthar et al., 2017). In the PRP group, 68% of participants had satisfactory granulation tissue, while 32% had unsatisfactory tissue. In contrast, the control group showed 38% satisfactory and 62% unsatisfactory tissue. The results (Table 2) imply that the PRP treatment may have a positive effect on the development of satisfactory granulation tissue compared to the control group. This finding highlights the potential benefits of PRP therapy in promoting wound healing and tissue regeneration. Therefore, the utilization of PRP therapy could be considered as an effective intervention in enhancing the quality of granulation tissue formation in patients with similar wound conditions.

Healing progress is a crucial indicator of the effectiveness of treatment

in wound management. In the PRP group, the distribution of healing progress is as follows: 0% in the 10-20% range, 16% in the 20-30% range, 18% in the 30-40% range, 30% in the 40-50% range, and 36% in the 50% or more range. On the other hand, the control group shows 10% in the 10-20% range, 48% in the 20-30% range, 38% in the 30-40% range, 2% in the 40-50% range, and 2% in the 50% or more range (Table 3). The results suggest a significant difference in healing progress between the PRP and control groups. Specifically, a higher proportion of patients in the PRP group exhibit advanced healing progress compared to the control group. This finding supports the effectiveness of PRP therapy in promoting wound healing and accelerating the recovery process.

Unlike the PRP treatment group, where ulcer severity appeared to influence treatment response, patients in the control group exhibited more diverse healing outcomes across different ulcer grades. These results underscored the importance of ulcer grading in predicting treatment response and guiding clinical decision-making in wound management. Tailoring treatment strategies based on ulcer severity can optimize therapeutic outcomes and enhance patient care in the management of chronic ulcers.

These results highlight the complexity of factors contributing to treatment response in patients with chronic ulcers receiving PRP therapy. Further research may be warranted to explore additional variables that could impact healing progress and optimize therapeutic outcomes in this patient population.

CONCLUSION

PRP treatment may significantly enhance wound healing compared to conventional methods, as it contributes to faster reductions in ulcer size and promotes granulation tissue formation. Patients receiving PRP show higher healing rates, particularly in larger and more severe ulcers, and this therapy may reduce the need for surgical interventions while improving overall patient outcomes and resource utilization. Future research should explore the optimal PRP concentrations, application frequency, and specific patient conditions for its use, as well as patient feedback on quality of life, to better understand its mechanisms and integrate it effectively into wound management protocols.

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