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COMPARATIVE STUDY BETWEEN CONVENTIONAL, PLATELET-RICH PLASMA (PRP), AND AMNION DRESSING IN THE MANAGEMENT OF CHRONIC ULCERS

General Surgery

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ABSTRACT

Background and Aims: Chronic ulcers pose a significant clinical burden due to their prolonged healing time, risk of infection, and impact on quality of life. This study aimed to compare the effectiveness of platelet-rich plasma (PRP) and amnion dressings with conventional saline dressings in chronic ulcer management, focusing on healing rate, ulcer size reduction, pain relief, and dressing frequency.**Methods:** A prospective, randomized comparative study was conducted at Varun Arjun Medical College, Uttar Pradesh, between April 2023 and March 2025. Sixty patients with chronic ulcers were equally divided into three groups: Group A (conventional dressing), Group B (PRP), and Group C (amnion dressing). Ethical clearance was obtained and informed consent was taken. Treatment protocols were standardized. Data were analyzed using SPSS v19, with significance at $p<0.05$.**Results:** Post-treatment ulcer size was significantly lower in Group B (0.85 ± 1.08 cm^2) and Group C (0.80 ± 0.95 cm^2) compared to Group A (2.10 ± 1.02 cm^2). Pain scores and dressing frequency were also reduced in PRP and amnion groups. No statistically significant differences were observed in baseline characteristics.**Conclusion:** PRP and amnion dressings demonstrated superior outcomes over conventional therapy, establishing their role as effective alternatives in chronic ulcer care.

KEYWORDS

Chronic Ulcer; Platelet-rich Plasma; Amnion Membrane; Wound Healing; Biological Dressings

INTRODUCTION

Chronic ulcers, defined as wounds that fail to proceed through an orderly and timely process of healing, remain a persistent challenge in clinical practice. Characterised by prolonged inflammation and disrupted epithelial continuity, they frequently arise in patients with comorbidities such as diabetes mellitus, chronic venous insufficiency, and peripheral arterial disease.[1,2] The management of these non-healing ulcers is complex, often leading to extended treatment durations, increased healthcare expenditure, and a significant decline in patient quality of life due to pain, immobility, and heightened risk of secondary infections, including osteomyelitis and sepsis. Conventional wound care, typically comprising of routine debridement, antiseptic dressings, and systemic antibiotics, remains the standard initial approach. However, its efficacy is frequently limited in chronic ulcers with compromised healing potential.[3] As research progresses, newer biologically active therapies such as platelet-rich plasma (PRP) and amnion-based dressings have emerged as promising alternatives. PRP, an autologous concentrate of platelets, delivers a high dose of growth factors directly to the wound site, enhancing tissue regeneration. On the other hand, amniotic membrane dressings offer a natural scaffold enriched with anti-inflammatory, antimicrobial, and pro-healing cytokines that support re-epithelialisation and matrix remodelling.[4,5]

While PRP and amnion dressings have shown individual promise, direct comparisons with conventional therapy remain scarce. This study aims to fill that gap by evaluating the efficacy, safety, and outcomes of all three approaches in chronic ulcer management. By assessing healing rates, ulcer size reduction, infection control, and patient satisfaction, the study seeks to identify the most effective modality and guide evidence-based clinical decisions.

MATERIAL AND METHODS

This prospective, randomized comparative study was conducted at Varun Arjun Medical College and Rohilkhand Hospital, Shahjahanpur, Uttar Pradesh, from April 2023 to March 2025. The study aimed to evaluate and compare the effectiveness of conventional dressing, platelet-rich plasma (PRP) therapy, and amnion dressing in managing chronic ulcers. Sixty patients aged 18–60 years with ulcers persisting for over four weeks were enrolled and randomly divided into three equal groups of 20 each. Inclusion criteria required ulcers ≤8 cm^2 with at least 50% granulation tissue, hemoglobin ≥10 g/dL, and well-controlled diabetes (HbA1c <7%). Patients with osteomyelitis, malignancy, chronic ischemia, uncontrolled infections, or low platelet counts were excluded.

Group A received alternate-day dressings using sterile saline and povidone-iodine. Group B received autologous PRP prepared through double centrifugation (2000 RPM followed by 3000 RPM) and applied twice weekly for up to ten sessions. Group C was treated with amniotic membranes harvested from screened donor placentas post-cesarean section, processed under sterile conditions, and applied twice weekly for up to ten applications.

Healing was assessed based on ulcer size reduction, granulation tissue formation, time to epithelialization, and pain intensity measured using the Visual Analogue Scale (VAS). Baseline demographic and clinical data were recorded, with follow-ups conducted at each dressing and post-treatment visit. Data were entered in Microsoft Excel and analyzed using SPSS (version 19+), applying suitable statistical tests with a significance level of $p < 0.05$.

Ethical clearance was obtained from the institutional committee, and written informed consent was taken from all participants. The study was self-funded, with no conflicts of interest declared. Uniform treatment protocols and standardized assessment tools ensured reliability and validity across all groups.

RESULTS

A total of 60 patients were enrolled, with the majority (65.0%) aged 50–60 years, indicating a higher prevalence of chronic ulcers in older adults. Other age groups included 30–39 years (16.7%), 40–49 years (10.0%), and 20–29 years (8.3%). Males comprised 53.3% of the cohort, and females 46.7%, reflecting a balanced gender distribution. Each treatment group—Conventional (Group A), PRP (Group B), and Amnion (Group C)—included 20 patients. Comorbidity analysis showed 23.3% had diabetes, 13.3% had both diabetes and hypertension, 8.3% had hypertension alone, and 55.0% had no comorbidities. The distribution was statistically comparable across groups ($\chi^2 = 0.793$, df = 6, $p = 0.992$), confirming population homogeneity.

Table 1: Distribution of Ulcer Duration Before Treatment Across Treatment Groups

Duration (Months)	Group A (Control)	Group B (PRP)	Group C (Amnion)	Total	χ^2	df	p-value
1	3	0	0	3	10.6	12	0.562
2	10	9	10	29			
3	2	4	3	9			
4	3	3	3	9			
6	2	4	4	10			
Total	**20**	**20**	**20**	**60**			

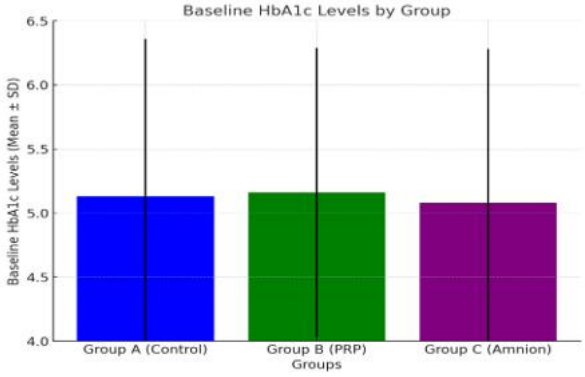

Figure: 1 Baseline HBA1c Levels

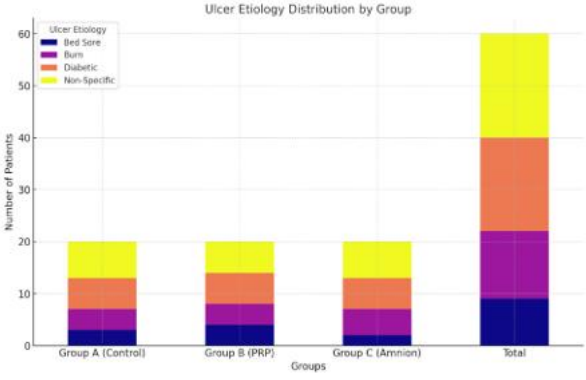

Figure: 2 Ulcer Etiology Distribution

Table 2: Distribution of Ulcer Locations Among Treatment Groups

Ulcer Location	Group A (Control)	Group B (PRP)	Group C (Amnion)	Total	χ^2 value	Df	p-value
Dorsum of foot	3	4	5	12	**11.3**	**22**	**0.971**
Dorsum of hand	1	1	1	3			
Foot	1	0	0	1			
Forearm	1	1	0	2			
Great toe	0	1	0	1			
Hand	1	0	2	3			
Heel	1	0	1	2			
Leg	7	7	6	20			
Lower back	3	4	2	9			
Medial malleolus	1	1	1	3			
Planter aspect of foot	1	1	1	3			
Thigh	0	0	1	1			
Total	**20**	**20**	**20**	**60**			

Table 3: Comparison of Pre and Post-Treatment Ulce0r Characteristics Across Study Groups

Group	Granulation % Pre-Treatment	Pre-Treatment Ulcer Size (cm^2)	Post-Treatment Ulcer Size (cm^2)
Group A (Control)	60 ± 6.07	4.0 ± 0.86	2.10 ± 1.02
Group B (PRP)	60 ± 5.13	4.2 ± 0.83	0.85 ± 1.08
Group C (Amnion)	60 ± 6.07	4.3 ± 0.80	0.80 ± 0.95

Figure 3: Baseline Pain Score (VAS)

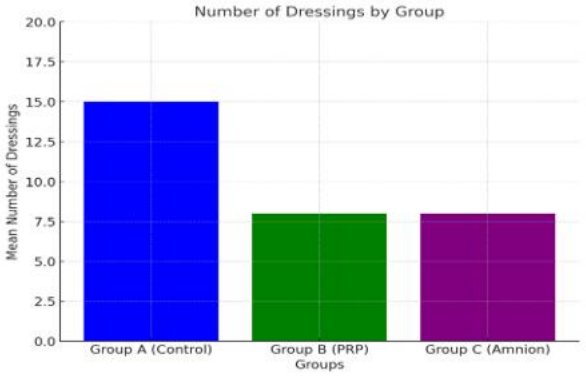

Figure: 4 Number of Dressings

Table 4: Distribution of Treatment Frequency Across Study Groups

Frequency of Dressings	Group A (Control)	Group B (PRP)	Group C (Amnion)	Total
Every Alternate Day	20	0	0	20
Twice Weekly	0	20	20	40
Total	**20**	**20**	**20**	**60**

CASES

CASE I - Conventional Dressing in Diabetic ulcer

A

B

A- Initial ulcer presentation with slough and necrotic tissue
B- Ulcer at end of 1 week, debridement done

C - Ulcer at end of 2 weeks.

D- Ulcer at end of 3 weeks

E- Ulcer at end of 4 weeks

CASE II - Conventional dressing in bedsore


A- Ulcer at presentation. B -Ulcer at end of 1 week


C- Ulcer at end of 2 weeks D- Ulcer at end of 3 weeks

E- Ulcer at end of 4 weeks

CASE III - PRP dressing in Non specific ulcer


A- Ulcer at presentation


B- Injecting PRP into ulcer C- Ulcer at end of 2 weeks

D- Ulcer at end of 4 weeks.

CASE IV - Amnion dressing in non specific ulcer


A. Wound at 1st week with amnion application

B-Application of Amnion C- at end of 2 weeks D- at end of 4 weeks



CASE V - Amnion dressing in non specific ulcer


A - Ulcer at presentation B- Amnion application over the ulcer


C- Ulcer at end of 2 weeks D- Ulcer at end of 4 weeks

DISCUSSION

This prospective randomized study compared the efficacy of conventional dressing, platelet-rich plasma (PRP), and amnion dressing in managing chronic ulcers. The study demonstrated that both PRP and amnion therapies resulted in superior healing outcomes compared to conventional treatment, as reflected in post-treatment ulcer size, pain reduction, and fewer required dressings.

Most participants were aged 50–60 years (65%), aligning with Salenius et al. (2021) and Takahashi et al. (2008), who reported increased ulcer prevalence and delayed healing in older populations due to comorbidities like diabetes and vascular disease.[6,7] The male predominance in this study (53.3%) is consistent with Gade et al.

(2020) and Knighton et al. (1986), which noted higher chronic ulcer incidence in men, particularly due to lifestyle factors like smoking.[8,9] However, Singh et al. (2021) observed more ulcers in women with spinal injuries, which contrasts with our balanced general population.[10]

Randomized allocation (20 per group) enabled valid comparisons, similar to Deng et al. (2023), who used equal group sizes to assess PRP efficacy.[11] Comorbidity analysis showed diabetes as the most common condition, followed by hypertension, though χ^2 analysis indicated no significant intergroup differences, consistent with Singh et al. (2021) and Pourmoussa et al. (2016), who found comorbidities not to significantly influence healing.[10,12]

Ulcer duration and etiology were similar across groups. Diabetic ulcers were most common, followed by burns and traumatic ulcers. The χ^2 test ($p > 0.05$) showed no significant difference across groups, similar to findings by Gade et al. (2020)[8] and Ren et al. (2020)[13]. Likewise, ulcer location did not significantly affect outcomes, aligning with Takahashi et al. (2008)[7]and Pourmoussa et al. (2016)[12].

Baseline ulcer size and granulation percentage were similar across groups, indicating well-matched study arms. The most notable findings were in post-treatment ulcer size reduction: PRP (0.85 ± 1.08 cm²) and Amnion (0.80 ± 0.95 cm²) outperformed Control (2.10 ± 1.02 cm²). These outcomes echo Gade et al. (2020)[8]and Elsaid et al. (2020)[14], Wang et al. (2022)[15], who reported faster healing with biologic treatments. Moreover, dressing frequency was halved in PRP and Amnion groups, reflecting more efficient healing protocols.

STRENGTHS

The study's prospective, randomized design with equal group allocation ensured methodological rigor and minimized selection bias. Standardized intervention protocols enhanced internal validity, while uniform outcome assessment improved comparability. Conducted in a tertiary care rural setting, the findings reflect real-world applicability. By evaluating not only healing outcomes but also pain reduction and treatment frequency, the study offers a holistic view of therapeutic efficacy in chronic ulcer management.

LIMITATIONS

Despite its strengths, the study is limited by a modest sample size and relatively short follow-up, restricting the evaluation of long-term healing sustainability and ulcer recurrence. The absence of blinding may have introduced observational bias. Additionally, the study did not incorporate advanced diagnostic modalities such as histological or molecular markers to objectively assess tissue regeneration, which could have further substantiated the clinical findings.

CONCLUSION

We concluded that both platelet-rich plasma (PRP) and amnion dressings offer distinct clinical advantages over conventional therapy in the management of chronic ulcers. These biologically active interventions significantly enhanced wound healing, reduced patient-reported pain, and lowered the frequency of dressing changes. Their regenerative potential, ease of application, and favorable outcomes position them as superior, patient-centric alternatives—especially valuable in resource-constrained settings and among individuals with comorbidities or recalcitrant wounds. Their integration into mainstream wound care protocols could mark a transformative step in chronic ulcer management.

Conflict of Interest: *None.*
Funding: *None.*
Ethical Approval: *Obtained.*
Consent: *Written consent secured.*

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