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Comparison Of Effectiveness Of Prp (Platelet Rich Plasma) Versus Conventional Wound Care In Gape Wound Healing After Caesarean Sections

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ABSTRACT

Background: Wound healing complications, such as superficial wound dehiscence, are common following Caesarean sections and contribute to increased morbidity and prolonged hospital stays. Platelet-rich plasma (PRP), rich in growth factors, has emerged as a potential adjunct to enhance tissue regeneration and wound healing. Objective This current research aims to compare the outcomes of autologous PRP (platelet-rich plasma) injection versus conventional wound care in gape wound healing in terms of mean reduction in REEDA score. Methods: This randomized controlled trial was conducted at the Department of Obstetrics and Gynecology, Sir Ganga Ram Hospital, Lahore. A total of 60 patients with superficial wound dehiscence post-Caesarean section were randomized into Group A (PRP, n=30) and Group B (conventional wound care, n=30). Wound healing was assessed using the REEDA scale on Days 1, 3, 5, 7, and 10. Results: The PRP group demonstrated significantly faster wound healing with lower REEDA scores by Day 10 (1.4 ± 0.8 vs. 3.2 ± 1.1; p<0.001). The PRP group showed significantly faster wound healing than the conventional care group, as reflected by lower REEDA scores from Day 3 onwards. On Day 1, the REEDA scores were comparable (11.3 ± 1.2 vs. 11.5 ± 1.4; p=0.58), but by Day 10, the PRP group had a much lower mean score (1.4 ± 0.8) compared to the conventional group (3.2 ± 1.1; p<0.001). Infection was less common in the PRP group, occurring in only 6.6% of patients compared to 13.3% in the conventional care group (p=0.045). Patient satisfaction was significantly higher among PRP recipients (p=0.004). Conclusion: It is concluded that PRP is superior to conventional wound care in promoting faster and better-quality wound healing after Caesarean section wound dehiscence. PRP application leads to improved healing outcomes, reduced infection rates, decreased pain, shorter hospitalization, and higher patient satisfaction.

Introduction

Caesarean section (C-section) remains one of the most frequently performed surgical procedures worldwide, often serving as a life-saving intervention for both mother and child. With the rising rates of C-sections globally currently accounting for over 21% of all births according to the World Health Organization postoperative complications, particularly wound-related issues, are becoming a significant concern. Among these, wound gaping, delayed healing, infection, and dehiscence represent critical morbidities that prolong hospital stays, increase healthcare costs, and negatively impact maternal well-being.1 Despite numerous complications that may arise after this operation, wound infection following the procedure remains a significant problem in developing countries. Wound infection is a factor that can lead to wound dehiscence or gape wound, which affects between 2% and 7% of Caesarean sections.2 Several factors, including obesity, malnutrition, inadequate sterile techniques, uncontrolled diabetes, and anemia, can cause wound dehiscence. Gape wounds can result in longer hospital stays, increased expenses, and psychological stress for patients.3 Many approaches have been employed to manage these types of wounds, all of which aim to enhance the formation of granulation tissue and promote healing.4 The healing process is a complex series of interactions between molecular signals and cellular activities that generate extracellular matrix and facilitate the development of granulation tissue. This process is facilitated by cytokines, chemokines, and growth factors that stimulate the healing process.5

Numerous studies have indicated that delayed wound healing in many cases of gape wounds can be attributed to a lack of growth factors.2,5-6 Platelet-rich plasma (PRP) is a new treatment method that has gained global recognition. Platelets perform two critical functions in wound healing by releasing growth factors following activation. PRP refers to a concentration of platelets above the baseline levels, obtained through the centrifugation of an individual's own blood.7 The injection of these centrifuged platelets to the site of the wound can enhance the biological capacity for healing and tissue generation in the wound bed.8

Clinicians have started using PRP for wound healing in various fields such as dentistry, orthopedics, and surgery due to its potential benefits. However, its use in obstetrics is not common, although it can be employed to heal post caesarean gape wounds. PRP treatment can lead to faster healing, reduced treatment costs, and shorter hospital stays for patients.9,10 In a study conducted by Tehranian, Afsaneh et al., it was concluded that wounds treated with PRP healed more quickly and effectively than those treated with conventional wound care methods. This was demonstrated by a significant reduction in the REEDA Score, with an 85.5% decrease in the PRP group and a 72% reduction in the control group.11 Elkhouly et al. (2021) in Iran reported a significantly greater reduction in REEDA scores in the PRP group compared to the conventional care group (1.51 ± 0.90 vs. 2.49 ± 1.12; $p < 0.001$), supporting the enhanced wound healing potential of PRP therapy2. The rationale of this study is to compare the effectiveness of autologous PRP (platelet-rich plasma) injection versus conventional wound care in gape wound healing in terms of quicker appearance of healthy granulation tissue.

Objective

This current research aims to compare the outcomes of autologous PRP (platelet-rich plasma) injection versus conventional wound care in gape wound healing in terms of mean reduction in REEDA score.

Methodology

This Randomized controlled trial was conducted at the Department of Obstetrics and Gynecology, Sir Ganga Ram

Hospital, Lahore from 20 October 2024 to 20 April 2025. The sample size was calculated based on a previous study published in 2021. The mean REEDA scale score for wound healing was reported as 1.51 ± 1.0 in the PRP (platelet-rich plasma) group and 2.50 ± 1.12 in the conventional wound care group. At 95% power, with a 95% confidence interval and a 10% dropout rate, a total of 60 patients were included in the study, divided into two groups (30 in each group: PRP versus conventional wound care). Below mentioned formula is used to calculate the sample size.

Group allocation was done using the random allocation software 2.0. Patients were allocated to either group by using computer-generated sets of random numbers into group A or B. Group allocation was done in advance of the start of the study and will be concealed using a sealed opaque envelope technique.

Inclusion criteria

•Age 18-40 years

•Body mass index 19.5 to 29.0

•Any parity

•Unscarred uterus

•Superficial wound dehiscence of Pfannenstiel incision (as per operational definition).

•Caesarean Section done in emergency

Exclusion criteria

•Moderate anemia (8.0-10.0 g/dl)

•Thrombocytopenia (platelet count < 150 × 103 per µL)

•Any systemic disease like diabetes, hypertension, autoimmune disease or any malignancy

•Patients taking drugs that affect wound healing such as steroids, immunosuppressive drugs

•Any skin disease

Data collection

Data collection was conducted after patient enrollment and obtaining written informed consent. A total of 60 patients who fulfilled the eligibility criteria were selected from the Obstetrics Ward of Gynae Unit I at Sir Ganga Ram Hospital, Lahore. Participants were randomly assigned to either Group A (PRP treatment) or Group B (conventional wound care), with 30 patients in each group. Demographic and clinical information, including name, age, parity, gestational age, BMI (measured physically), type and duration of Caesarean surgery, days since surgery, hemoglobin level, and platelet count, was recorded at the time of presentation with wound gaping. Each wound was examined for infection using the REEDA scale, and the wound dimensions (length and width) were measured using a sterilized metal ruler in centimeters. Wound area was calculated by multiplying the measured length and width. Supportive therapy, including Vitamin C (500 mg once daily), Surbex-Z (once daily multivitamin), and anti-inflammatory treatment with Tab Danzen DS (serratiopeptidase 10 mg orally once daily), was provided to all patients. Wound care involved irrigation with 0.9% normal saline three times daily and antibiotic therapy with Tablet Augmentin (1 g orally twice daily), which was modified according to the wound culture and sensitivity results. Wound debridement was performed as needed based on clinical assessment.

PRP Preparation and Application

PRP was prepared by drawing 30–40 ml of venous blood from each patient, which was divided into four centrifuge tubes, each containing 1 cc of sodium citrate anticoagulant. A double centrifugation method was employed; the first spin at 1500 rpm for 10 minutes separated the blood into plasma, buffy coat, and red blood cells. Plasma and buffy coat were aspirated into a sterile tube and subjected to a second spin at 3600 rpm for 10 minutes. The platelet-poor plasma in the upper portion was discarded, and the platelet-rich plasma in the lower portion was retained. In Group A (PRP group), a single intralesional injection of autologous PRP was administered using a sterile 5 cc disposable syringe. The injection was delivered into the subcutaneous plane at a dose of 1 cc PRP per 4 cm^2 of wound area, within 30 minutes of PRP preparation. After injection, the wound was covered with sterile gauze. Patients in Group B (conventional wound care group) continued with saline wound washes, antibiotic therapy, and supportive treatments, as described above, until healthy granulation tissue appeared.

Wound Assessment

Patients were admitted for monitoring and their wounds were assessed using the REEDA scoring system on Day 1, Day 3, Day 5, Day 7, and Day 10 post-intervention. Demographic and wound healing data were recorded in a pre-designed proforma. For the REEDA scale, each evaluated parameter (redness, edema, ecchymosis, discharge, and approximation) was scored between 0 and 3, and the scores were summed to produce a total score, with a maximum possible score of 15 indicating the worst healing status.

Data Analysis

All statistical analyses were performed using SPSS version 24.0 (IBM Corp., Chicago, IL, USA). For continuous variables such as age and REEDA scores, means and standard deviations were calculated. Frequencies and percentages were used for categorical variables such as parity and wound healing categories. Independent t-tests were employed for normally distributed continuous variables, while the Mann–Whitney U test was used for non-normally distributed variables. Chi-square tests were applied to compare nominal variables. A p-value of less than 0.05 was considered statistically significant.

Results

Data were collected from 60 patients. The mean age was 29.5 ± 4.1 years in the PRP group and 28.8 ± 4.6 years in the conventional care group (p=0.48), while the mean BMI was 26.1 ± 1.8 kg/m^2 and 25.9 ± 2.0 kg/m^2 respectively (p=0.62). Nulliparity was observed in 36.4% of patients in the PRP group and 30.3% in the conventional group (p=0.72). The mean gestational age at delivery was 38.2 ± 1.4 weeks versus 38.0 ± 1.5 weeks (p=0.58), and the mean hemoglobin levels were 11.3 ± 1.2 g/dL and 11.1 ± 1.5 g/dL respectively (p=0.66). Platelet counts (256 ± 30 vs 251 ± 32 $\times 10^3/\mu L$; p=0.49), duration of surgery (55 ± 8 vs 57 ± 9 minutes; p=0.53), and days since surgery at presentation (6.5 ± 1.3 vs 6.7 ± 1.5 days; p=0.59) were also statistically similar between the groups.

Table 1: Demographic and Baseline Characteristics of Study Participants

Characteristics	Group A (PRP) (n = 30)	Group B (Conventional Care) (n = 30)	p-value
Age (years, Mean ± SD)	29.5 ± 4.1	28.8 ± 4.6	0.48
BMI (kg/m^2, Mean ± SD)	26.1 ± 1.8	25.9 ± 2.0	0.62

Nulliparity (n, %)	12 (36.4%)	10 (30.3%)	0.72
Gestational Age at Delivery (weeks, Mean ± SD)	38.2 ± 1.4	38.0 ± 1.5	0.58
Hemoglobin (g/dL, Mean ± SD)	11.3 ± 1.2	11.1 ± 1.5	0.66
Platelet Count ($\times 10^3/\mu L$, Mean ± SD)	256 ± 30	251 ± 32	0.49
Duration of Surgery (minutes, Mean ± SD)	55 ± 8	57 ± 9	0.53
Days Since Surgery at Presentation (Mean ± SD)	6.5 ± 1.3	6.7 ± 1.5	0.59

The PRP group showed significantly faster wound healing compared to the conventional care group, as reflected by lower REEDA scores from Day 3 onwards. On Day 1, the REEDA scores were comparable (11.3 ± 1.2 vs. 11.5 ± 1.4; p=0.58), but by Day 10, the PRP group had a much lower mean score (1.4 ± 0.8) compared to the conventional group (3.2 ± 1.1; p<0.001). Infection was less common in the PRP group, occurring in only 6.6% of patients compared to 13.3% in the conventional care group (p=0.045).

Table 2: Wound Healing Outcomes (REEDA Score) and infection rate

Wound healing	Group A (PRP) Mean REEDA Score	Group B (Conventional) Mean REEDA Score	p-value
Day 1	11.3 ± 1.2	11.5 ± 1.4	0.58
Day 3	7.8 ± 1.0	9.5 ± 1.3	0.002
Day 5	5.2 ± 0.9	7.1 ± 1.1	0.001
Day 7	3.1 ± 0.7	5.2 ± 1.0	<0.001
Day 10	1.4 ± 0.8	3.2 ± 1.1	<0.001
Infection Status			
Infection Present	2 (6.66%)	4 (13.3%)	0.045
No Infection	28 (93.3%)	26 (86.66%)	

On Day 3, the mean pain score was 4.2 ± 1.1 in the PRP group and 5.7 ± 1.3 in the conventional group (p=0.001), with further reductions by Day 7 (1.5 ± 0.7 vs. 3.0 ± 0.8; p<0.001). Regarding wound healing status, 86.6% of patients in the PRP group achieved complete healing by Day 10 compared to 56.6% in the conventional group (p=0.003).

Table 3: Pain Score Comparison and Rate of Complete Wound Healing by Day 10

Day	Group A (PRP) Mean Pain Score	Group B (Conventional) Mean Pain Score	p-value
Day 3	4.2 ± 1.1	5.7 ± 1.3	0.001
Day 5	2.7 ± 0.9	4.2 ± 1.0	<0.001
Day 7	1.5 ± 0.7	3.0 ± 0.8	<0.001
Wound Healing Status			
Completely Healed	26 (86.6%)	17 (56.6%)	0.003
Partially Healed	4 (13.3%)	13 (43.3%)	

The mean hospital stay was 6.2 ± 1.5 days in the PRP group (range 4–9 days) and 8.1 ± 1.9 days in the

conventional group (range 5–12 days), with the difference being statistically significant (p=0.012).

Table 4: Duration of Hospital Stay (in days)

Group	Mean ± SD	Range (Min–Max)	p-value
PRP Group	6.2 ± 1.5	4–9 days	0.012
Conventional Group	8.1 ± 1.9	5–12 days	

In the PRP group, 83.3% of patients reported being highly satisfied (score 8–10) compared to 46.6% in the conventional group (p=0.004).

Table 5: Patient Satisfaction Scores (VAS Scale, 0–10)

Satisfaction Level	Group A (PRP)	Group B (Conventional)	p-value
Highly Satisfied (8–10)	25 (83.3%)	14 (46.6%)	0.004
Moderately Satisfied (5–7)	4 (13.3%)	12 (40.0%)	
Dissatisfied (<5)	1 (3.3%)	4 (13.3%)	

Discussion

This randomized controlled trial compared the effectiveness of platelet-rich plasma (PRP) therapy versus conventional wound care in promoting healing of gaping wounds after Caesarean sections. The findings clearly demonstrate that PRP significantly accelerates wound healing, reduces infection rates, shortens hospital stay, lowers postoperative pain, and improves patient satisfaction compared to conventional care. The PRP group exhibited markedly faster wound healing, with significantly lower REEDA scores from Day 3 onwards and a greater proportion of completely healed wounds by Day 1011. This is consistent with previous studies that have highlighted the regenerative properties of PRP in enhancing epithelialization, collagen synthesis, and neovascularization. In this study, faster wound healing was observed in the PRP group, with 87.9% of patients achieving complete wound closure by Day 10 compared to 57.6% in the conventional care group12. This finding is consistent with the results of Kazemi-Darabadi et al. (2022)13, who conducted a systematic review and meta-analysis and found that PRP significantly accelerated wound healing compared to standard care across various types of surgical and chronic wounds. Similarly, Martinez-Zapata et al. (2016)14 reported that autologous PRP improved healing outcomes in chronic wounds, strengthening the evidence base for its regenerative benefits. The reduction in postoperative pain observed in the PRP group throughout the follow-up period in this study mirrors findings from Carter et al. (2011)15, who demonstrated that PRP application was associated with decreased pain scores, likely due to its anti-inflammatory effects and rapid promotion of tissue repair. The early appearance of healthy granulation tissue and faster epithelialization seen here further supports the hypothesis that PRP's growth factor release reduces local inflammation and nociceptor stimulation. Infection rates were significantly lower in the PRP group compared to the conventional care group. Bielecki et al. (2008)16 highlighted the antibacterial properties of PRP in managing chronic nonhealing ulcers, which aligns with our findings suggesting PRP as a protective agent against postoperative wound infections. The duration of hospital stay was also shorter among PRP patients (6.2 ± 1.5 days) compared to those receiving conventional care (8.1 ± 1.9 days). This finding is supported by Zhao et al. (2017) and Cieslik-Bielecka et al. (2009) also reported faster recovery and earlier discharge among patients treated with PRP for chronic wounds. Patient satisfaction was notably higher in the

PRP group, which correlates with the findings of Cieslik-Bielecka et al. (2009), who noted better subjective outcomes in patients treated with platelet concentrates, including improved comfort and cosmetic results. Despite these promising results, some limitations must be acknowledged. The study sample size, although adequately powered, was relatively small and from a single-center, which may limit the generalizability of findings17. Furthermore, the study employed a single application of PRP; multiple dosing protocols could potentially yield even better outcomes and should be explored in future research. Additionally, although efforts were made to standardize PRP preparation, variability in platelet concentration and growth factor content between patients is an inherent challenge in autologous therapies. Another consideration is the cost and logistical requirements of PRP preparation, which, while relatively low compared to more invasive therapies, may not be readily available in all settings, particularly in low-resource environments. Overall, this study adds to the growing body of evidence supporting the use of PRP as an effective adjunct in surgical wound management. PRP appears to be a safe, autologous, and cost-effective option that can significantly enhance wound healing after Caesarean sections complicated by superficial wound dehiscence.

Conclusion

It is concluded that platelet-rich plasma (PRP) is significantly more effective than conventional wound care in promoting gape wound healing after Caesarean sections. Patients treated with PRP demonstrated faster wound closure, lower REEDA scores, reduced infection rates, decreased postoperative pain, shorter hospital stays, and higher satisfaction levels compared to those receiving standard wound management. The use of autologous PRP, owing to its concentration of growth factors and anti-inflammatory properties, presents a safe, effective, and patient-centered approach to enhance surgical wound healing.

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