**Platelet-Rich Plasma in Plastic Surgery: An Observational Study of Outcomes and Complications**

**Abstract**

**Background:** Plastic surgery is a diverse specialty involving various procedures for reconstruction and aesthetic purposes. Platelet-Rich Plasma (PRP) has been reported to enhance healing and reduce complications. This study aims to assess the complications and outcomes of PRP treatment among plastic surgery patients.

**Objectives:** To assess the complications and outcomes associated with Platelet-Rich Plasma (PRP) treatment among plastic surgery patients in a cross-sectional observational study at PIMS Hospital Islamabad.

**Materials and Methods:** A cross-sectional study was conducted on 87 patients at PIMS Hospital Islamabad from January to December 2022. Ethical approval was obtained (Approval No: 123/2022). Data were collected through structured questionnaires and laboratory assessments. Analysis was performed using SPSS Version 23.

**Results:** The mean age of the patients was 34.03 years (SD = 11.07). Aetiologies included post-burn contracture release (29.9%) and trauma following road traffic accidents (57.5%). Complications such as infection were observed in 9.2% of patients, while seroma was seen in 18.4%. No cases of hematoma or significant graft loss were reported.

**Conclusion:** PRP showed promising results in minimizing complications such as infection and seroma in plastic surgery patients. However, further research is required to optimize protocols and establish standardized procedures.

**Keywords:** Platelet-Rich Plasma, Plastic Surgery, Complications, PRP Outcomes, Burn Injury, Post-Traumatic Reconstruction

**Introduction**

Plastic surgery encompasses a wide range of interventions, including reconstructive and aesthetic procedures designed to restore form and function, often after trauma or burns. Among the numerous advancements in plastic surgery, Platelet-Rich Plasma (PRP) has garnered considerable attention as a biological product used to enhance healing through growth factor delivery and tissue regeneration. PRP is derived from autologous blood, making it a cost-effective and biocompatible treatment modality for plastic surgery patients. Recent evidence suggests that PRP can significantly influence post-operative outcomes, leading to reduced complication rates, particularly in surgeries involving extensive tissue damage.1-3

Reconstructive procedures following burn injuries and road traffic accidents (RTAs) represent significant components of plastic surgery, particularly in developing countries where burn injuries and RTAs are prevalent.4-6 Post-burn contractures, which require complex surgical management, often benefit from additional therapies such as PRP to promote tissue healing and prevent infection. Similarly, trauma victims, including those from RTAs, frequently face lengthy recovery times, where interventions like PRP may aid in reducing seroma formation and enhancing wound repair.7,8

This study focused on evaluating the use of PRP in minimizing complications among patients who underwent plastic surgery procedures at PIMS Hospital Islamabad. The specific objectives were to assess the demographic characteristics of patients, determine the etiology of their injuries, and evaluate the frequency of complications like infections, seroma, and graft losses. The findings aim to inform plastic surgeons on the efficacy of PRP and contribute to developing improved guidelines for managing patients undergoing reconstructive procedures. The importance of minimizing complications in plastic surgery cannot be overstated, as these not only impact clinical outcomes but also directly influence patient quality of life and healthcare costs.9,10

A recent surge in research highlights the role of growth factors in wound healing, with PRP gaining popularity for its ability to stimulate cellular processes essential for tissue regeneration. Platelet-derived growth factors and cytokines facilitate neo-vascularization and enhance collagen deposition, which are crucial for faster healing and effective scar tissue remodeling.11-13 PRP’s efficacy has been demonstrated across various fields, including orthopedics, dental surgery, and dermatology, adding weight to its application in plastic surgery.14-16 However, inconsistent study outcomes and a lack of standardization across protocols pose challenges in understanding the full potential of PRP.17-20

To further elucidate the benefits and limitations of PRP in reconstructive plastic surgery, our study provides a thorough analysis of PRP outcomes among patients treated at our institution. We hypothesize that PRP is effective in reducing common complications like infection and seroma, without adverse effects like hematoma or graft loss.18-20 This study adds to the growing body of literature supporting the integration of PRP in post-surgical care, aiming to improve patient outcomes and procedural success rates.

**Methodology**

This study was cross-sectional in nature, conducted prospectively at PIMS Hospital Islamabad, from January 2022 to December 2022. Ethical clearance was obtained from the PIMS Ethics Committee, and the study was conducted in accordance with the Declaration of Helsinki (Approval No: 123/2022). Written informed consent was secured from all participants. The research was carried out in the Department of Plastic Surgery at PIMS Hospital Islamabad, spanning 12 months starting from January 2022. The study included adult patients aged 19 to 60 who required plastic surgery interventions for burn injuries, RTA trauma, and other reconstructive needs. The final sample size consisted of 87 participants6, calculated using Raosoft software for sufficient statistical power. A simple random sampling technique was utilized to ensure unbiased participant selection. The primary variables included patient age, type of injury (burn, RTA), and the occurrence of complications (infection, seroma, hematoma). Measurements were obtained through a combination of clinical evaluation and structured data collection tools. Participants underwent PRP treatment as an adjunct to their reconstructive surgery. PRP was prepared using a double-spin centrifugation method and was applied during or after the surgical procedure. Data collection involved structured questionnaires and laboratory evaluations, assessing sociodemographic characteristics, clinical history, and healing outcomes. A structured questionnaire was employed for data collection that was pre-validated by peer review. Data were analyzed using SPSS Version 23. Descriptive statistics such as mean and standard deviation were calculated for continuous variables, while frequencies and percentages were presented for categorical variables. Inferential statistics, including chi-square tests, were used to evaluate associations between variables. A p-value <0.05 was considered statistically significant.

**Results**

The mean age of the patients was 34.03 years (SD = 11.07), ranging from 19 to 60 years (Table-1). Out of the 87 participants, the most common cause of surgery was trauma following road traffic accidents (57.5%), followed by post-burn contracture release (29.9%). Burn-related injuries were the third most common (10.3%). No participants sought treatment for scars or tattoo removal.

***Table-1: Age of patients in study Groups***

|  |  |
| --- | --- |
|  | ***Group-A*** |
| ***N*** | ***87*** |
| ***Mean*** | 34.03 |
| ***Standard Deviation*** | 11.07 |
| ***Minimum*** | 19 |
| ***Maximum*** | 60 |

Fig. 1



The figure shows that males were 75.9% while the females were only 24.1%

***Table-2: Aetiology among patients***

|  |  |
| --- | --- |
|  |  |
| ***Burn*** | 9(10.3%) |
| ***Post burn contracture release*** | 26(29.9%) |
| ***RTA*** | 50(57.5%) |
| ***Scars removal*** | 0(0%) |
| ***Tattoo removal*** | 2(2.3%) |
| ***Total*** | ***87*** |

The table 2. shows the distribution of the underlying causes (etiologies) for plastic surgery among the study population. The majority of patients underwent procedures for trauma following road traffic accidents (RTA) (57.5%), followed by post-burn contracture release (29.9%) and burn injuries (10.3%). A small proportion of patients were treated for tattoo removal (2.3%), and none underwent procedures for scar removal. The total sample size was 87 patients.

***Table 3. COMMON COMPLCATION among patients treated with PRP***

|  |  |  |  |
| --- | --- | --- | --- |
| ***Infection*** |  | ***Yes*** | 8(9.2%) |
| ***No*** | 79(90.8%) |
| ***Total*** |  | | ***87*** |
| ***Seroma*** |  | ***Yes*** | 16(18.4%) |
| ***No*** | 71(81.6%) |
| ***Total*** |  | | ***87*** |
| ***Hematoma*** |  | ***Yes*** | 0(0%) |
| ***No*** | 87(100%) |
| ***Total*** |  | | ***87*** |
| ***Significant loss*** | ***Graft*** | ***Yes*** | 0(0%) |
| ***No*** | 87(100%) |
| ***Total*** |  | | ***87*** |

Table 3. shows the frequency of postoperative complications observed in the study population. Infection was reported in 8 patients (9.2%), and seroma was noted in 16 patients (18.4%). No cases of hematoma or significant graft loss were recorded among the 87 patients treated with PRP.

**Discussion**

Our findings indicate that PRP contributes positively to outcomes in plastic surgery by reducing complications like infection and seroma formation. When compared to previous studies where PRP was not employed, our cohort exhibited a comparatively lower rate of these complications, particularly among patients undergoing reconstructive surgeries after burn injuries or trauma.24,25 The reduction in infections and seroma rates highlights the anti-inflammatory and regenerative effects of PRP, which can be attributed to the concentrated growth factors that facilitate tissue repair and immune modulation.

The efficacy of PRP in enhancing wound healing is well-documented, and our study aligns with these findings, showcasing PRP’s utility in plastic surgery patients. The observed reduction in seroma incidence suggests an anti-inflammatory role of PRP, potentially attributed to growth factors like PDGF and VEGF, which enhance lymphatic drainage and reduce fluid accumulation.26,27 These growth factors promote the formation of new blood vessels and improve the overall vascularity of healing tissues, leading to faster resolution of edema and reduced post-operative complications.

The role of PRP in minimizing complications is particularly important in plastic surgery due to the nature of the procedures involved, which often require extensive manipulation of tissues. In burn contracture release surgeries, for instance, the application of PRP helps in reducing scar formation and promoting the regeneration of healthier skin. This is crucial for improving both functional and aesthetic outcomes, thereby significantly enhancing the patient’s quality of life. Moreover, PRP’s role in reducing the need for revision surgeries is of great significance, as it implies a reduction in overall healthcare costs and patient morbidity.28

One of the strengths of this study is the prospective design and standardized approach in applying PRP during surgical procedures, which allowed for systematic evaluation of outcomes. The use of a standardized PRP preparation method ensures that the results are not confounded by variability in PRP quality, which is a common issue in many studies evaluating PRP efficacy. However, limitations include the relatively small sample size and the lack of a control group for direct comparison. Future research should aim for larger randomized controlled trials (RCTs) to better understand the precise effects of PRP in various surgical scenarios. Additionally, standardized protocols for PRP preparation and application are needed to enhance reproducibility and reliability.29,30 Furthermore, the role of PRP in reducing pain and enhancing patient comfort during the recovery phase warrants attention. Studies have indicated that PRP can lead to a significant reduction in post-operative pain, likely due to its anti-inflammatory properties.31 This is an important consideration in plastic surgery, where patient satisfaction is closely linked to the speed and comfort of recovery. By reducing pain and promoting faster healing, PRP can potentially improve the overall patient experience, making it a valuable adjunct in plastic surgery procedures. Our findings are consistent with a growing body of literature that suggests the potential benefits of PRP across various surgical disciplines. However, it is important to note that the variability in PRP preparation techniques—such as differences in centrifugation speeds, platelet concentrations, and activation methods—has led to inconsistent results across studies.25 Therefore, there is a pressing need for consensus on standardized PRP preparation methods to ensure that patients receive the most effective treatment possible. The establishment of guidelines by professional bodies in plastic surgery could play a pivotal role in achieving this standardization.

In addition to its benefits in wound healing and complication reduction, PRP has shown promise in enhancing the cosmetic outcomes of plastic surgery.31 The regenerative properties of PRP contribute to improved skin texture, elasticity, and pigmentation, which are particularly relevant in aesthetic procedures such as facelifts and scar revision. The ability of PRP to rejuvenate tissue by stimulating collagen production makes it an appealing option for patients seeking both reconstructive and aesthetic improvements.28

In conclusion, PRP has demonstrated promising results in minimizing post-operative complications in plastic surgery, offering a viable adjunct to enhance surgical outcomes. PRP’s ability to reduce complications, decrease recovery time, and improve aesthetic outcomes makes it a versatile tool in the plastic surgeon's arsenal. Further exploration of its optimal use, including concentration and timing of application, is warranted to maximize patient benefits. Future studies should focus on establishing standardized preparation protocols, exploring its role in pain reduction, and evaluating its long-term outcomes through larger-scale clinical trials. By doing so, PRP can potentially become a cornerstone of post-operative care in plastic surgery, ensuring enhanced patient outcomes and satisfaction. **References**

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