https://doi.org/10.29309/TPMJ/2022.29.06.6291

The Professional Medical Journal
www.theprofesional.com
2022, Volume, 29 Issue, 06

ORIGINAL ARTICLE

Plasma rich platelet efficacy in healing of chronic wounds.

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Article Citation: Tayyaba Farhat ul Ain, Zafar S, Reza S, Mazhar S, Yasmine T, Ajmal S. Plasma rich platelet efficacy in healing of chronic wounds. Professional Med J 2022; 29(6):855-858. https://doi.org/10.29309/TPMJ/2022.29.06.6291

ABSTRACT… Objective: To determine the effect of platelets rich plasma in healing of chronic wounds. **Study Design:** Randomized Control Trial. **Settings:** Medical Unit-I, Plastic Surgery Ward at Bahawal Victoria Hospital Bahawalpur in Collaboration with Pathology Department, Quaid-e-Azam Medical College, Bahawalpur. **Period:** January 2020 to July 2020. **Material & Methods:** In this study fifty patients of split thickness of skin graft were enrolled which having remain clinical reasons and Plasma rich platelet were collected by aphaeresis and applied immediately. PRP therapy was applied only on 30 patients while 20 patients were taken as standard control PRP was applied on 30 patients and followed them for 6 weeks. We start observation of PRP therapy from the 1st dressing till the time of wound healing. **Results:** we have observed 100% up taken graft in patients who have received PRP therapy while in control group observed 4 patients showed complete graft loss 7 patients showed partial and 9 shoed complete uptake. **Conclusion:** This study demonstrated promising results to split thickness skin grafts by the application of Plasma rich platelets (PRP).

Key words: Chronic Diabetes, PRP, Wound Healing.

INTRODUCTION

Very few studies have been conducted on the efficacy of Plasma rich platelets in human subject, due to its novelty and recent discovery. It is also found that in some non-control trial PRP was also used as control which results were very effective in host defense mechanism platelet with PRP play a vital role to producing g protein on wound site that attract macrophages.[4] PRP is important in vascularization and regeneration.[5,6] It is also a potential reservoir of many essential growth factors like vascular endothelial growth factors, platelet-derived GF, insulin like growth factor and transforming growth factor-beta-1 which facilitate healing and repair.[7]

From any peripheral vein, the extraction of PRP could be started. Plasmapheresis is performed for the extraction of platelet concentrates from the blood of a patient, whereas PRP concentrated to 300% of normal blood level.[8] This plasma is then activated to a gel-like substance which consists of platelet releasing contents and multiple growth factors in the scaffolds of fibrin matrix.[9] The degranulation of platelets by thrombin and similar other proteins initiates the release of growth factors such as platelet-derived growth factor- AB, transforming growth factor beta-1 and vascular endothelial growth factor.[10] This observed increase in the rate of epithelialization and pain reduction at wound sites are thought to be due to these growth factors.[11]

We have hypothesized that the application of PRP in the split-thickness skin graft is a safe strategy to induce positive changes in the wound microenvironment. Hence, this study was carried out to explore whether the platelet growth factors from PRP could be used to enhance the survival of skin graft. So it would be beneficial to be used in those patients who have some chronic disorders causing delay in wound healing.

MATERIAL & METHODS

This Randomized control trial was conducted at Medical Unit I, Plastic Surgery Ward at Bahawal

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Article received on: 22/12/2020
Accepted for publication: 22/12/2021

Victoria Hospital Bahawalpur in collaboration with Pathology Department, Quaid-e-Azam Medical College, Bahawalpur. It was a six months duration study commenced from 17-01-2020 to 16-07-2020.

Inclusion Criteria

1. Patients who are known cases of chronic Diabetes Mellitus admitted in medical Unit I
2. All patients visiting plastic surgery ward at BVH being treated for skin ulcers of various etiology e.g. pressure ulcer, burn etc.

Exclusion Criteria

Patients with Anemia, Thrombocytopenia, Coagulopathies or known disorder of platelets functions, Hypovolemia or Sepsis at the time of presentation.

Patients on anticoagulant or fibrinolytic drug therapy.

MATERIAL & METHODS

Total of 50 patients, meeting the criteria for plateletpheresis, were randomly included in the study after taking their informed verbal consent. Two groups were made. A and B.

Patients who received PRP were included in group A. Patients without PRP were included in group B. To avoid confounding the ages and gender for the patients were matched in both the groups.

Prior to the plateletpheresis procedure, (EDTA) ethylenediaminetetraacetic acid anticoagulated blood samples were collected and the cell counts were done using automated cell counter (Sysmex KX21, Cobe, Japan). In the PRP method, an initial soft spin centrifugation to separate red blood cells was followed by a second hard spin centrifugation to concentrate platelets, which were suspended in the smallest final volume of 4 ml PRP, in the lower 1/3rd of the tube. Under aseptic conditions split thickness skin graft of approximately 3mm thick was taken. We infiltrated prepared PRP intradermal and subdermal with 24G needle and the wound was dressed using paraffin gauzes and moist dressing was applied. In group B patients graft of same thickness, under the same circumstances was taken and the donor side was dressed with antiseptic moist dressing. Patients of both groups were re-evaluated after every 15 days till 3 months. The patients were observed for:

1. Re-epithelization of donor area
2. Post-Operative itching
3. Erythema

RESULTS

Information on patients, graft thickness, postoperative management, re-epithelization of graft tissue, post-operative itching and erythema for both groups A & B were observed fortnightly and presented in Tables-I and II. For each patient, the surface area and duration of tissue re-epithelization were comparable between control and PRP intervention. Patients who received PRP accomplished rapid granulation tissue uptake e.g. in $\leq$ 2 weeks as compared to the control group without PRP application showing delay in graft healing e.g. among 9 patients' complete granulation tissue uptake was $\geq$ 4 weeks, 4 patients showed partial re- epithelization and 3 patients show slow uptake even on 6th week. Duration of healing was comparable between both the groups. No infection, adverse reaction or additional complications were observed in these receiving PRP.

No. of Patients	Graft Size = 3mm in Thickness	Follow – ups (2 Weeks)					
		1	2	3	4	5	6
25	Re- epithelization	Minimum	Partial reepithelization among 99 patients			Complete in 99 patients, among 35 patients not completed	
	erythema	observed	minimum			recovered	
	Post- operative itching	Present in 9 patients	recovered			recovered	

Table-II. Group B.

No. of Patients	Graft Size = 3mm in thickness	Follow up (2 Weeks)					
		1	2	3	4	5	6
25	Re- epithelization	done					
	erythema	Not observed					
	Post- operative itching	Mini-mum					

Table-I. Group A: Patients with PRP:

DISCUSSION

PRP has gained popularity in the field of orthopedic, oral and maxillofacial, dental, ophthalmological, plastic and reconstructive surgery as a treatment modality.[12,13,14,15,16,17,18] This study was undertaken to assess the efficacy of plasma rich platelets in terms of graft survival in recipients of split-thickness skin graft and showed encouraging results. Numerous studies from the literature provide strong evidence to support its clinical use Roukis and Schade[5] observed that addition of PRP to the split-thickness skin graft recipient sites reduced healing time and enhance primary healing, most probabily as a result of a reduction in the shearing force and enhancing the wound environment with the growth factors. A study conducted by Kakudo et al[3], revealed that PRP promotes angiogenesis and epithelialization of split thickness skin graft donor sites. They found that epithelialization progressed more rapidly showing a significant shortening in the time to undergo reconstructive surgery.[9]

Among patients with chronic foot ulcers 19% are known cases of Diabetes Mellitus[19], results in prolonged stay in hospital causing psychological, physical as well as financial trauma to the patients. We applied these non-healing ulcers with PRP in our medical unit-1 that is inexpensive and simple, showing complete healing after 6 weeks.

Additionally, PRP application resulted in a shorter hospital stay.

In our study, we have also observed that in 135 cases among control group showed good tissue healing; the plausible reason for this may be the role of native platelets, which are considered to provide a more controlled release of the PDGFs. This may partially enhance the cascade of tissue repair processes required for wound healing.

Our study demonstrated promising results on application of Plasma rich platelets to split-thickness skin grafts. Our findings could have been better substantiated if we had done the histopathological examination of our cases to reveal angiogenesis and epithelialization of skin graft. More randomized studies with a larger sample size should to be undertaken in this area for the establishment of PRP as a validated treatment modality.

CONCLUSION

This provisional data suggests that PRP provide some degree of rapid re-epithelization of donor site in patients of group I. In group II patients there is delayed re-epithelization of graft and there may be a chance of hypertrophic scar formation in future.

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