Case Report

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Autologous Platelet-Rich Plasma Utilisation in Plastic Surgery as Adjunctive Burn Management Treatment

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Abstract

To explore the utilization of Autologous Platelet Rich Plasma (APRP) as a complementary treatment for diverse conditions in plastic surgery. APRP can be used as an adjunct treatment to enhance outcomes in different plastic surgery cases. Given its abundance in diverse growth factors, APRP holds promise as a supplemental therapy to improve outcomes across various plastic surgery procedures.

Keywords: Autologous Platelet Rich Plasma; APRP; Wound healing

INTRODUCTION

Wound healing is a complex and coordinated process comprising multiple overlapping stages. Optimal healing necessitates the presence of various growth factors, among which platelets play a crucial role. Extensive research has established the significance of platelets in promoting wound healing by releasing essential growth factors. Additionally, platelets facilitate the secretion of bioactive proteins that attract key cells such as macrophages, mesenchymal stem cells, and osteoblasts, thereby aiding in the removal of necrotic tissue and promoting tissue regeneration and healing.

Autologous Platelet Rich Plasma (APRP) has emerged as a valuable tool in expediting wound healing. Platelet-Rich Plasma (PRP) is characterized by its elevated platelet concentration and contains a rich assortment of clotting and growth factors. APRP boasts significantly higher levels of platelet-derived growth factor (PGF), transforming growth factor (TGF), vascular endothelial growth factor

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(VEGF), epidermal growth factor (EGF), and fibroblast growth factor (FGF) compared to normal plasma. This heightened concentration of growth factors in APRP enhances tissue regeneration and healing processes.

Given its remarkable properties in tissue repair and regeneration, APRP is increasingly recognized as an adjunct therapy for various conditions in plastic surgery. This discussion underscores the significance of APRP as a supplemental treatment modality in plastic surgery.

MATERIALS AND METHODS

This study was conducted in the department of Plastic Surgery, JIMER, Pondicherry, India. APRP has been tried as an adjuvant therapy for wound healing for a 80 year old male patient with thermal burns over the left upper limb (Fig. 1).

Fig. 1: Showing condition of thermal burns over left upper limb at time of presentation BJWAT scoring 30

Patient's demographic profile was recorded in the study proforma. APRP was prepared1 using standard and validated technique described by Li, Weivei et al. After taking informed consent 45 ml of whole blood was taken from peripheral vein with sterile precautions and 0,5 ml of 3.2% Sodium Citrate was added to make it 5 ml (blood:anticoagulant 9:1). The centrifugation tube was placed in centrifugation apparatus. The solution was centrifuged at 3000 rpm for 10 minutes. Three portions were seen after first centrifugation. Upper portion containing plasma and platelets, middle portion containing White blood cells (WBCs) with platelets (Buffy coat) and lower portion containing Red blood cells (RBCs). Middle and lower portions are discarded. Upper portion was transferred taken in a new tube for recentrifugation at 4000 pm for 10 minutes. Following which two portions were seen. Upper 2/3rd portion containing platelet poor plasma and the lower 1/3rd portion containing platelet rich plasma (erythrocyte with platelet clumps). Lower 1/3rd portion was used for APRP therapy. In this patient, subcutaneous injection of APRP was given around the wound margin circumferentially (Fig. 2).

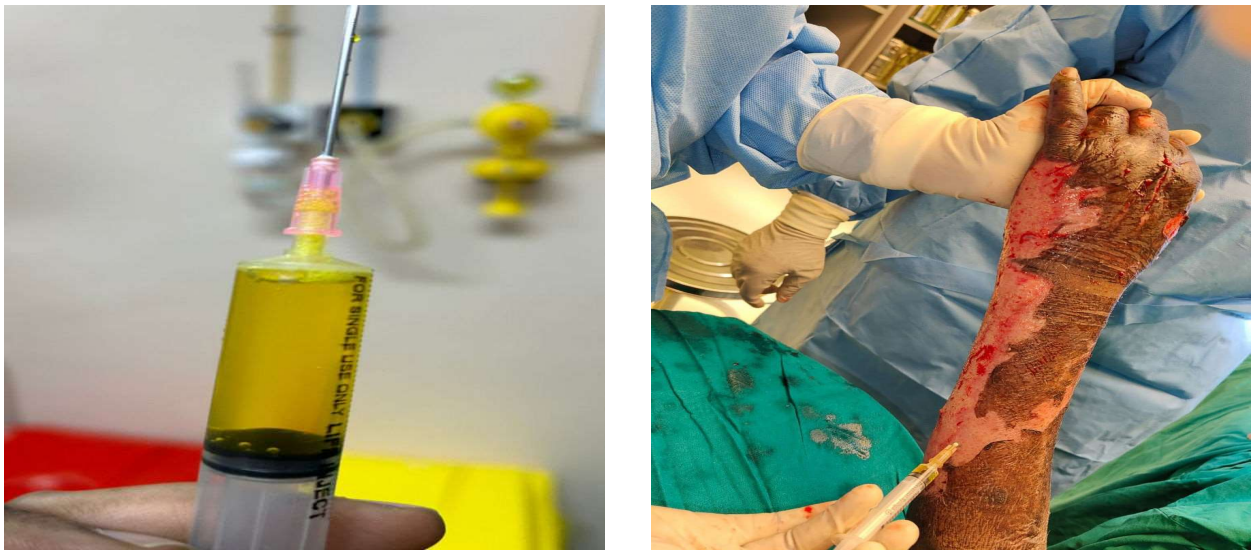

Fig. 2: Shows APRP injection and injection of APRP in site

Fig. 3: Showing improvement in condition of thermal burns five sessions after application of APRP BJWAT scoring 26

RESULTS

Wound healing was found to be hastened by application of APRP, proving the efficacy of using APRP in treatment for wound healing (Fig. 3).

DISCUSSION

Autologous platelet-rich plasma (APRP) is derived from the patient's own blood and contains a higher platelet count compared to the peripheral blood.[1] Initially utilized for treating thrombocytopenia, its applications expanded to various medical fields, notably sports medicine for musculoskeletal injuries. In wound management, APRP addresses the impediment to healing caused by low platelet count and high protease activity. By supplying growth factors, APRP promotes mitogenic, angiogenic, and chemotactic actions[2], aiding chronic wound healing. Furthermore, APRP fosters the deposition of TYPE-I collagen, potentially beneficial for scar management.[3] Activation of APRP, typically achieved with calcium salts[4-6] yields heightened concentrations of growth factors like PDGF and VEGF. However, the volume of APRP obtained from a patient's blood poses a limitation, especially for treating large wounds, necessitating careful consideration. Additionally, administering APRP may pose challenges on uneven surfaces, affecting its uptake efficiency.[7,8]

CONCLUSION

APRP proves beneficial in promoting wound healing across a spectrum of cases, regardless of whether they are acute or chronic and irrespective of their underlying causes. Its utility extends to burn injuries as well as within the realm of cosmetic surgery. Our case report findings affirm that APRP contributes to enhanced wound healing across diverse wound types.

REFERENCES

1. Rubina Alves, Ramon Grimalt. A review of plateletrich plasma: History, biology, mechanism of action, 4:18-24.
2. Padmalakshmi Bharathi Mohan, Saurabh Gupta, Ravi Kumar Chittoria, Abhinav Aggarwal, Chirra Likhitha Reddy, Imran Pathan, Shijina Koliyath. Autologous Platelet-rich Plasma Enriched Pixel Grafting. Journal of Cutaneous and Aesthetic Surgery, Volume 13, Issue 4, October-December 2020.
3. Barbara Hersant, Mounia Sid Ahmed-Mezi, Romain Bosc, Jean-Paul Meningaud. Autologous PlateletRich Plasma/Thrombin Gel Combined with SplitThickness Skin Graft to Manage Postinfectious Skin Defects: A Randomized Controlled Study. Adv Skin Wound Care. 2017 Nov;30(11):502-508.
4. Claudia S Cohn, Evelyn Lockhart. Autologous platelet-rich plasma: evidence for clinical use. Curr Opin Hematol. 2015 Nov;22(6):527-32.
5. Sudhanva H.K., Panday S, chittoria RK, Mohapatra DP, friji MT, Dinesh KS. Role of APRP in the successful uptake of Split Skin Graft. Dermatology international Volume 1 number 2 July to December 2016.
6. Elankumar S, Sudhanva H.K., Abhinav A, Chittoria R.K. APRP spray devices: a novel technique of applying APRP. Dermatology international Volume 2 number 2, July to December 2017.
7. Weibrich G, Kleis WK, Hafner G, Hitzler WE,. Growth factor levels in platelet- rich plasma and correlation with donor age, sex and platelet count. Journal of cranio-maxillofacial surgery. 2002; 30(2): 97-102.
8. Yuan T, zhang CQ, Tang MJ, Guo SC, Zeng BF. Autologous platelet- rich plasma enhances healing of chronic wounds. Wounds. 2009;21(10): 280-5.