

## Role of PRP in Improvement of Skin Graft Texture

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### INTRODUCTION

Over the past three decades, greater understanding into the physiologic pathways involved in wound healing has yielded a number of novel wound treatment products [1]. One of these products, autologous platelet-rich plasma (PRP), has seen increasingly widespread use across medical specialties, finding regular application in the fields of chronic neuropathic wounds [2], maxillofacial bone defects [3], and cosmetic [4], spinal [5], and reconstructive surgery [6].

The extraction of PRP begins with any peripheral venous access. The extraction of platelet concentrate from patient blood occurs via plasmapheresis, whereby PRP is concentrated to 300% of normal blood levels [7]. This extracted plasma is then activated to produce multiple growth factors. The degranulation of platelets initiates the release of different growth factors such as platelet-derived growth factor-AB, transforming growth factor beta-1, and vascular endothelial growth factor [8]. These growth factors are thought to be responsible for the observed increased rate of epithelialization at wound sites [2].

Currently [9,13], the focus of clinical research with regard to PRP therapy on graft sites emphasizes wound healing and epithelialization rates [7]. In this study, we used autologous PRP to burn wounds.

### MATERIAL AND METHODS

This pilot study done at Oraby Burn and Oncology Hospital, reviewed 10 patients treated with PRP at site of burn raw areas from 2014 up to the year 2016. Inclusion criteria: Patients of either sex, aged 18-60, with at least one STSG site treated with PRP, and one without.

All treatments were highly standardized. Inter-ventional STSG sites were treated with intraoperative and postoperative injection of autologous PRP and dressed with Vaseline gauze padding, and light compression bandage, in ascending order. In both therapies, initial dressing changes occurred on postoperative day (POD) 3 PRP applied post-operatively every 10 days by derma roller after complete graft healing.

Dermatome used for harvesting the grafts. All patient grafts were harvested with a thickness of 0.01-0.02 in., and meshed to a ratio of 1.5:1 or 2:1. Following preparation, the grafts are applied to the wound site and secured using skin staples.

Patients with thrombocytopenia (platelets count less than 150000 per microliter) or coagulation disorders were excluded, also those patients receiving aspirin or non steroidal anti inflammatory during the last 2 weeks.

A variety of extraction and preparation methods exist for PRP. In this case series, the following procedure was followed. After general anesthesia induction in the operating room, 10-50mL of blood was drawn in special sterile tube containing an anticoagulant Na citrate 3.8% which was centrifuged 1500 rpm for 6min. at room temperature this will separates red blood cells from plasma that contains buffy coat (white blood cells and platelets), the plasma was transferred by syringe to another test tube then centrifuged again at 3000 rpm for 10min. thus obtaining a two parts of plasma, the upper part containing platelets poor plasma and lower part rich in PRP (Fig. 1). The platelets poor plasma is gently aspirated and withdrawn while the plasma rich PRP is aspirated and activated by calcium chloride at ratio of 1ml CaCl for each 9ml PRP thus obtaining concentrated activated PRP this PRP was injected at the wound area.



Fig. (1): Left tube showing puffy coat and right tube containing upper platelets poor plasma and lower platelets rich plasma.

**RESULTS**

Information on patients’ age, gender, past medical history, graft size, postoperative management, and texture of grafted skin for both with and without PRP application, STSG thickness and surface area were comparable between control and PRP group. No adverse reaction, infection, or additional com-

plication was observed in those receiving topical PRP.

The graft take was more than 95% in those patients treated with PRP (Fig. 2) while those without was 60% to 90%. The texture and color of the grafts treated with PRP was better than the grafts treated without PRP. The incidence of hypertrophic scar was less than those treated without PRP (Figs. 3,4,5).



Fig. (2): Full take of meshed graft at forearm treated by PRP injection intraoperatively.



Fig. (3): Left photo showing P.B. scarring of the face, middle photo showing 5<sup>th</sup> postoperative day of medium thickness STSG injected intraoperatively by PRP, right photo showing texture of the graft after injection of PRP intraoperatively and serial injection of PRP by Dermaeoller 1.25mm every month for 6 months.



Fig. (4): Left photo showing P.B. scarring of the face, right photo showing texture of the graft after injection of PRP intraoperatively and serial injection of PRP by Dermaeoller 1.25mm every month for 6 months.



Fig. (5): Left photo showing P.B. scarring of the of left hand, right photo showing texture of the graft after injection of PRP intraoperatively and serial injection of PRP by Dermaeoller 1.5mm every month for 6 months.

## DISCUSSION

Activation of extracted plasma produce multiple growth factors. The degranulation of platelets initiates the release of different growth factors such as platelet-derived growth factor-AB, transforming growth factor beta-1, and vascular endothelial growth factor [7,8]. These growth factors are thought to be responsible for the observed increased rate of epithelialization at wound sites [2].

Attention has been directed toward healing rates and scar reduction in STSG by various methods [16-20]. Acceptance of PRP in promoting epithelialization has been a point of contention; however, it seems that regular dressing changes have a synergistic effect with PRP [3,14,21,22]. This reinforces the connection between proper postoperative wound maintenance, and positive wound outcomes.

Postoperative topical PRP for STSG d sites is cost effective, safe, and easy to use [23]. In addition, during the course of our study, no adverse reactions, infections, or additional complications were observed in the patients receiving PRP [7].

### Conclusion:

The fact that no standard protocol has yet been formulated for the efficacious platelet concentration range and preparation method of PRP, which would serve towards the manufacture of a more homogeneous group of PRP products. Following the detailed analysis of the available literature, it might seem logical to expect a future for PRP within the field of plastic and reconstructive surgery. Nevertheless, the widespread adoption of PRP will require clearly defined standardized methods for PRP preparation, and additional.

Comprehensive studies, demonstrating statistical confidence of clinically relevant and validated end points, which may further confirm the potentially high efficacy of this blood product in improvement of graft take and quality.

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