Wound Repair/Cosmetic Surgery
Healing Enhancement of Skin Graft Donor Sites with Platelet-Rich Plasma

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Introduction

Split-thickness skin grafts are frequently used in oral and maxillofacial preprosthetic surgeries as well as several types of mucosal neck surface deficiencies, such as may be seen in tumor and trauma wounds. As a variable of size and depths, healing is noted to be slow, associated with discomfort, and eventuates into a scar. Platelet-rich plasma (PRP) has been documented to accelerate and enhance bone graft healing and maturity. However, no definitive data in humans have yet shown a similar effect on soft tissue healing.

Purpose

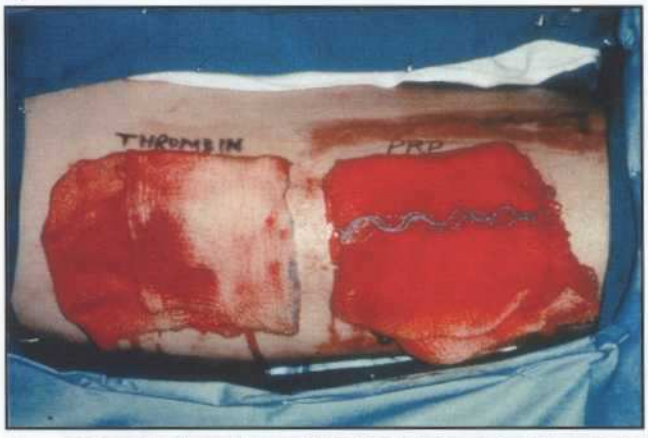
The purpose of this study was to assess the potential of PRP to accelerate the soft tissue wound healing and epithelialization of a split thickness skin graft donor site.

Materials and Methods

This study consisted of 20 patients who required split-thickness skin grafts in excess of 10x10 cm. Each patient underwent 2 side-by-side split-thickness graft harvests measuring about 5x7 cm. One donor area was treated with topical bovine thrombin covered with an occlusive Opsite dressing. The adjacent second donor area was treated with 6 mL of a platelet concentrate containing greater than 1 million platelets per mm^3, obtained from the Platelet Concentrate Collection System (3i Corp.) and an occlusive Opsite dressing (Figures 1 and 2).

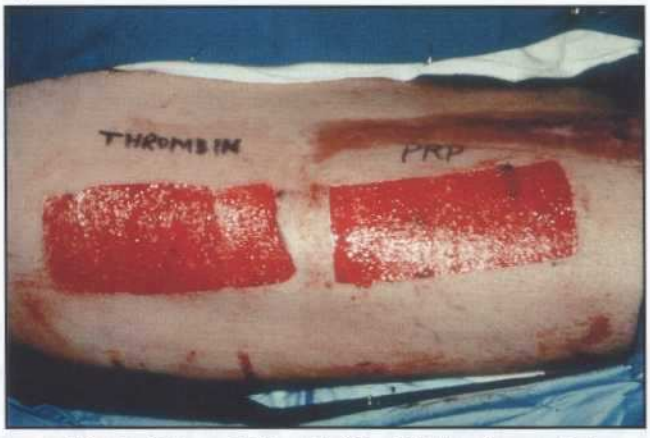
Wound assessments were conducted by direct observation, a patient pain evaluation scale, and photographic morphometry at 7 days, 14 days, 20 days, and 30 days. Histopathology specimens were obtained at variable times with special patient consents.

Figure 1



Donor Site with Thrombin and PRP Soaked Gauze for Hemostasis

Figure 2

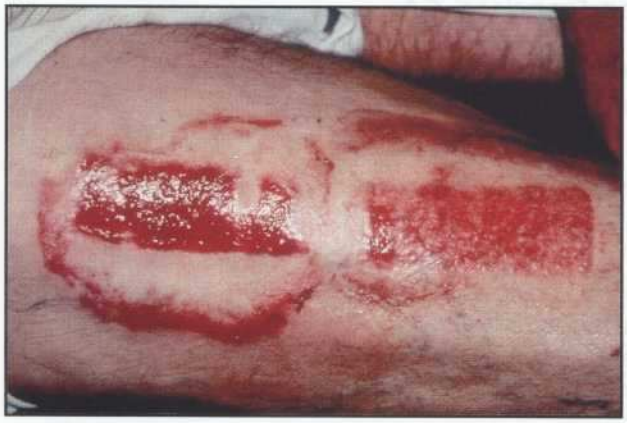


Skin Graft Harvest Site with "Op-site" dressing applied

Results

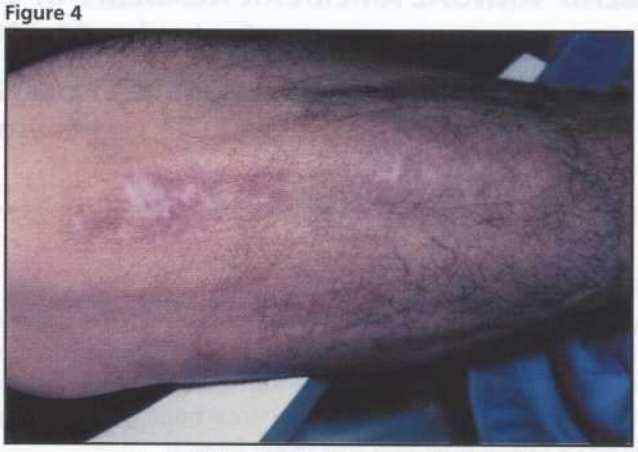
Direct observation noted a consistent acceleration in the maturity of the wound and PRP added at each assessment time (Figures 3 and 4). It was particularly noted that the PRP added wound passed quickly through the granulation tissue phase so as to avoid the crusty escar, which was observed on all control sites. The photographic morphometry quantitated the degree of granulation tissue, escar, and epithelialization (Table 1).

Figure 3



Skin Graft Harvest Site 7 days "Post-Op"

Figure 4



Skin Graft Harvest Site 6 months "Post-Op"

Table 1.

	Thrombin (%)	% Epithelium PRP	*P*
7 days	4	91	.010
14 days	15	95	.010
20 days	38	100	.010
30 days	69	100	.010

Table 2. PATIENT DISCOMFORT SCALE (1-10), MEAN VALUES (N = 20)

	Thrombin (%)	% Epithelium PRP	*P*
7 days	6	1	.005
14 days	7	1	.010
20 days	4	1	.010
30 days	2	0	.010

Table 1 indicates that granulation tissue and the escar that forms from the granulation tissue indicative of delayed epithelialization were always higher in the controls than the PRP added wound, whereas the surface area of epithelialization was always higher in the PRP added wound. These results correlated to the patients' discomfort scale (Table 2) which indicated a pain level and an "annoyance" level related to the escar to be higher in the control wounds.

The histologic specimens confirmed an advanced degree of epithelial migration and thickness in the PRP added wounds.

Conclusions

Platelet-rich plasma added topically to a de-epithelialized wound accelerates the early phase of wound healing presumably by release of platelet-derived growth factor (PDGF) and transforming growth factor beta (TGF-ß), as well as a fibrin-rich base that provides early revascularization and a framework for epithelial migration. Clinically, these biologic events gain an earlier epithelialization, and less pain.

References

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3. Tayapongsak P, O'Brien DA, Monteiro CB, et al: Autologous fibrin adhesive in mandibular reconstruction with particulate cancellous bone and marrow. J Oral Maxillofacial Surg 52:161, 1994

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