Review Article

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Role of Regenerative Methods in Management of Amputation Stump

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Abstract

Wound healing is an array of carefully planned steps playing in a sequence to mettle the ill fate that nature has brought on the body. It includes inflammation, proliferation and remodelling. Wound healing depends on different growth factors, cytokines, interleukins and cell population for success. In this article we report how we have used different regenerative methods like the autologous platelet rich plasma, insulin therapy, prolotherapy, low level laser therapy for augmenting in wound healing.

Keywords: Platelet rich plasma; Regenerative medicine; Wound healing.

INTRODUCTION

Wound healing can become delayed due to multitude of reasons like infection, foreign material, lack of growth factors etc. the wound healing can be augmented by using different methods like growth factors, NPWT. The wound healing can also be delayed by the large size of the wound and surface area of the wound that needs to be covered wound that are covered by skin graft also needs to be supported with different growth factors.

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MATERIALS AND METHODS

The patient is a 42 year male manual labourer who had a road traffic accident and sustained injury to his right lower limb. he underwent above knee amputation of the lower limb and sustained surgical site infection. The wound had to be open and was decided for secondary healing. However, the repeated dressing, antibiotics to mitigate infection could not bring healing to the raw area (Fig. 1). Hence, we resorted to use regenerative methods to supplement the growth factors. We used methods of platelet rich plasma (Fig. 2), prolotherapy (Fig. 3), Low level laser therapy (Fig. 4) for wound bed preparation according to the TIME principle. We also used non cultured keratinocyte suspension for the wound (Fig. 5), dermal pixel grafting (Fig. 6) to supply growth factors to the raw area. The wound

bed was prepared and skin grafting (Fig. 7) was done to cover the raw area. The skin graft was also supplemented with regenerative methods (Fig. 8).

Fig. 1: Raw area at presentatio

Fig. 2: Aprp fowoud Bed Preparation

Fig. 3: Prolotherapy For Wbp

Fig. 4: Lowlevel Laser Therapy

Fig. 5: No Cultured Keratinocyte Graft

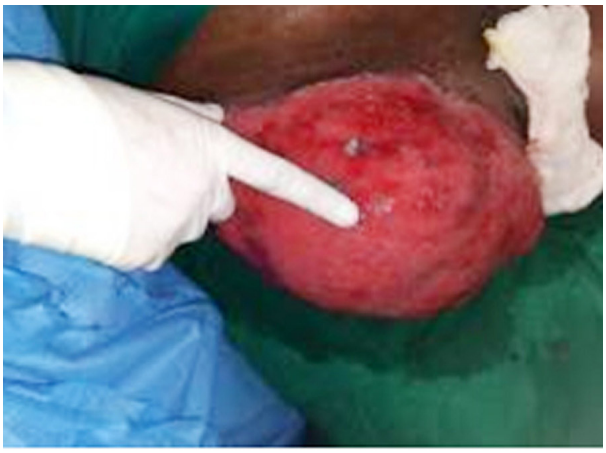

Fig. 6: Dermal Pixel Graft

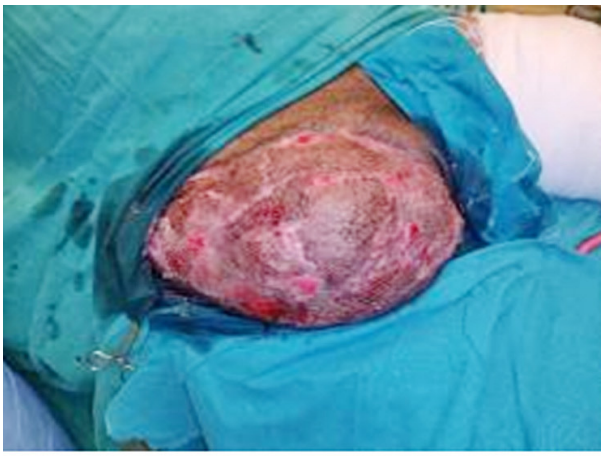

Fig. 7: Skin Grafting done with Donor Site

Fig. 8: LLLT to skin graft area

Fig. 9: Healed Wound

DISCUSSION

Platelet Rich Plasma (PRP) is a biological product defined as a portion of the plasma fraction of autologous blood with platelet concentration above the baseline (before centrifugation).[1] PRP contains high levels of platelets and also the full complement of clotting factors, the latter remaining at their normal, physiologic levels.[2] It is comprised of a range of growth factors, chemokines, cytokines, and other plasma proteins.[3] PRP is a source of signaling molecules, and upon activation of platelets in PRP, the P-granules degranulate and release GFs and cytokines that will change the pericellular micro-environment. Some of the most important GFs released by platelets in PRP include vascular endothelial GF(VEGF), fibroblast GF (FGF), platelet derived GF(PDGF), epidermal GF, hepatocyte GF, insulin like GF1,2 (IGF-1, IGF-2), matrix metalloproteinases (MMP)2,9, and interleukin 8.[4,5]

LLLT, phototherapy or photo biomodulation refers to the use of photons at a non-thermal irradiance

to alter biological activity.[6] LLLT at low doses has been shown to enhance cell proliferation of fibroblasts[7-10], keratinocytes[11], endothelial cells[12] and lymphocytes.[13,14]

In vitro studies have shown that cultivation of cells in high glucose culture medium can increase the PDGF expression. PDGF has multiple reparative effects in wounds, including promotion of angiogenesis, fibroblast proliferation, and extracellular production. TGF-b expression is also increased by high glucose.[15,16] TGF-b is involved in different steps of wound healing from inflammation to wound re-epithelialization. Other growth factors increased by high glucose include EGF, b-FGF, IGF and CTGF.

CONCLUSION

We have used different regenerative methods to augment the wound healing process and have found it to be useful. However, it needs large randomised control trials to be used in large scale. The limitation o f the study was that it was done in a single patient.

DECLARATIONS

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Conflicts of interest: None.

Consent for publication: Not applicable.

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