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Reconstruction of Amputated Stump with SVC Thrombosis

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Abstract

Wound healing is an array of planned steps in a sequence which includes inflammation, proliferation and remodelling. Wound healing depends on growth factors, cytokines, interleukins, etc. There is no well established method that accelerates wound healing. In this article we report how we have managed a case of post traumatic amputation stump who had developed iatrogenic SVC thrombosis, using different regenerative methods like the autologous platelet rich plasma, insulin therapy, prolotherapy, low level laser therapy for augmenting in wound healing. We also successfully managed SVC thrombosis during the hospital course. In this article we also discuss about the role of prolotherapy in wound healing.

Keyword: Amputated stump, Prolotherapy, SVC thrombosis, Wound healing

INTRODUCTION

Wound healing can become delayed due to multitude of reasons like infection, foreign material, lack of growth factors etc. Wound bed preparation is a newer concept and can be summarized with the acronym T.I.M.E, T for tissue: non-viable or deficient. I for infection/ inflammation, M for moisture balance. E for epidermis which was changed later to E for edge. Large wounds often require a graft or a flap for wound coverage, which require the wound bed preparation. Prolotherapy is a procedure in which an irritant is injected or sprayed into the wound. The irritant injected will initiate an inflammatory reaction, which promote healing of wound. We share our experience of using prolotherapy in the preparation of wound bed, in this article.

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MATERIALS AND METHODS

This study was conducted in the Department of Plastic Surgery at tertiary care center. Informed written consent was taken from the patient. The details of the patient: 36 year old female with no known comorbidities with alleged history of road traffic accident 4 months back and had sustained injury to both lower limbs and right below knee amputation. Patient had vascular injury in the right lower limb for which she was admitted and operated in CTVS department. She had degloving injury to left lower limb for which serial debridement was done by general surgery department. Now patient

presented to plastic surgery department for further management with extensive raw area involving left lower limb from groin to just above ankle (Figure 1). Pale granulation tissue present with no active discharge. Right Below knee amputation stump present with exposed bone. Patient was malnourished with severe anemia. Her general condition was improved with parenteral nutrition, blood transfusion, albumin therapy. Patient underwent hydrojetdebridement (Figure 2) with insulin spray (Figure 6) and hemoglobin spray (Figure 3) serially. We resorted to use regenerative methods to supplement the growth factors. We used platelet rich plasma (Figure 7), prolotherapy (Figure 5), Low level laser therapy (Figure 8) platelet rich fibrin matrix (Figure 9) for wound bed preparation according to the TIME principle. Due to prolonged immobilization during the course with added central venous catheter placement, patient developed right IJVand SVC thromosis for which thrombectomy (Figure 4) was done. She underwent repeated cycles of prolotherapy, LLLT, heterografting (Figure10) Regulated oxygen negative pressure wound therapy (Figure 11) split thickness skin grafting (Figure12), until the residual raw area was NIL. About 80 % uptake was present.

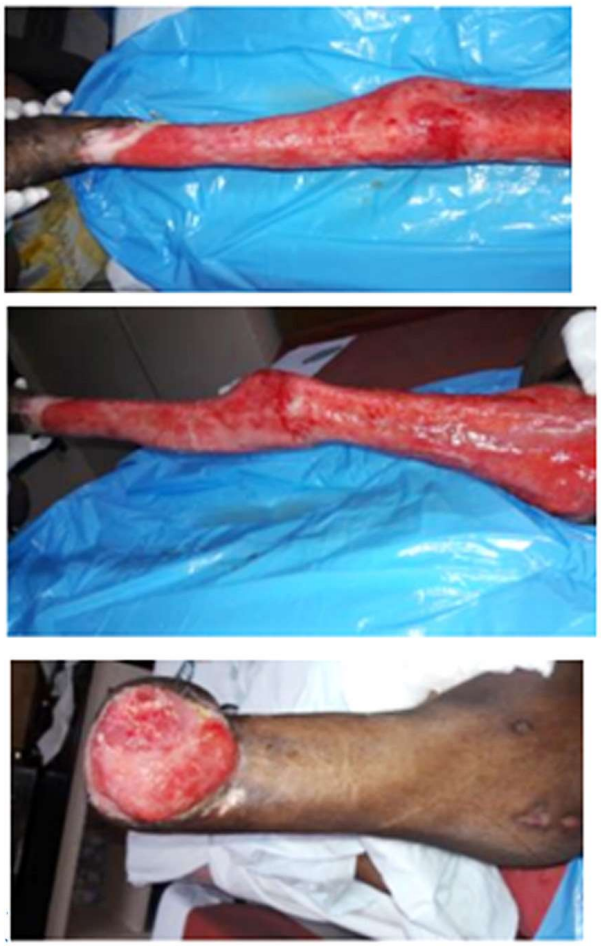

Fig. 1: Wound at the time of presentation

Fig. 2: Hydrojet debridement

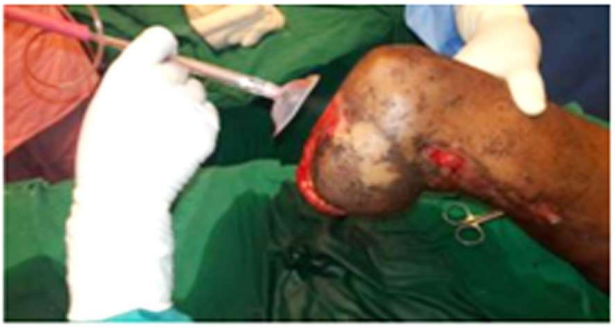

Fig. 3: Hemoglobin spray

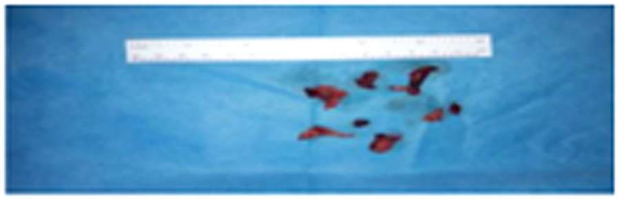

Fig. 4: Right IJV and SVC thrombectomy

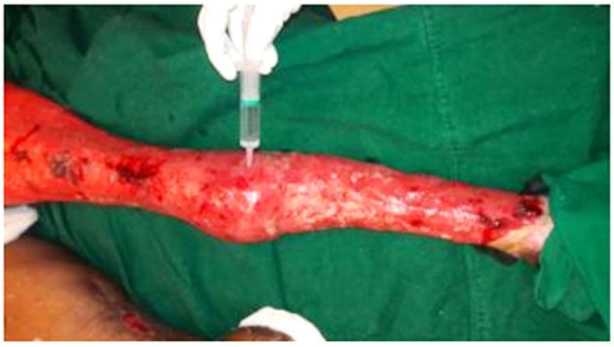

Fig. 5: Prolotherapy

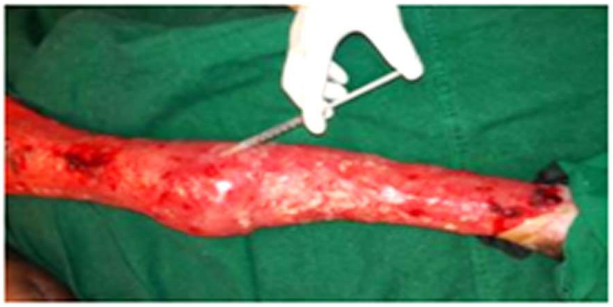

Fig. 6: Insulin therapy

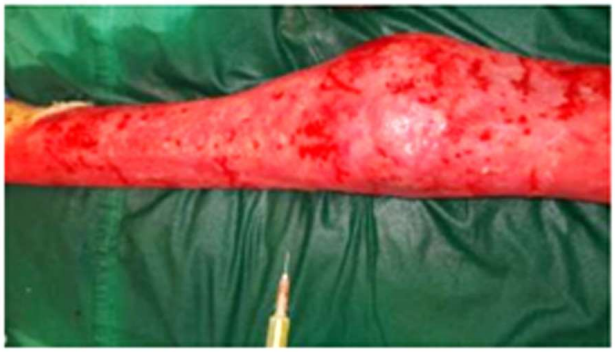

Fig. 7: APRP

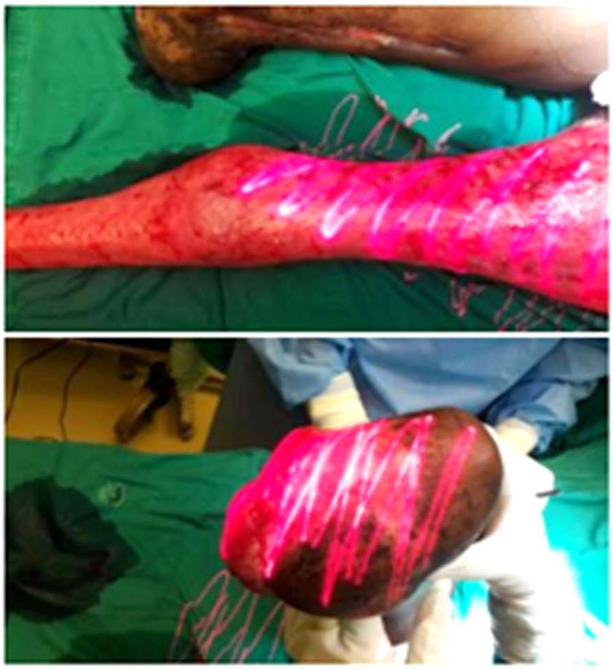

Fig. 8: Low light laser therapy for wound bed preparation

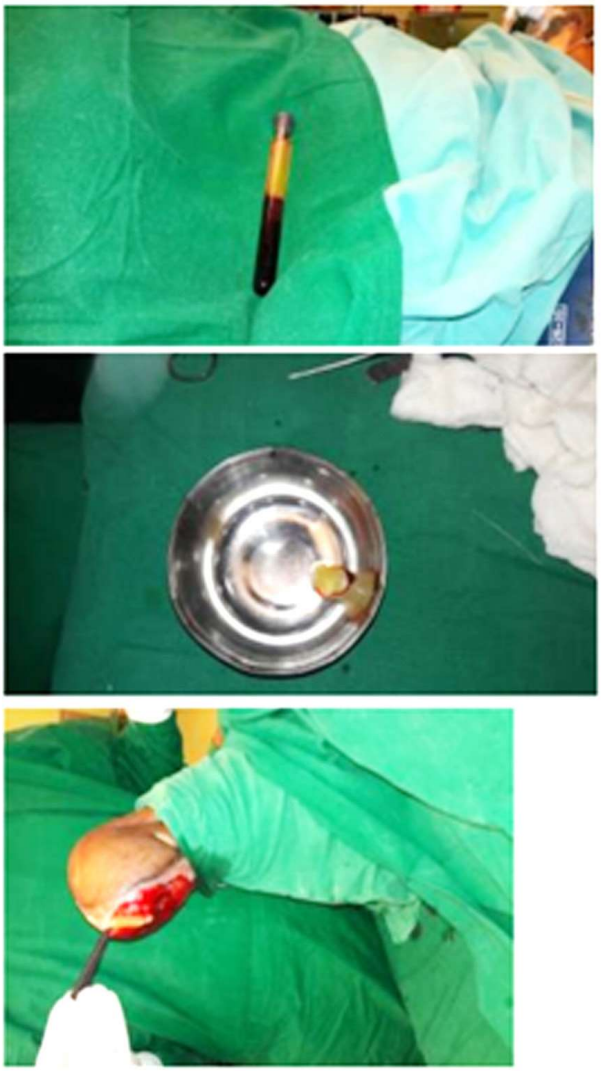

Fig. 9: Platelet rich fibrin matrix therapy

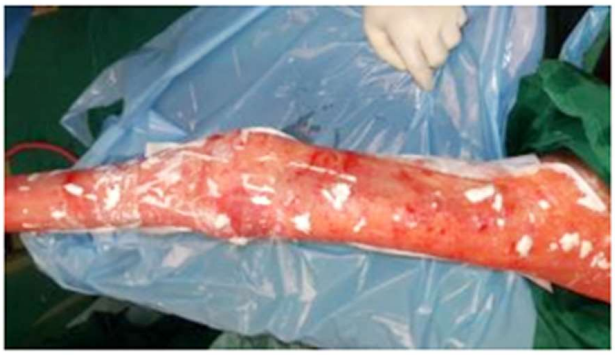

Fig. 10: Heterografting with dry collagen sheet

Fig. 11: RONPT with splint in situ

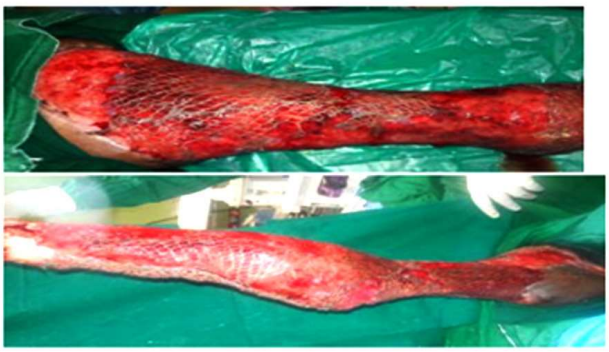

Fig. 12: Split thickness skin grafting

RESULTS

After multiple sessions of various regenerative methods, the wound healing was successful. Patient was advised rehabilitative measures with walker and was ambulating well.

DISCUSSION

Multiple agents are being used in prolotherapy

like irritants (phenol), chemoattractants (sodium morrhuate), osmotic agents (dextrose).[1] Although the exact mechanism of prolotherapy is not clear, it is believed that the injection of hypertonic dextrose causes cell dehydration and osmotic rupture at the injection site that leads to local tissue injury. That will subsequently induce granulocyte and macrophage migration to the site, with release of the growth factors and collagen deposition. In vitro studies have shown that even concentrations as low as 5% dextrose have resulted in the production of several growth factors critical for tissue repair. Some of these growth factors include PDGF, TGF-β, EGF, b-FGF, IGF-1, and CTGF 1. In Vitro studies have shown that the cultivation of cells in high-glucose culture medium can increase PDGF expression. PDGF has multiple pro-reparative effects in skin wounds. TGF-β expression is also upregulated by high-glucose which helps in angiogenesis, fibroblast proliferation, collagen synthesis, matrix deposition, and remodeling, and wound reepithelialization.[2] Other growth factors upregulated include EGF, b-FGF, IGF, and CTGF, all having multiple preparative functions and improves healing. Some studies on prolotherapy suggest that there are direct effects on collagen synthesis . There is up-regulation of matrix in response to dextrose prolotherapy.[3,4] Collagen type-I synthesis is increased in high-glucose cultivation of renal fibroblasts, in a TGF-β-mediated pathway. Changes in the cartilage matrix protein aggrecan is reported in chondrocytes cultured in high-glucose and in patients who have received intraarticular injections of 12.5% dextrose. In our case, dextrose 25% was used as prolotherapy agent. It was used as adjunct to other modalities. There was no adverse effects noticed.

CONCLUSION

We have used different regenerative methods to augment the wound healing process and have found it to be useful.

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