

Role of Hybrid Reconstructive Ladder in Degloving Injuries

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How to cite this article:

Lakshmi Sriram, Ravi Kumar Chittoria, Neljo Thomas/Role of Hybrid Reconstructive Ladder in Degloving Injuries/J Orth. Edu. 2022;8(2):53-56.

Abstract

The reconstructive ladder discusses progressively more difficult soft tissue coverage methods for wound coverage and healing. Regenerative medicine modalities can be added to conventional reconstructive methods, making it a hybrid reconstruction ladder, which may make it easier to achieve wound coverage at a lower 'rung'. We have used the hybrid reconstruction ladder in a patient with post traumatic degloving injury of lower limb with significant clinical improvement.

Keywords: Hybrid reconstructive ladder, Degloving injury.

INTRODUCTION

Degloving soft-tissue injuries (DSTIs) are dangerous surgical conditions that are characterized by avulsions or detachments of the skin and subcutaneous tissue from the underlying muscle and fascia as a result of an abrupt shearing force applied to the skin surface.¹ Because males sustain proportionally more traumatic injuries than females, DSTIs are more frequently seen in males. Although it can happen anywhere on the body,

lower extremities, the trunk, the scalp, and the face are the primary locations for DSTIs, with varying degrees of skin and soft tissue loss.^{2,3} Determining the degree of the devitalized tissue and the blood supply to the damaged tissues can be challenging when treating degloving soft tissue injuries.⁴ Plastic and reconstructive surgeons developed the phrase "reconstructive ladder" to characterise stages of progressively sophisticated care of soft tissue lesions. The simplest reconstruction strategy would be used by the surgeon to solve a clinical reconstructive problem, which is the lowest step on the ladder. As a more complex or effective solution was needed for a specific reconstruction challenge, the reconstructive surgeon would move up the ladder. Complex wound patterns have spurred efforts to develop fresh, cutting edge tissue regeneration methods. These procedures, sometimes known as hybrid reconstructions, combine conventional reconstructing techniques with regenerative medicine applications. The hybrid reconstruction model aids in maximizing the function while minimizing the disability and morbidity associated with traditional reconstruction.

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Received on: 20.08.2022

Accepted on: 27.08.2022

MATERIALS AND METHODS

This study was conducted in the Department of Plastic Surgery, in a tertiary care centre in South India after getting the department ethical committee approval. Written and informed consent was taken from the patient for proposed treatment plan and clinical photography. The subject was a thirty six old female with alleged history of road traffic accident with post traumatic degloving

injury of left lower limb (Figure 1) with right below knee amputation. Hydro jet debridement with Hb spray therapy, Insulin therapy, Autologous platelet rich plasma, Egg membrane therapy, Dry collagen scaffold dressing, Prolotherapy, Low level laser therapy (Figures 2-7), Negative pressure wound therapy (Figure 8), were used in the preparation of wound bed followed by split thickness skin grafting (Figure 9).



Fig. 1: Patient at presentation



Fig. 2: Hydrojet debridement



Fig. 3: Prolotherapy



Fig. 4: Insulin therapy



Fig. 5: Activated platelet rich plasma therapy



Fig. 6: Low level laser therapy



Fig. 7: Heterografting with dry collagen sheet



Fig. 8: Negative pressure wound therapy

Fig. 9: Split thickness skin grafting



Fig. 10: Patient at discharge

RESULTS

The wound healed well at the time of discharge. Residual raw area was nil. Patient underwent physiotherapy and rehabilitation post discharge.

DISCUSSION

The standard treatments for extremity injuries with

significant composite tissue loss (bone, skin, soft tissue, nerves) require a broad range of therapies. Amputation of the extremity, limb shortening to help with soft tissue coverage of the remaining limb, free tissue transfers, pedicle flaps, local flaps, skin grafting, bone reconstruction, nerve repair or reconstruction, and vascular repair are some of these.^{5,6} Traditional treatments could further reduce a patient's functional ability and increase donor site morbidity.⁷ This has led to increased use of regenerative medicine techniques to promote tissue regeneration and improve reconstructive and clinical outcomes. Results improved at every level of the reconstruction ladder, and these modalities may allow for the expansion of indications at each level.⁸ Various reconstructions have successfully used dermal regenerates, soft tissue regeneration techniques, biologic scaffolds, fat grafting techniques, and adipose-derived stem cells. In our study too, regenerative techniques greatly improved wound healing and overall clinical outcome.

CONCLUSION

Wound healing was greatly improved by the use of regenerative medicine therapies in the treatment of degloving injuries. The Hybrid Reconstruction Ladder is still under development and further large scale studies are needed before routine clinical

application.

Conflicts of interest: None.

Financial support and sponsorship: None

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