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Role of Pixel Grafting as an Adjunct in the Management of Post-Traumatic Degloving Injury

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Abstract

Degloving injuries are major debilitating conditions and its treatment is also challenging. The treatment of degloving injuries requires a multimodal approach. Adjuvant pixel grafting can be tried for injuries where donor site for acquisition of graft is inadequate autologous but the literature is still limited. In this study we share our experience regarding the use of pixel grafting as an adjunct in the management of degloving injury of the extremity.

Keywords: Degloving injury; Pixel grafting; Extremity trauma

Introduction

Degloving soft-tissue injuries are a form of avulsion of soft tissue, in which an extensive portion of skin and subcutaneous tissue detaches from the underlying fascia and muscles. These injuries can affect any part of the body but it usually effects the extrmeties, trunk, scalp, face and genitalia. In addition to the local tissue injuries, most of these patients have other injuries as part of polytrauma with massive blood loss and the degloved skin and soft tissue are often effectively dead [1-3]. Degloving injuries if not recognised early will lead to increased morbidity and mortality. Various management procedures are described according to the site injured. Pixel grafting can be used as an adjunct in the management of degloving injuries where in the donor site for acquisition of graft is limited.

Materials and Methods

This study was conducted in the department of plastic surgery in a tertiary care centre during the period of May-June 2020. Departmental ethical committee approval was acquired and well informed consent was taken from the study participant. The study subject was a 36 year old lady with no known co-morbidities with H/O road traffic accident 4 months back and sustained vascular injury to right lower limb and degloving injury to left lower limb. She underwent below knee amputation of the right lower limb and serial debridements of the degloving wound. She was referred to plastic surgery department with extensive raw areas over the below knee amputation stump and left lower limb. Regular dressings were done and antibiotics were started according to culture sensitivity. Patient's nutritional status including hypoproteinemia and anemia. Split thickness skin grafting was done for left leg raw area with donor site being right thigh. Grafting was done in two sittings.

Figure 1: *Raw area remaining after SSG.*

Even with grafting of 2 sessions the raw area was not completely covered and their still remained raw areas in the left leg and right lower limb below knee amputation stump (Figure 1). Full thickness skin graft was harvested from right groin region and was minced 10 times and this minced graft was spread over a collagen sheet and applied to the remaining raw area (Figures 2-4).

Figure 2: *FTSG harvested from right groin.*

Figure 3: *Pixel graft prepared.*

Figure 4: *Pixel graft applied with dry collagen sheet.*

Results

In our study we found that the minced pixel graft expanded and covered the remaining raw area (Figure 5).

Figure 5: *Healed raw areas.*

Discussion

Degloving soft-tissue injuries are serious and potentially devastating. They require early recognition and early treatment. In the management of closed injuries in particular, a high index of suspicion remains crucial. A multidisciplinary approach is usually needed. Early reconstruction and effective rehabilitation are also essential to care for such patients. There is a need for multi-disciplinary and multi-institutional studies. The management of lower-limb degloving injuries can be complex and quite involved. In recent years, use of a vacuum assisted closure (VAC) device to prepare the wound bed for grafting has become standard practice [4]. Occasionally, lowerlimb degloving injuries require cryopreserved split-thickness skin grafts procured from degloved flaps, artificial dermal replacement, or VAC therapy. Full-thickness skin loss from major trauma or burn will require surgical reconstruction unless the area is very small [5-6]. The most common method of reconstruction is split-thickness skin grafting [8,9]. Split-thickness skin grafting provides epidermal regeneration and minimizes wound contraction compared with healing in nontransplanted full-thickness wounds. Meek described a technique for mincing a split-thickness skin graft into small pieces, allowing 10-fold expansion. Meek's method never gained widespread clinical application, in part because the skin graft pieces needed to be placed with the dermal side down to ensure survival. Smaller grafts would increase the regenerative potential of the graft by creating many more pieces of the same original

skin graft. These grafts can be compared to the pixels on a computer screen, and hence called "pixel grafts". In the moist or wet environment, orientation of the micrografts is unimportant, and they will survive with the dermal side up or down [10]. Pixel grafts would survive by diffusion rather than by neovascularization, the probability and duration of survival of pixel grafts is higher than micrografts because of decreased diffusion distance for nutrients.

Conclusion

In our study we found that pixel grafting was useful in promoting re-epithelialisation of raw area especially in cases where skin graft donor areas are limited. The limitation of the study includes that it is a case report and a single centre study with no statistical analysis. Further randomised controlled studies are required to further substantiate the efficacy of pixel grafting in management of large raw areas.

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