

## Role of Non-Suction Epidermal Blister Grafting (NSEBG) in wound management

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### Abstract

Chronic wounds are associated with delay in healing and prolonged morbidity for the patient. Different methods of wound coverage are available including flap, skin grafting, temporary substitutes for dressing etc. In this article we have used Non-Suction Epidermal Blister Grafting for healing of non-healing ulcer (NHU) and have found it to be useful.

**Keywords** Non Suction Epidermal Blister Grafting, Non healing ulcer, Epidermal graft.

### Introduction

Non healing ulcers have a delay in wound healing due to various factors including underlying infection, presence of foreign material, lack of nutrition, lack of growth factors, etc. Chronic wound require coverage after adequate wound bed preparation (WBP) in the form of skin grafts. There are different types of skin grafts like split thickness skin grafts (STSG), full thickness skin grafts, pixel grafting, meek grafting. STSGs require anaesthesia and an operating room, as there is pain during harvesting the graft, as the dermatome harvester takes the graft in the plane between the papillary (superficial) and reticular (deep) dermis, exposing the sensory nerves and dermal appendages which are essential for healing of donor site, causes postoperative pain. In addition, healing is often delayed by donor site bleeding, infection, and pruritis.<sup>1</sup>

Epidermal skin grafting is used when only epidermis is needed for superficial wounds. As the epidermal layer alone is harvested from the donor site, it avoids many of donor site complications and doesn't need an operating theatre. In this article we share our experience in using modified method of harvesting EBG for treatment of non-healing ulcer.

### Materials and Methods

This study was conducted in the department of Plastic Surgery at a tertiary care center after getting the departmental ethical committee approval. Written informed consent was taken from the patient. The details of the patient in study are as follows: 37 year old female with no known co morbidities with history of road traffic accident 4 months back and underwent right below knee amputation due to vascular injury and degloving injury of the left lower limb for which serial debridement was done by cardiothoracic and general surgery department. Now, the patient presented to plastic surgery department with extensive raw area over the left lower limb (Fig. 1) and non-healing ulcer of about 4\*4cm over the right below knee amputation stump. The regular dressing and skin grafting could not lead to wound healing and had left many raw areas which did not heal completely.

The Non Suction Epidermal Blister Grafting was raised by using 26 G needle (Fig. 2) to raise a bleb by giving local anesthesia (~2ml) in the epidermodermal plane. The adequacy of raising the flap was checked by watching for the orange peel (Fig. 3) like appearance. The epidermal grafts was taken by using size 15 blade and harvesting the epidermis alone (Fig. 4). The harvested graft was applied into the raw area (Fig. 5) with the help of stapplers. The dressing was done after 5 days then alternate days for 10days

### Results

There was complete wound healing of the recipient areas (figure 6) of the wound along with healing of the donor areas. (Fig. 7).



**Fig. 1:** raw area over the right lower limb



**Fig. 2:** Blister raised using 26G needle



**Fig. 5:** EBG applied to raw area



**Fig. 3:** orange peel appearance



**Fig. 6:** Healed raw area



**Fig. 4:** epidermal blister graft excised



**Fig. 7:** Well healed donor area

## Discussion

Epidermal grafting using suction blisters method in human skin was introduced by Kiistala and Mustakallio<sup>1</sup> in 1964, and used by Falabella<sup>2</sup> to treat the vitiligo. Autologous suction blister epidermal grafting (SBEG) has been used for treatment of recalcitrant, vitiligo and other secondary leukodermas, difficult-to-heal wounds, including burns and lower limb ulcers.<sup>3-7</sup> Since the dermis of the donor site is not damaged scarring does not develop although variable loss of pigmentation can occur. The upper thigh is the recommended site. As the dermal plexus is left undisturbed, bleeding does not occur so it is useful in patients on anticoagulants.

Suction blister epidermal grafting techniques cause division through the epidermis at the lamina lucida, and irregular hemidesmosome disruption as well as the formation of cytoplasmic vacuoles within keratinocytes.<sup>8</sup> The basic structure of the epidermis remains and the dermis remains unchanged.<sup>8</sup> Success depends upon separation at the dermal-epidermal (DE) junction and transfer of the entire, intact basal layer to the recipient site.

The exact mechanisms of epidermal graft take is not known. Costanzo et al<sup>6</sup> suggested starting of epithelialization from the edge of the ulcer as the main method. Other authors<sup>9-11</sup> suggested that epidermal grafts does not “take” to the underlying granulation tissue, but, reepithelialisation occur from wound edges. Costanzo et al<sup>6</sup> opined this edge effect could be taking place by growth factors from grafted keratinocytes. A recent study of in vitro examination of the epidermal grafts obtained using the epidermal harvesting system has shown that migratory basal layer keratinocytes and melanocytes are proliferative in vivo. Study of intact microdome roofs derived from healthy human demonstrated viable basal cells produced key growth factors which are important for controlling wound healing responses, which include vascular endothelial growth factor (VEGF), hepatocyte growth factor (HGF), granulocyte colony-stimulating factor (G-CSF), platelet-derived growth factor (PDGF), and transforming growth factor alpha (TGF-alpha).<sup>13</sup> The advantages are that it is easily taken ,easy to apply, less pain on taking graft, it allows donor site to heal. However the disadvantage is that there is less amount of the graft available.

## Conclusion

Non-Suction Epidermal Blister Grafting can be used as a method for harvesting epidermal grafts that are used in treatment of non-healing ulcers with minimal donor site morbidity.

## Conflicts of Interest

All contributing authors declare no conflicts of interest.

## Source of Funding

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