



EFFECT OF NEGATIVE PRESSURE WOUND THERAPY ON SKIN GRAFT TAKE

Plastic Surgery

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ABSTRACT

For the skin grafting to have favourable outcome in wounds it is very important that the graft has a constant adherence to the wound base without any shear. Moreover, there should not be any exudative fluid or blood in the base of the skin graft. Conventionally limb immobilization is done by using splintage which causes discomfort to the patients. It is essential to know about effect of negative pressure wound therapy on take of skin graft when no splintage is provided and its effect on regrafting. 120 patients with different traumas were treated with NPWT with skin graft without splint application. Hospital stay was noted. The Percentage of patients with >90% graft take was noted and compared to previous studies. 112 patients had more than 90% graft take. 8 patients had 70-90% graft take. None of the patients require regrafting. NPWT is a method to secure graft without the need for splintage. It optimises the wound environment. The skin graft uptake rate is excellent. The need for reoperation is minimal.

KEYWORDS

NPWT, skin graft, splint, regrafting.

INTRODUCTION

The Skin graft is a versatile method to close a wound early in many cases where the vascularity of the wound bed is intact and none of the vital structures are exposed. Skin graft take is modified by many factors. Conventional methods of fixing the skin graft & bolster application decreases the shear or movement of the skin graft and with limitation of the movement of skin grafted part using splintage. Even with these methods sometimes skin graft take is not satisfactory especially when there is increased discharge and the contour of the wound precludes adherence of the skin graft to the wound bed. Moreover, splint application to the extremity patients makes patient restless. Hence, it is necessary to see if the use of NPWT (Negative Pressure Wound Therapy) can improve skin graft take results.

MATERIAL AND METHODS

This is a prospective study done in burn and plastic surgery department over a period of 2 years. 120 patients were treated with the application of NPWT for extremity surgeries where the skin graft was applied and splinting was not done. Patient from 14 to 60 years of age with no bone exposed, wound not infected, no excessive discharge or smell who suffered extremity Patients with trauma due to various etiologies were selected. All the wounds and their results were assessed based on age, site, etiologies, co-morbidities, and dimensions & complications after surgery.

SURGICAL TECHNIQUE

Patient was stabilized first. Then the wound assessment was done. The presence of wound infection was ruled out. The Wound was optimized for skin grafting. After obtaining surgical fitness patient was operated. Debridement & freshening of the edge of the wound was done. After creating a template and noting its measurements. Haemostasis of the wound bed was achieved.

Split thickness skin graft of the same dimension was harvested of intermediate thickness. The skin graft placed then fixation of the graft with staplers was done. After putting a layer of paraffin gauze, the NPWT appliance was applied with continuous pressure of 75mmHg. Any suction leak was ruled out. The first dressing of the skin graft was done on 5th day.

RESULT

120 patients were enrolled. Demographics consisted of 79 males (65.85%) and 41 females (34.16%) between the age group 14-60 years. 34 upper extremity defect (28.3%) and 86 lower limb defects (71.66%). The average size of the defect was 48.4cm² with a maximum size being 210.6cm². Etiologies of the defect were varied. Scald burn(5.83%), electric burn (4.16%), chemical burn (2.5%), flame burn (11.6%), Pressure sore (1.6%) and road traffic accidents (74.16%). Out of 120 patients, 9 were diabetics (7.5%), 2 had chronic renal disease (1.6%), and 15 had hypertension(12.5%). Enrolled patient defect features are shown in table 1. 112 patients had >90% graft take (93.34%), 8 patients had 70-90% graft take (6.66%). No patient required regrafting.(Table 2) The average length of in-hospital admission was 9 days and The range of hospital stay was 7 to 18 days.

Table 1 Patient Profile

GENDER DISTRIBUTION

- Male-79(65.83%)
- Female-41(34.16%)

SITE

- Upper extremity -34(28.3%)
- Lower extremity-86(71.66%)

SIZE

- Average size of wound-48.4cm²
- Minimum size-30.8cm²
- Maximum size-210.6cm²

ETIOLOGY

- Scald burn-7 (5.83%)
- Electric burn-5 (4.16%)
- Chemical burn-3 (2.5%)
- Flame burn-14 (11.6%)
- Road traffic accidents-89 (74.16%)
- Pressure sore-2 (1.6%)

COMORBIDITIES

- Diabetes-9 (7.5%)
- Chronic renal disease-2 (1.6%)
- Hypertension-15 (12.5%)

Table 2 Skin Graft Take Percentage

>90%	Take-112 (93.34%)
70-90%	Take-8 (6.66%)
Regrafting	-0

DISCUSSION

Negative Pressure therapy was started by Russians during the Soviet Afghanistan war to achieve better wound care[1]. Dr Bagaoutdinov in 1985 used negative pressure unit with foam dressing to treat infected wounds[1]. Dr. Morykwas et al introduced the modern NPWT technique with polyurethane foam with an attached vacuum mechanism.[2]NPWT decreases edema, promotes an increase in healthy granulation tissue formation, drainage of exudative fluid. This promotes the take of graft by creating an optimal situation for skin graft take. NPWT increases vascularity and also acts as a bolster. It also optimizes the condition of skin graft take in complicated places and uneven contour.

The goals of NPWT are to prepare wound for grafting, providing a stable bolster effect on graft, increasing contact of skin graft and wound , increases perfusion in surrounding tissue, increase in survival of the skin graft. It is important to stop NPWT at the right time as its overuse causes granulation to develop on the skin graft surface. With the NPWT system due to good wound and skin graft adherence, the patient is able to ambulate early after skin grafting. Trauma was the most common etiology in our study as with the studies of Mosidies et al and jeschke et al.[3,4]. Various wound etiologies treatment is

documented for better survival of a skin graft in literature like Fournier's gangrene[5], diabetes[6], chronic ulcer[7], donor sites of radial artery forearm flap[8], and reconstruction of the vulvovaginal region by a skin graft.[9] Studies of Llanos et al[10] and Petar et al[11] where custom made NPWT therapy was used and they had similar results. The use of NPWT has lead to increased graft survival. hence no regrafting was required. Similar to the findings of Llanos et al.[10] Blume Pa et al [12]and Scherer et al.[13]This further resulted in a decrease in the in-hospital stay. In the studies by Llanos et al in 2006 stated using NPWT in skin grafting cases mean hospital stay was 8 days, range of hospital stay in their study was from 7 days to 13 days in NPWT. whereas the hospital stay range in control was 7 days to 23 days with 12 days being the mean hospital stay. The difference observed was significant (p-value 0.001)[10]. In the studies by Scherer et al in 2002 stated using NPWT in skin grafting cases mean hospital stay was 14 days, range of hospital stay in their study was from 5 days to 24 days in NPWT. whereas the hospital stay range in control was 4 days to 34 days with 19 days being the mean hospital stay. The difference observed was not significant[13].

NPWT helps graft in preventing shear as well as causes adhesion to the wound bed and draining exudate from the skin graft base. Hence, improving all the causes of graft take In our study out of 120 patients none required regrafting. Although the graft take in 8 patients was 70-90% none required reoperation. Similar results have been seen with studies of Llanos et al and Petar et al and others [10,11,12,13].When the skin graft is dressed using conventional dressing using a bolster. The graft take is unpredictable with loss of graft ranging from 15% to 30%[14]. This further increases the cost for the patient by increasing hospital stay and reoperation rate. Lee et al has demonstrated a decrease in hospital stay due to an increase in the success of graft take when compared to conventional technique[14].

CONCLUSION

NPWT is a convenient way of securing the graft which also helps in the drainage of exudative fluid. It in turns helps in graft take resulting in a decrease in hospital stay with a decrease in regrafting rates. It helps the patient to return to his daily living early and decreasing the overall cost of treatment. NPWT is a reliable method to obtain predictable results in suboptimal wound conditions. It helps to rehabilitate the patient early and allows for early mobilization.

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