Case Report

Full thickness skin grafting with marginal de-epithelialization of the wound: Experience with two cases

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Abstract

Two cases are presented where large (25 mm and 45 mm diameter) skin cancers were removed followed by the application of full thickness skin grafts over the defect where the margins of these defects had been de-epithelialized in order to enhance the take of the full thickness skin grafts.

FTSGs have a greater risk of failure as compared to split skin grafts (SSG). This relates to the thickness of the graft (split vs full thickness) and the time to vascularization of the defect bed (48 hours). It is proposed that de-epithelialization of the wound (recipient) margin provides an immediate partial wound vascular bed, reducing the need for adequate vascularization of the recipient wound bed.

These cases suggest that with marginal de-epithelialization of the recipient wound margin, survival of a large skin graft can be enhanced.

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Introduction

The advantages of FTSGs include superior cosmetic appearance, greater thickness minimizing wound contracture or distortion and allowing for more resistance to trauma, a more rapid healing time and less pain for the patient as compared to SSGs.

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Case 1

The first patient presented with a squamous cell carcinoma (SCC) measuring 25 mm on the dorsum of her right hand. The SCC was outlined then with a 3 mm circumferential line (for “adequate surgical clearance”) drawn around these markings.

Another 3 mm wide circumferential margin for de-epithelialization was then marked (Figure 1). De-epithelialization using a sharp 4 mm curette performed before excision of the SCC as tissue movement is relatively stable compared with the skin post excision. The SCC was then removed by excision along the “adequate surgical clearance line”. Donor skin (an ellipse with diameter 35 mm) was removed from the right forearm and the donor site was closed by primary intent (Figure 2).

The donor skin was trimmed of subcutaneous fat and perforated a number of times with an 18-gauge needle to allow wound-bed blood and serous fluid to escape. The FTSG was then cut to shape with tangential excision of the deep dermis along the graft margin using sharp curved iris scissors. The FTSG was then sutured over the wound and the de-epithelialized margin with interrupted nylon suture. A bolster of petroleum jelly impregnated gauze was then placed over the FTSG and held in place by a running nylon suture.

Dressings to the FTSG and donor site were removed on day 7. Both the graft and donor site had healed (Figure 3).

Case 2

The second case was an 82-year-old fit healthy male who presented with an SCC on his scalp measuring 45 mm in diameter.

Figure 1. Right hand before de-epithelialization between the continual and the dotted lines. Excision of the SCC along the continual line.

Figure 2. FTSG and donor site on the right forearm.
The SCC was outlined with a dotted margin and then two circumferential lines drawn prior to de-epithelialization of the skin (Figure 4).

The skin was then de-epithelialized between these circumferential continual lines (Figure 5). Following excision of the SCC a FTSG was sutured over the wound and de-epithelialized margin. The donor site in this case was skin from the left clavicular region of his chest. The donor skin was trimmed of subcutaneous fat and perforated a number of times with an 18 gauge needle. The FTSG

Figure 3. FTSG on the right hand at 7 days at the time of suture removal.

Figure 4. SCC (45 mm) on the scalp with continual line markings prior to de-epithelialization of the skin between these lines. Excision of the SCC along the inner continual line.

Figure 5. De-epithelialization before excision of the SCC.
was then cut to shape with tangential excision of the deep dermis along the graft margin using sharp curved iris scissors. The donor wound was closed by primary intent. The FTG was then sutured in place over the scalp wound and de-epithelialized margin (Figure 6).

Dressings and sutures were removed on day ten. The FTSG had taken and the donor site healed (Figure 7).

Discussion

The use of FTSGs as compared to split skin grafts (SSG) is limited by the thickness of the graft and the vascularity of the defect bed. FTSG may be used to cover defects as long as there is a suitable recipient bed. Once the blood supply of the skin graft is well established, the contribution of blood vessels from the graft bed is superfluous.

There are a number of sequential stages during graft healing. These include plasmatic imbibition where the survival of the graft depends upon nutrient diffusion. This stage lasts approximately 48 hours, but is shortened when there is vascular proliferation in the recipient bed. During imbibition, the cells of the graft become hypoxic and more dependent on anaerobic metabolism. This results in the release of vasoactive factors that stimulate the growth of capillaries at the bed-graft interface.

The time at which vascularization (inosculation) begins to occur in the graft is one to two days and the time at which sufficient blood supply is restored for survival of the graft is between four and five days.

It is recognized that FTSGs have a greater risk of failure as compared to SSGs. Smahel found that when FTSG was placed on a prepared two-day old bed in rats “the stage of plasmatic imbibition was reduced to about one half that on a fresh bed and healing throughout was more reliably successful.”
Gringrass and others found that a skin graft may bridge a large avascular defect if “the surrounding bed is prepared for several days and the entire area is regrafted with full thickness skin”. Thibault and Bennett found that the most significant factor in increasing graft take was a delay in the transplantation of the fresh graft and the wound bed by two days.

Lee and others proposed that FTSG survival equates to healthy granulation tissue formation on the wound bed, marginal de-epithelialization of the normal skin surrounding the defect, preservation of the subdermal plexus of the graft and tangential excision of the deep dermis along the graft margin. (The width of the FTSGs applied to the finger defects was up to 7 mm).

Burm and Hansen presented case studies where FTSG was placed over a fresh wound with exposed cartilage of the ear following marginal de-epithelialization of the defect. They suggest the FTSG over an avascular area survives due to rapid marginal vascularization. The width of the exposed cartilage of the ear after keloid excision in their series of seven patients “was usually less than 5 mm”.

These findings and the two case studies presented here support the postulate that by applying full thickness skin to de-epithelialized wound margins reduces the time of plasmatic imbibition and increases the time for vascular inosculation and so increases the chance of FTSG survival.

Also, the donor site closed by primary intent heals quicker than the donor site of SSG and is less painful for the patient. In these cases, the donor skin required was larger than the defect covered, due to the need to also cover the de-epithelialized wound margins. This was not a problem as sites on the body (e.g. clavicular region) where large areas of skin may be harvested can easily be closed by primary intent, the skin is relatively elastic and perforation of the donor skin to allow wound bed fluid and blood accumulation to escape also results in increased elasticity of the skin.

Both cases presented here are examples of the removal of large (greater than 25 mm diameter) skin cancers followed by the application of FTSGs to de-epithelialized wound margins resulting in complete take of the FTSG and healing of the donor sites at one week. FTSG to a large defect with marginal de-epithelialization may be a viable option in the surgical management of skin cancer.

In order to validate the hypothesis that marginal wound de-epithelialization enhances full thickness skin graft survival an appropriately powered and designed randomized trial would need to be performed.

Conflict of interest

Nil.

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References

1. Johnson TM, Ratner D, Nelson BR. Soft tissue reconstruction with skin grafting. J Am Acad Dermatol. 1992;27:151–165.
2. Wright JK, Brawer MK. Survival of full thickness skin grafts over avascular defects. Plastic Reconstr Surg. 1975;55:65–70.
3. Thibault M-J, Bennett RG. Success of delayed full thickness skin grafts after Mohs micrographic surgery. J Am Acad Dermatol. 1995;32:1004–1009.
4. Smahel J. Free skin transplantation on a prepared bed. British Journal Plast Surg. 1971;24.
5. Gringrass P, Grabb WC, Gringrass RP. Skin graft survival on avascular defects. Plastic Reconstr Surg. 1975;55:65–70.
6. Lee JH, Burm JS, Kang SY, Yang WY. Full thickness skin grafting with de-epithelialization of the wound margin for finger defects with bone or tendon exposure. Arch Plast Surg. 2015;42:334–340.
7. Burm JS, Hansen JE. Full thickness skin grafting with marginal de-epithelialization of the defect for reconstruction of helical rim keloids. Ann Plast Surg. 2010;65:193–196.
8. Fietz D, Sivyer GW, O’Brien DO, Rosendahl C. The halo split skin graft in the management of non-melanoma skin cancer of the leg: a retrospective study. Dermatology Practical and Conceptual. 2013;3:11.
9. Robinson JK, Hanke CW, Sengelmann RD, Siegel DM. Surgery of the skin. Procedural dermatology. Elsevier Mosby. 2005;Chapter 8:124.