

P. J. Shoemaker

Split Thickness Skin Grafting

SUMMARY

Primary care physicians often see wounds in which skin loss is a major factor. Although most of these wounds will heal with local care and with a reasonable functional result, split thickness skin grafting as a simple outpatient or bedside procedure can speed healing more comfortably for the patient and with greatly improved functional results. This article outlines the techniques of skin grafting as part of a minor surgical armamentarium. (Can Fam Physician 1982; 28:1145-1147).

SOMMAIRE

Les médecins de première ligne voient souvent des blessures où les pertes de tissu cutané sont un facteur important. Bien que la plupart de ces blessures guériront avec un traitement local sans perte de fonction, la greffe de peau en couche mince comme technique simple en externe ou au lit du patient réduira le temps de guérison en procurant au patient plus de confort et une grande amélioration des résultats fonctionnels. Cet article décrit les techniques de la greffe de peau comme partie des techniques de chirurgie mineure.

Dr. Shoemaker is an assistant professor of plastic surgery at Queen's University, Kingston. Reprint requests to: Dr. P. J. Shoemaker, Johnson V, Hotel Dieu Hospital, Kingston, ON. K7L 5E9.

SKIN IS a compound organ which does not regenerate. The powerful force of wound contraction in conjunction with marginal epithelialization can heal even a large defect, often resulting in a much smaller scar than the original wound. This is especially effective where the skin is abundant and mobile.

In other less favorable areas, wound contraction plays a much smaller role and marginal epithelialization alone is the means by which wound closure is effected.

Typical areas where this variant must occur are the hand and leg. Unfortunately many wounds resulting in tissue loss are found in these areas. The desirable properties of skin, such as elasticity and durability, are a function of the thickness of dermis present.

When epithelialization is the main means of wound closure, a more delicate, easily traumatized scar results since there is no dermis present in the central wound.

Fortunately, it is possible to harvest from a less critical area of the body a portion of dermis with its attached epidermal cells, leaving a wound that heals rapidly and well.

The resultant split thickness or partial thickness graft has an excellent chance of surviving on a suitable recipient site.

'Take'

Take of a skin graft is the affectionate term used by practitioners of skin-grafting to imply that a graft has survived and is attached to the recipient site. This phenomenon has three phases. The first is called plasmatic imbibition, during which the cellular elements survive by diffusion of nutrients and oxygen. Inosculation occurs after 48 hours. This is a random anastomosis between recipient vessels and those in the skin graft.

Finally, a creeping revascularization with vessels from the bed vasculature occurs over a longer period of time.

Simultaneously, the early fibrin glue which initially binds the skin graft in place is replaced by collagen, fixing the graft permanently in place.

The Suitable Wound

A satisfactory recipient wound is one that has adequate vascularity in almost all of its surface to produce granulation tissue. There must be no active bleeding nor an excessive amount of bacteria.

In practical terms, this is either an acute surgical or traumatic defect, or the 'clean' chronic wound with minimal exudate or necrotic tissue. Bare

cortical bone, completely denuded tendon, open joints or other avascular tissue will not support a skin graft. Very small areas of such examples may be bridged if there is adequate surrounding vascular tissue.

Typical examples are finger tip amputations commonly seen in emergency rooms, and chronic leg ulcers due to a combination of infection, trauma and venous disease of the lower extremity (see Figs. 1-6).

The Technicalities

Many varieties of skin harvesting dermatomes are available. The complex powered instruments are not necessary for our purposes. The Silver Dermatome (Downs Surgical Limited, Toronto, #HG165-01L) or a #22 scalpel blade are readily available and easily used (see figs. 7-8). Instructions accompany most instruments and some practice before the fact is necessary.

The operator must be cautious to safeguard against inflicting a mighty surgical wound on the donor site, thereby creating a larger problem.

Adequate anesthesia for the donor area is ensured by using 0.5% lidocaine injected immediately subdermally to distend the site over an area much larger than the intended graft size. The elevation of tissue makes the procedure technically easier.

Sterile saline or surgical lubricant will allow the dermatome to move

smoothly and also facilitates graft harvesting. The skin should be stabilized by pressure of one hand; controlled to and fro motion of the instrument completes the procedure.

The dermatome is directed at a slight downward angle and with moderate pressure into the underlying skin. When sufficient graft is obtained, the instrument is angled upwards as the motion is continued, thus severing the graft from the bed. The large scalpel blade is applied absolutely parallel to the skin surface. Applied in this fashion, the amount of parallel pressure determines the thickness of graft taken.

The Suitable Graft

The thinner the graft, the better the chances for survival. However, excessively thin grafts transfer little dermis and do not markedly restrict wound contraction. Most wounds will best be served by applying a graft of 0.3-0.4 mm. The donor wound will heal well, leaving a barely perceptible scar.

These grafts when harvested are translucent but not completely transparent, and leave a typical bleeding pattern of fine, closely spaced bleeding points (see Fig. 9).

Selection and Care Of the Donor Site

As noted, the donor site does suffer some permanent marking. Most males will accept this in the volar forearm as a site for hand grafts. In the case of a female, however, a site in the upper lateral thigh may be preferred. Thus, any marking can be kept in an area normally covered by bikini underwear.

For lower extremity grafting the upper thigh is a convenient location.

Any standard non-adherent dressing may be applied and left unchanged for 10-12 days, at which time the wound is usually soundly healed.

Care of the Graft Site

After harvesting, the graft can be immediately transferred to the wound,

or stored momentarily in a saline moistened gauze.

It is absolutely critical that orientation of the graft is not confused. The shiny cut surface of the graft must be applied to the wound. Upside-down application is a guarantee of failure.

Although the graft may be sutured in place, this requires the added work of anesthesia to the recipient site. It is preferable in almost all cases to simply lay the graft in place after bleeding is controlled by gentle moist saline gauze pressure. In the case of troublesome bleeding not easily controlled, the use of a compression dressing and delay of grafting for a day or two is necessary. Without intimate immobile contact between graft and recipient blood vessels, the operation will be unsuccessful.

Aftercare

A moistened inner dressing over nonadherent gauze is applied to mold

Fig. 1.
Granulating traumatic skin loss to the leg.



Fig. 2.
Appearance immediately following skin grafting.



Fig. 3.
Healed wound ten days later.

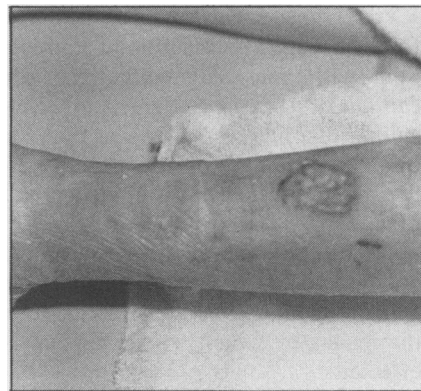


Fig. 4.
Thumb tip amputation by circular saw.



Fig. 5.
Graft lain in place without sutures.



Fig. 6.
Donor site on forearm.



to the underlying defect more readily and absorb any wound exudate.

In acute wounds where hemorrhage is well controlled and the chance of infection is minimal, the dressing may safely be left for five to seven days before initial inspection.

On the other hand, if there is a suspicion that hemorrhage or exudate may break the intimate contact between graft and bed, then inspection at 48 hours is indicated. If the suspicions are founded then the fluid or clot can be gently expressed or removed by aspiration, allowing graft take to proceed. Delaying these maneuvers for a longer period of time will result in loss of the skin graft, since inosculation and vascularization cannot occur.

Gentle removal of bandages is essential, since only fibrin glue is holding the graft in its early stages of healing and it can be dislodged rather easily. Soaking the inner dressing in saline or 3% hydrogen peroxide may be useful in loosening a resistant dressing. The frequency of dressing changes hereafter is dictated by the condition of the wound. If there is excessive exudate then obviously frequent wet dressings are indicated.

When the wound is dry and virtually healed, only a light protective dressing is required to prevent abrasion to the early delicate healing.

Special Considerations

In the lower extremity uncomplicated by venous disease, early ambulation can be safely undertaken, although graft take is enhanced by a period of 48-72 hours bed rest.

Thereafter firm compression by an elastic bandage for three to four weeks is necessary to prevent fluid exudate

stripping the adhesion between graft and bed. Post-phlebotic limbs create greater problems in healing, and usually necessitate a longer period of bed rest, then a permanent compressive bandage to support the graft when the patient is up. Successful grafting, of course, doesn't guarantee permanent healing—recurrence of ulceration is the rule rather than the exception.

Complications

Fortunately there are seldom serious complications from grafting. A few annoying ones are detailed.

Donor Site Scarring

Any donor site shows some effect from harvesting a graft when thin to medium grafts are used. Fine stripped scarring or pigmentary changes are the worst consequences. If a deeper graft is inadvertently taken, rather unsightly hypertrophic scarring could follow. With care this should easily be avoided.

Loss of Graft

Careless bandaging and applying the graft upside down are sure ways to encourage this. Infection and hemorrhage have previously been discussed. Even when wound conditions are imperfect and the graft lost, there is almost always diminution of wound size and a healthier wound.

Occasionally mechanical injury even two to three weeks following grafting can cause hemorrhage between graft and bed causing a delayed loss of graft.

Unsatisfactory Healing

Particularly in the hand, fissuring and hyperkeratosis may occur between

the specialized hand skin and skin from a distant donor site. This is especially inconvenient to the manual worker and may only be solved by revising the graft with skin taken from a hand donor site. Such a donor site creates technical difficulties for the casual operator.

Since sweat and sebaceous glands are not transferred in the graft, some dryness and flaking may occur, necessitating application of extrinsic lubrication.

Conclusion

It is gratifying to see a healthy healed wound following a simple skin grafting operation. The improvement in rate and comfort during healing is beneficial, both economically and in the quality of the wound.

Primary application of a skin graft never compromises any reconstructive procedure that may be required. In fact, many wounds that initially seem to require complex procedures on first inspection are best treated by skin grafting as a primary procedure. Often the eventual result cannot be significantly improved with further surgery.

The skills involved are easily learned and are adaptable to a wide variety of wounds. ●

References

1. McGregor IA: *Fundamental Techniques of Plastic Surgery*, ed 7. New York, Churchill Livingstone, 1980, pp. 55-99.
2. Converse JM: *Reconstructive Plastic Surgery*, ed 2. Toronto, W.B. Saunders, 1977, pp. 156-163.

Fig. 7.
Hand-held #22 scalpel blade
harvesting graft.



Fig. 8.
Silver dermatome in action.

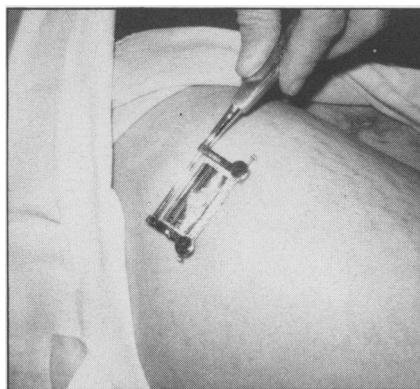


Fig. 9.
Multiple fine bleeding points in
thigh donor site.

