

MINCED SKIN AUTOGRAFTS

Surgical Technique Using the XPANSION® Skin Grafting Instrumentation as Described by

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Introduction

Split thickness skin grafting is a standard reconstructive technique frequently used in patients for burns, acute wounds following surgery or trauma, and chronic wounds that fail to heal with nonsurgical management.¹⁻³ However, skin grafting has been limited by access to a surgeon and an operating room, as well as the need for special instruments and general anesthesia.

Minced skin technology addresses the existing limitations of skin grafting as well as the effective but generally impractical use of cultured keratinocytes. First introduced by Meek in 1958⁴ it preceded the practice of expansion by meshing introduced by Tanner in 1964.⁵ However, the Meek method gained limited use due to complicated instrumentation and the need to orient the pieces with the dermal side down.

In 2002, Svensjo et al described a technique where it was not necessary to orient the minced skin pieces in any specific direction.⁶ This method has been further developed with simplified devices for skin graft procurement and mincing.

Indications

The XPANSION® Skin Grafting Instruments consist of single-use disposable instruments designed to be used for the harvesting, mechanical preparation, and application of skin autografts for the purpose of transplantation

onto wounds. This product is provided sterile for single patient use. **Note: It is assumed that all systemic and regional co-morbidities have been treated.**

Contraindications and Risks

As with any surgical procedure, care should be exercised in treating preexisting conditions that may affect the success of the surgical procedure. Every patient is different and patient results may vary. Specifically, a wound with necrotic tissue or infection should not be grafted until clean. When removing the skin graft from the donor site, the donor site should be dressed before touching the recipient wound in order to avoid cross-contamination from the recipient wound to the donor site. In addition, a skin graft that is too thick will produce a deep donor site resulting in delayed healing of the donor site. The donor site should not be located over bony prominences as this could result in a graft that is too thick and a donor site that is difficult to heal.

Surgical Technique

The preferred time of grafting is 3-7 days after debridement. The wound site is treated with local antimicrobials. If indicated, systemic antibiotics can be used between debridement and grafting. Perioperative systemic antibiotics are given before grafting and continue for one week postoperatively.

Every chronic and acute wound with signs of infection should be cultured. A deep swab culture is the most practical. A positive culture in combination with clinical signs of infection as well as all cultures showing beta hemolytic streptococci, MRSA, or VRE should be treated with systemic and/or local antibiotics.¹

Wound Bed Preparation

All necrotic material should be removed with sharp or enzymatic debridement. Complete narrow excision of the wound edges and the base are preferred when possible to create a clean, granulating bed prior to grafting. This not only removes necrotic material and biofilm, it also reduces the bacterial count.¹ Bleeding can be stopped with cautery or silver nitrate sticks.

Prior to grafting, the wound should be prepped with an anti-septic (e.g. Betadine®, Hibiclens®).

Harvesting Graft

A split-thickness skin graft can be harvested from anywhere, but the upper anterior thigh is usually preferred. In most cases the donor site will be completely healed by 3 weeks post-operatively, appear as a small pink spot by 6 months, and barely visible by 12 months.

The donor site is cleaned, shaved and outlined with a marking pen and both donor site and wound are infiltrated with 0.5% lidocaine with epinephrine. The wound is prepared with an antiseptic and draped with sterile technique. Apply saline solution to donor site. Do not use mineral oil as petroleum can negatively impact micrograft take and proliferation.

Place dermatome flush against skin surface with index finger resting directly on top of handle.

FIGURE 1 Pressing straight down into the flesh (i.e. not angling the blade), initiate graft with dermatome using a back and forth sawing motion. Maintain gentle downward pressure and **take care to keep dermatome parallel to the skin while slowly** advancing blade to harvest desired length of graft. Use the other hand to pinch skin and maintain convexity and tension during harvest.

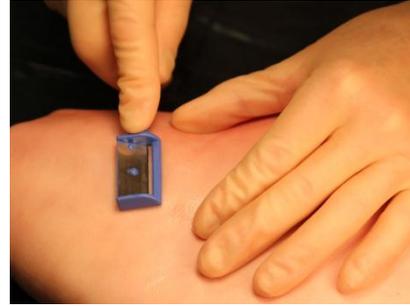


FIGURE 1: Dermatome flush against skin

To remove the graft, keep it tensioned as the dermatome is rotated away from the skin surface. The dermatome is pressure dependent, but it has been calibrated to harvest a graft 0.012"-0.016" in thickness. If the procedure is done in an operating room, any dermatome providing a graft that is 0.012-0.016 inches thick can be used. Transfer graft to cutting mat **dermal side down** to maximize friction with cutting surface. **FIGURE 2** Lightly moisten graft with several drops of sterile saline but do not flood graft.



FIGURE 2: Graft on cutting mat dermal side down

Mincing Graft

Open XPANSION® Device handles and grasp with thumbs in thumb grooves. **FIGURE 3** Align graft through viewing window. Applying **significant, even thumb pressure** on both handles, pass XPANSION® Device over graft completely from one end to the other to create a number of thin strips. **FIGURE 4**



FIGURE 3: Graft through window of dermatome



FIGURE 4: GRAFT CUT IN STRIPS

Turn cutting mat 90° and repeat XPAISON® Device complete pass until all strips have been cut into small square pieces. **FIGURE 5** Multiple passes with the mincing device are acceptable. This technique will create pieces of skin that are 0.8mm x 0.8mm in size. **FIGURE 6**



FIGURE 5 Rotate mat and cut into squares

Transferring Graft

Use spatula and forceps as needed to transfer pieces from cutting mat to clean, granular wound bed. Spread minced skin as evenly as possible on wound bed. The wound surface is then covered with a dressing.



FIGURE 6 Minced skin pieces

NOTE: Graft orientation is not important for graft take.

Micrografting Pre-Op Procedure & Post-Operative Dressing Protocol

There are two important requirements for micrograft take:

1. **Wound bed preparation** must be diligent
 - a. No necrosis
 - b. No biofilm
 - c. Minimal contamination, and
 - d. Adequate blood supply to wound bed (healthy granulation tissue in chronic wound, clean vascularized acute wound).
2. A **moist environment** must be maintained for at least 14 days post-grafting procedure.

The recommended dressing consists of four components:

1. Contact layer (non-adherent interface)
2. Hydrogel
3. Moist Dressing (foam)
4. Compressive wrap if wound is on upper or lower extremity

Sample Dressing Combination

1. Mepitel® interface on top of the micrografts (others: Tegaderm® Interface, Adaptic®)
2. A 3 mm (1/8") layer of Hydrogel on top of the contact layer. The hydrogel can be mixed with 0.5% Gentamicin cream in a 4:1 ratio if the wound is contaminated.
 - a. Commonly found hydrogels: Normlgel®, Tegaderm® Hydrogel, and Surgilube®.
 - b. **No petroleum-based products should be used on contact layer.**
3. Adhesive moist foam dressing. It is imperative that the foam is held in place with adhesive (self-contained or adhesive tape).
 - a. Typical foam dressings include Mepilex® Border, Optifoam®, and Allevyn® Border.
4. In the lower extremity an outer gauze and compressive wrap is applied to complete the dressing.

Note: **Donor site** should also have a similar moist dressing. A hydrogel should be applied first and remain in place until the site is healed.

Dressing Changes

Every 3 Days post-grafting until wound is healed:

1. Remove foam
2. Leave Interface layer in place so as not to disturb skin micrografts
3. Add 1/8" layer of Hydrogel (with Gentamicin cream if deemed necessary)
4. Add new moist adhesive foam

5. Add compressive wrap in upper/lower extremity

Note about Negative Pressure Wound Therapy

The use of negative pressure with minced skin is acceptable as long as the pore size of the interface layer is small enough to prevent the 0.8mm x 0.8mm grafts from being pulled through the dressing. Negative pressure without a contact layer must be strictly avoided, as this can pull the grafts into and through the foam or gauze.

Patient Instructions

Elevate leg or arm at least to level of heart for two weeks. May lower limb for 5 min/hour during first week and 10 minutes/hour during second week. If the wound is elsewhere on the body, there is no limitation to activity. Grafted wounds must be **immobilized** (immobilizing boot for foot).

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Dr. Eriksson is the inventor of the minced skin single-use disposable instrument technology and is a shareholder in a company with an interest in this technology.

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