

Deepithelialized Flaps and Grafts: Applications in Dermatologic Surgery

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PRACTICE POINTS

- Deepithelialized flaps should be considered for single-stage reconstruction with tunneled interpolation flaps, reconstruction requiring contour preservation, and reconstruction involving free margins.
- Deepithelialized grafts may be considered for volume replacement, reconstruction requiring contour preservation, and reconstruction in areas of high mechanical tension.

Deepithelialized flaps and grafts have been widely used by reconstructive surgeons in a diverse array of surgical specialties and have more recently made an appearance in dermatologic surgery. These techniques may be advantageous in their enabling of contour preservation of deep defects, reconstructions in areas of high mechanical tension, single-stage repairs, auricle reconstruction requiring tissue transfer, and reconstruction requiring free margins in areas with a paucity of local soft tissue. This article provides a review of the literature on deepithelialized flaps and grafts. We also highlight the use of these techniques in the field of dermatology and encourage appropriate application of deepithelialized flaps and grafts in dermatologic surgery.

Cutis. 2018;101:213-216.

Deepithelialized flaps and grafts have been widely used by reconstructive surgeons in a diverse range of medical specialties since the early 20th century.¹ These reconstructive modalities have more recently been applied to dermatologic surgery. Deepithelialized flaps and grafts involve removal of the epidermis from the dermis for a variety of surgical purposes. Although these techniques play an important role in dermatologic surgery, reports of application of deepithelialized flaps and grafts in the dermatology literature is limited. This article includes a presentation of

the applications of deepithelialized flaps and grafts in procedural dermatology.

DEEPTHelialIZATION TECHNIQUES

There are a variety of techniques for deepithelialization, although sharp deepithelialization generally is preferred by dermatologic surgeons. The scalpel technique can be accomplished by making an intradermal incision with a No. 15 blade. Traction is an essential component of the deepithelialization process and facilitates sharp removal of the epidermis and superficial dermis in an even plane. The peeling orange technique, which has been described in reduction mammoplasty, is a variant of the scalpel technique used for creating a large area of deepithelialized tissue.² A No. 10 blade is used to make multiple partial-thickness intradermal incisions 1 to 2 cm apart along the pedicle. Traction facilitates rapid deepithelialization of the skin strips on the pedicle. A sharp curette is an alternative option for sharply removing the epithelium from a small area. Electric dermatome, laser, and electrocautery techniques for deepithelialization also can be considered.^{2,3}

APPLICATION OF DEEPTHelialIZED FLAPS

Deepithelialized flaps may be considered for single-stage reconstruction with tunneled interpolation flaps, reconstruction requiring contour preservation, and reconstruction involving free margins.⁴⁻¹⁷

Reconstruction With Single-Stage Tunneled Interpolated Flaps

Alar Base—A partially deepithelialized tunneled interpolated flap is an elegant reconstructive option for defects involving the upper cutaneous lip and alar base. The flap is elevated from the ipsilateral nasolabial fold, deepithelialized proximally, and tunneled under the intact portion of the cutaneous upper lip and ala. The flap is then

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The authors report no conflict of interest.

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deepithelialized superiorly to bolster the alar base and inset at the recipient site.⁴

Nasal Ala—The tunneled interpolated flap is useful for reconstruction of defects of the nasal ala. A flap with a superior deepithelialized pedicle and an anticipated inferior Burow triangle is designed along the axis of the nasolabial fold. The inferior Burow triangle and central flap are elevated at the level of the superficial subcutaneous fat and the pedicle is dissected. The donor and recipient sites are widely undermined, and the flap and pedicle pass through the tunnel. The donor site is closed primarily, the inferior Burow triangle is trimmed, and the flap is sutured into the defect.⁵ This flap allows for preservation of free margins and favorable placement of incision lines. Furthermore, pincushioning of the flap helps to recreate the rounded shape of the lateral ala.⁶

Nasal Tip—Nasal tip defects can be repaired with a retroangular flap, centered on the angular artery. The flap

is elevated along the axis of the nasolabial fold, deepithelialized at its proximal base, and transferred through a subcutaneous tunnel to the nasal tip. The angular artery is ligated at the inferior aspect of the flap.⁷

Nasal Sidewall—A deepithelialized tunneled interpolated forehead flap, similar to the classic paramedian forehead flap, can be used to reconstruct nasal sidewall defects. A flap is elevated on the contralateral forehead and the proximal portion is deepithelialized. A tunnel is then bluntly dissected just above the periosteum, and the flap is introduced into the defect through the tunnel and inset. This flap has the advantages of being a single-stage procedure, restoring volume to the defect area, and maintaining excellent vascular supply.⁸

Eyelid—A tunneled interpolated forehead flap also can be used to repair medial canthal defects and for anterior lamellar repair of lower eyelid defects. In a study of 9 patients receiving a tunneled interpolated forehead flap in these anatomic locations, all flaps demonstrated

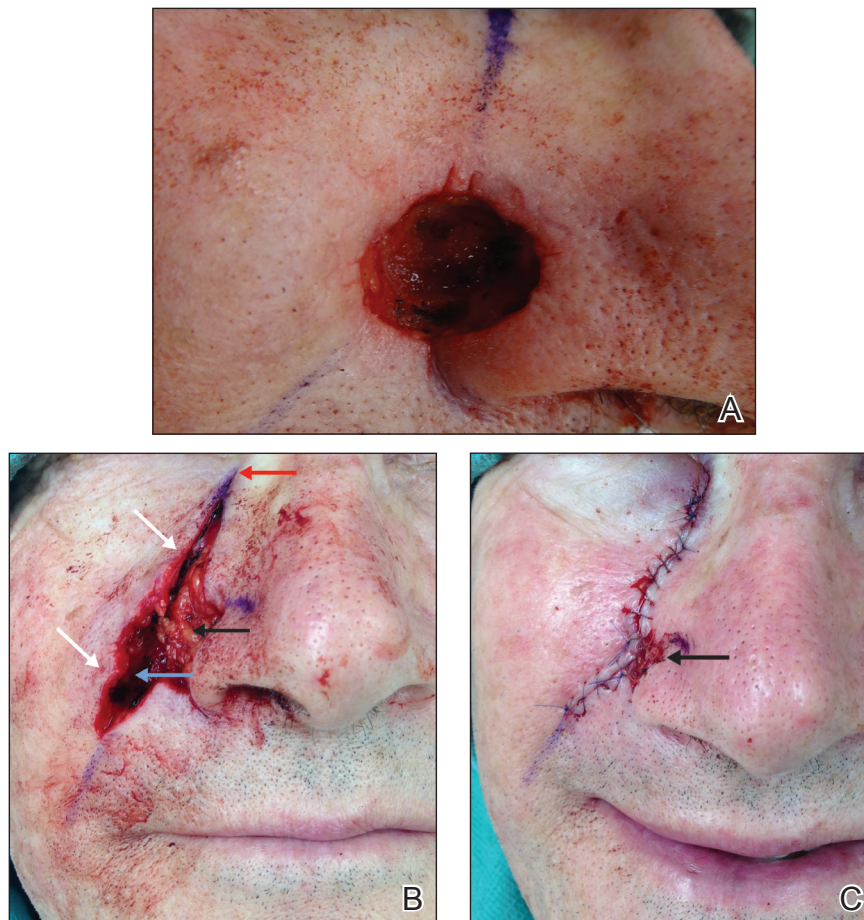


FIGURE 1. Subcutaneous hinge flap. The defect at the alar-cheek junction was too deep for immediate graft placement (A). Superior and inferolateral incisions from the defect were made (B)(white arrows). The cheek advancement was undermined in the subcutaneous plane, effectively deepithelializing the underlying tissue (blue arrow). A deepithelialized hinge flap was elevated from underneath the undermined cheek from the right malar fat pad and transposed into the right nasal ala defect to restore alar volume (black arrow). The Burow triangle along the superior aspect of the primary closure was excised as a full-thickness skin graft (red arrow) and was defatted and inset into the right nasal ala defect (C)(black arrow).

viability, protection of the globe, and preservation of the concave architecture of the medial canthus.⁹

Earlobe—Earlobe defects may be repaired with a pull-through interpolated preauricular flap. A flap is elevated superiorly in the preauricular region and the proximal aspect of the flap is deepithelialized. The flap is pulled through a tunnel and inset at the anterior earlobe defect. The donor site is closed primarily.^{10,11}

Concha—Reconstruction of anterior conchal defects with exposed cartilage can be accomplished with a pull-through interpolated postauricular flap based on the auriculomastoid fossa. The postauricular flap is elevated, the base is deepithelialized, an incision is made in the medial aspect of the defect, and the flap is moved through a tunnel between the posterior and anterior surfaces of the ear. The flap is secured to the anterior surface of the concha.¹²

Reconstruction Requiring Contour Preservation

Central Face—The hinge flap is optimal for reconstruction of deep central facial defects (Figure 1). The hinge flap is planned at a site contiguous with a margin of the defect and can include the dermis, subcutaneous tissue, muscle, or a combination of these. The desired tissue is folded over on the pedicle to fill the defect. Cutaneous coverage is accomplished through a primary closure, separate flap, or skin graft. In addition to restoring contour and therefore the cosmetic subunit, the hinge flap is performed in a single stage, resists wound contracture, and provides a well-vascularized wound bed resulting in a low incidence of graft failure.^{13,14} Muscular hinge flaps have been described for reconstruction of forehead defects with exposed bone based on the frontalis muscle.¹⁵

Lower Lip—A variant of a V-Y advancement flap has been described for reconstruction of defects greater than one-third the length of the lower lip. The top of the “V” is deepithelialized and the flap is advanced such that the top of the “V” abuts the inferior border of the defect. The “V” flap is inset at its advanced position, converting the “V”-shaped wound into a “Y.” An overlying buccal mucosal graft provides reconstruction of the lower red lip and labial mucosa.¹⁶

Helix of the Ear—Large defects of the scapha and helix of the ear can be reconstructed with the use of a staged interpolated postauricular flap. The postauricular flap is elevated into a subcutaneous plane. A full-thickness incision is made medial to the helical rim, and the flap is tunneled through and sutured into place. The pedicle is later divided, and the distal aspect of the flap is deepithelialized and inset into the helical rim for volume restoration.¹⁷

Reconstruction Involving Free Margins

Nasal Ala—For large defects involving the upper cutaneous lip with adjacent alar base involvement, a partially deepithelialized V-Y flap is a useful reconstructive option (Figure 2).

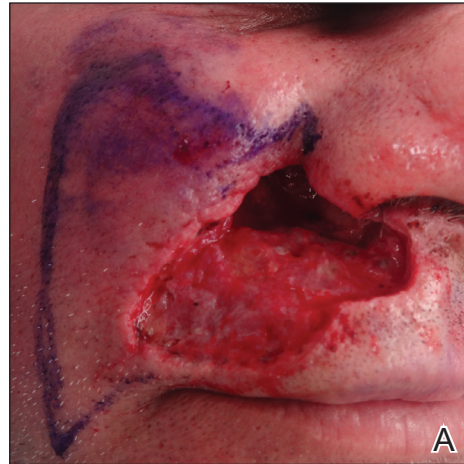


FIGURE 2. Partially deepithelialized V-Y flap (A). The defect involved the alar base, medial cheek, and white lip with collapse of the ala and external nasal valve dysfunction. The diagonal purple lines indicate the planned deepithelialization. The flap was raised from the adjacent tissue and undermined (B). The superior deepithelialized aspect of the flap was sutured into the soft tissue void under the remnant ala. The native alar position was restored and the external nasal valve dysfunction was corrected. The free alar margin was preserved at 12 weeks' follow-up (C).

Infraorbital Region—A deepithelialized variant of a V-Y advancement flap can be used for closure of infraorbital defects. The limbs of the V-Y flap are deepithelialized and anchored to the medial and lateral canthal tendons or periosteum. Ectropion prevention is the primary advantage of this flap.¹⁸

APPLICATION OF DEEPITHELIALIZED GRAFTS

Deepithelialized grafts may be considered for volume replacement, reconstruction requiring contour preservation, and restoration of mechanical integrity in areas of high mechanical tension.^{3,19-21}

Reconstruction Requiring Contour Preservation

Deepithelialized grafts are used to improve depressed nasal scars and restore volume in deep nasal wounds. One method involves deepithelialization of 2 postauricular punch biopsies. An 18-gauge needle is used to make a small hole in the depressed nasal scar, the dermal grafts are inserted, and the defect is closed primarily.¹⁹ Dermal grafts may be harvested from excess full-thickness skin grafts (FTSGs) or dog-ear tissue. When used under flaps, the dermal graft is trimmed to the size of the defect. When used under FTSGs, thin dermal graft strips are placed in a gridlike pattern to allow for revascularization. A study of 15 patients with contour deformities reconstructed with dermal graft insertions demonstrated that 14 (94%) patients had no significant complications and improvement of scar depression was achieved.²⁰

Reconstruction in Areas of High Mechanical Tension

Plantar Foot—A combined dermal and full-thickness sandwich graft has been described for reconstruction of plantar foot defects.³ The graft is created by obtaining a FTSG twice the size of the wound defect and deepithelializing half of the graft. The graft is then defatted and the deepithelialized portion is folded beneath the other half, allowing the papillary dermis to make contact with the wound surface.

Scalp—Dermal graft reconstruction for scalp defects may be accomplished with a split-thickness skin flap. The flap is harvested using an electronic dermatome that ensures the proximal aspect is still attached to adjacent skin. The dermis is removed from the area underneath the back-folded split-thickness skin flap. The dermal graft is meshed and sutured into the recipient site. The split-thickness skin flap is replaced over the donor site. Meshed reversed dermal grafts have excellent survival rates, even with direct placement on bone without periosteum. Querings et al²¹ reported graft survival with no complications in 19 of 21 (90.4%) patients undergoing scalp or plantar sole reconstruction.

CONCLUSION

With the widespread adoption of the fresh-tissue technique for Mohs micrographic surgery and the

establishment of the American Society for Dermatologic Surgery in 1970, the depth and scope of techniques used by dermatologic surgeons has dramatically expanded. Although the use of dermal flaps and grafts is not as widespread in dermatology as other reconstructive techniques, their unique advantages should be considered. Deepithelialized flaps and grafts should be considered when the following reconstructive goals are desired: (1) conversion of a 2-stage interpolation flap to a single-stage tunneled flap, (2) contour and cosmetic subunit preservation of deep defects through volume augmentation, (3) reconstruction in areas of high mechanical tension, and (4) free margin preservation. The multiple applications of deepithelialized flaps and grafts as described in this review demonstrate their continued applicability in dermatologic surgery.

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