

Discussion: Template for Skin Regeneration

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This review of the basic science and clinical applications of bilaminate neodermis, or dermal regeneration template (Integra; Integra LifeSciences, Plainsboro, N.J.), serves as an excellent overview of a useful adjunct to help solve a wide array of complex reconstructive defects. Although originally developed for burn reconstruction, for which it gained its U.S. Food and Drug Administration approval, Integra has since been applied to a myriad of other problems as mentioned in the article, including bridging over exposed bone, cartilage, or tendon and even reconstruction after resection of skin malignancy. Over the years, its utility has been reported in the peer-reviewed literature, where now it has solidified its rung on the “reconstructive ladder,” a thought paradigm on how to approach defects requiring reconstruction.

From a head and neck reconstruction standpoint, Integra has been used in place of adjacent tissue transfers, large rotation flaps, and even free tissue transfer when used to treat wounds from burns, avulsions, malignancy, and trauma. Partial and total scalp reconstructions have been reported in the literature, as well as performed by the authors, with durable success and no donor-site morbidity save for that incurred by ultrathin split-thickness skin grafting (Fig. 1). It has even been able to bridge large areas of exposed bone without periosteum, although the time to second-stage reconstruction with skin grafting is certainly extended given the amount of neovascular bridging required, despite the use of negative pressure. To date, however, there has not been an upper limit of defect size reported when using the product. What is important to emphasize is the need for a vascular bed and surrounding tissue as well as a clean wound that has been aggressively débrided and bioburden reduced (Fig. 1).

From an upper extremity reconstruction standpoint, Integra has proven particularly useful in the reconstruction of soft-tissue deficits of the hand and forearm, even with exposed tendon without intact paratenon. The flowable version can be used when tunneling and/or undermining is present to help obliterate dead space and allow for an even bed and acceptable contour (Fig. 2).

Regardless of the area of reconstruction, the elasticity, pliability, and character of the bilaminate neodermis reconstruction approximate those of normal skin, as referenced within the article and as anecdotally reported. In our practice, it has been used to reconstruct large areas where skin contracture would sabotage the results and cause functional impairment and aesthetic compromise. In essence, it gives the results of a full-thickness skin graft at the price of a thin split-thickness graft and without the donor-site morbidity. It is especially useful in defects in which large full-thickness grafts would otherwise be required but where limited donor availability exists. We have used it successfully as a second stage over free muscle flap reconstruction of the face after devastating electrical burns (Fig. 3).

The principles of diabetic wound care parallel those of burn wounds and what the dermal regeneration template is trying to restore: retention of moisture and prevention of infection. In addition, use of dermal regeneration template facilitates the cell replication and capillary growth necessary for wound closure. Using a dermal regeneration template may actually effectively replace the need for a full-thickness autograft from a patient population that is already challenged by large and deep wounds.

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Fig. 1. (Above, left) Partial scalp defect after traumatic avulsion, with exposed bone without periosteum at two locations. (Above, right) One-year postoperative view of two-stage bilaminare neodermis reconstruction. (Below) Appearance at 18 months postoperatively, demonstrating durability as well as prosthetic ear reconstruction.

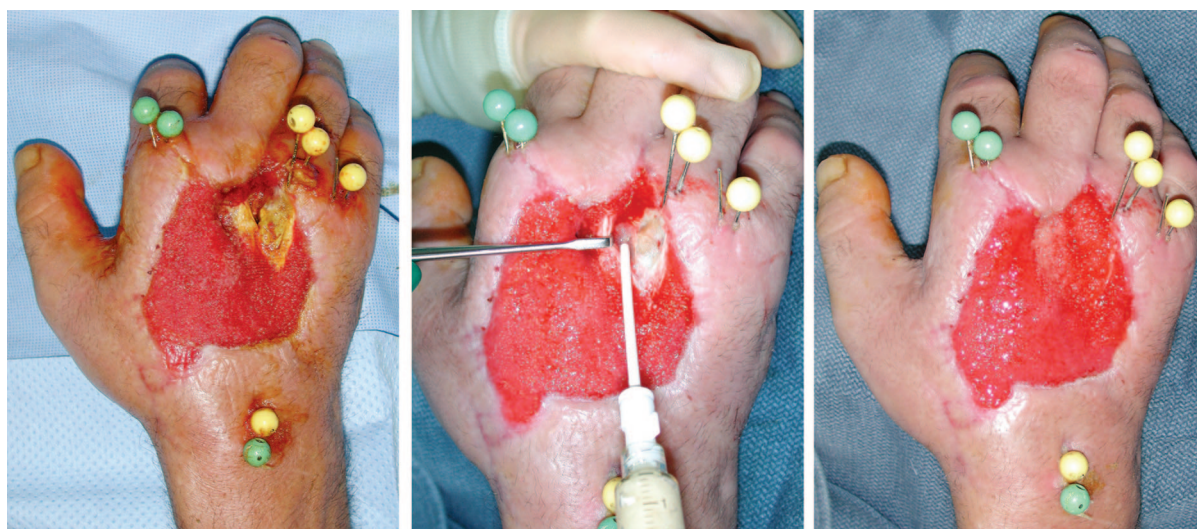


Fig. 2. (Left) Dorsal hand defect with exposed tendon without paratenon or bone, as well as tunneling. (Center) Insertion of flowable neodermal product. (Right) Obliteration of dead space using flowable product as well as coverage of exposed tendon.



Fig. 3. (Above, left) Fourth-degree electrical burn with exposed bone without periosteum. (Above, right) Wound after free tissue transfer using latissimus serratus. (Center, left) Wound after maturation of bilaminare neodermis on top of the free flap. (Center, right) Placement of a 0.007-inch split-thickness skin graft. (Below) Patient at 18-month follow-up demonstrating durability of the result. Note the appearance and character of a full-thickness skin graft.

Although Yannas et al. do an excellent job of identifying the role of dermal regeneration template, robust clinical evidence is still needed in the peer-reviewed literature. Clerici et al.¹ conducted a study of 30 diabetic patients who underwent surgical débridement with subsequent grafting with dermal regeneration template and reported an 86.7 percent healing rate and a significantly more distal level of amputation ($p < 0.003$). Although there is some clinical evidence supporting the use of dermal regeneration template in wound care, this article primarily highlights conceptual support for its application.

As a whole, Yannas et al. have done a comprehensive technical review of the dermal regeneration template technology. They have clearly identified a role for dermal regeneration template as an essential adjunct in wound healing in burn patients. We suggest that the same concepts can be further applied in other realms of wound care,

such as chronic diabetic wounds, among others. Future studies will help provide evidence to support its role in the reconstruction of a variety of wounds and defects.

PATIENT CONSENT

The patient provided written consent for the use of his images.

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REFERENCE

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