Artificial Dermis Offers Wound Care Alternative

BY JEFF EVANS
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VAIL, COLO. — A bioengineered skin substitute may have applications in reconstructive surgery that extend beyond its indication for burn victims, Dr. Kapil Saigal said at a symposium sponsored by the American Academy of Facial Plastic and Reconstructive Surgery.

The recent development of biomaterials for head and neck reconstruction has provided alternatives to autologous skin transplantation, such as cadaveric allograft skin, xenografts, and bioengineered skin substitutes, said Dr. Saigal, a fourth-year resident in the department of otolaryngology–head and neck surgery at Jefferson Medical College, Philadelphia.

A biologic skin substitute can be used as a permanent replacement or as a temporary biologic dressing. These skin substitutes can decrease bacterial counts; slow the loss of water, proteins, and electrolytes from the wound; reduce pain and fever; help restore function and facilitate early motion; and prevent desiccation of vessels, tendons, and nerves.

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Fewer data are available on the functionality of biological skin substitutes in reconstructive surgery than in burn treatment and chronic wound healing, he said.

Integra artificial dermis is a composite bilayer dermal regeneration template that is used for skin replacement. It was approved by the Food and Drug Administration in 2003 for the treatment of life-threatening third-degree burns to provide immediate coverage for as much as 95% of body surface area.

The biomaterial is composed of a dermal replacement layer of a porous matrix of crosslinked bovine tendon collagen coated with a glycosaminoglycan (chondroitin-6-sulfate); a temporary epidermal layer of polysiloxane polymer (silicone) prevents moisture loss.

After Integra has been in place for 2-3 weeks, the template changes from its original color of pink to yellow or an orange-peach color, which indicates that the graft is vascularized and a new dermal-like layer has been generated. The epidermal polysiloxane layer can be removed so that a very thin epidermal autograft can be placed on the new dermis. Very little wound contraction occurs because of the thick dermal component, Dr. Saigal explained.

The template is thought to improve "fibroblast proliferation from the wound edges, while the addition of a glycosaminoglycan actually decreases the inflammatory component of wound healing and prevents the formation of granulation tissue," he said at the symposium, which also was sponsored by the American Society for Dermatologic Surgery and the American Society of Ophthalmic Plastic and Reconstructive Surgery.

Dr. Saigal reported that he and his associates have used Integra in 15 patients for wounds ranging from those on the eyelid to radiated scalp wounds with graft sizes of 10-140 cm^2. Most of the reconstructions have been performed on an outpatient basis.

They have used the skin substitute to perform a delayed reconstruction after removal of a cutaneous malignancy, repair a defect after surgery for severe rhinophyma, cover wounds of the head and neck that were not amenable to primary or focal closure, and heal areas that have been irradiated or will be irradiated postoperatively. The product may be useful in closing wounds in children and elderly patients, he suggested.

In a case series of seven patients with an average age of 70 years who received the Integra artificial dermis, 100% of the split-thickness skin grafts that were applied after a mean of about 5 weeks survived without any complications (Plast. Reconstr. Surg. 2005;115:1010-7).

Other reports in the literature suggest that Integra has a better "take rate" in complicated wounds when it is combined with a vacuum-assisted closure or with fibrin glue, said Dr. Saigal, who disclosed that he and his colleagues have no financial interest in Integra.

Integra costs about $700-$900 per graft, he said. ■