Evaluation of Six Split-Thickness Skin Graft Donor Site Dressing Materials in a Swine Model

Pamela C. Masella DO, Eric M. Balent MD, Terri L. Carlson DO, Karen W. Lee, Lisa M. Pierce DSc

Abstract

Background: Split-thickness skin grafting is a widely used reconstructive technique for the replacement of damaged or missing skin caused by burns, trauma, and chronic wounds. Donor sites may be used repeatedly when a large area of injury exists, and therefore the time to healing of the donor site becomes especially important. Ideal wound care for donor sites should include dressings that promote healing, prevent complications, and are cost-effective. Numerous donor site dressings are commercially available with no conclusive evidence-based consensus regarding the optimal dressing choice. We therefore used a swine model to identify which of five commonly used dressing materials promotes wound healing most effectively for use on split-thickness donor sites in comparison with our standard dressing, Xeroform (petrolatum gauze).

Methods: Twenty-four partial-thickness skin wounds were created on the backs of 4 Yorkshire pigs using a dermatome. After randomization, wounds (n=4 per dressing type per pig) were dressed with Xeroform, Opsite (polyurethane film), Kaltostat (calcium sodium alginate), DuoDERM (hydrocolloid), Aquacel (hydrofiber), and Mepilex (silicone foam). After 3 days (n=3 pigs) or 5 days (n=1 pig), full-thickness skin samples were excised and evaluated histologically for re-epithelialization and inflammation. Comparisons also included incidence of infection, ease of use (application and wound care), and cost analyses.

Results: DuoDERM-treated donor sites showed the greatest percent re-epithelialization (81±7 SEM) while Mepilex sites showed the lowest (33±4) after 3 days (p=0.004, DuoDERM vs. Mepilex). All dressings demonstrated complete re-epithelialization except Mepilex (85±4%) at 5 days. There were no infections and inflammation was mild among all dressing types. Mepilex was easiest to use, while Aquacel, Kaltostat, and Opsite were most difficult (p=0.03). Xeroform was most cost-effective (0.17 cents/cm²) and Aquacel (7.10 cents/cm²) was most expensive. Combined scoring revealed DuoDERM = Xeroform > Opsite = Mepilex > Kaltostat > Aquacel (Table 1).

Conclusions: DuoDERM and Xeroform were the most effective dressings overall. DuoDERM tended to outperform all dressings in re-epithelialization at 3 days, while Xeroform was least expensive, easy to use, and demonstrated rapid re-epithelialization. These findings suggest that Xeroform may be preferred for use on large donor site areas. DuoDERM may be more appropriate for use on small donor sites when time to healing is a priority.

References:

Disclosure/Financial Support:
There are no disclosures to report. None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

Declaration of Interest: The views expressed in this abstract are those of the authors and do not reflect the official policy or position of the Department of the Army, the Department of Defense, or the US government.