

# Systematic Review of Skin Graft Donor-Site Dressings

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**Background:** Debate continues about what split-thickness skin graft donor-site dressing provides the best outcomes for patients at the lowest cost. The goal of this systematic review was to determine which donor-site dressings are associated with the best outcomes for the following: pain, infection rate, healing quality, healing rate, quality of life, and cost.

**Methods:** A comprehensive literature review and assessment was undertaken by two independent reviewers. Articles were selected using specific inclusion criteria. Split-thickness skin graft donor-site dressings were classified as either moist or nonmoist based on the state of the dressing upon initial application. Methodological quality of randomized controlled trials was assessed using the Jadad scale.

**Results:** Seventy-five relevant articles were included in the final analysis, three of which were review articles. The most commonly measured outcome was healing rate (64 of 72), followed by pain (58 of 72), infection rate (40 of 72), healing quality (40 of 72), and cost (15 of 72). No studies measured quality of life. The majority of articles were randomized controlled trials (35 of 75), followed by observational studies (22 of 75), unsystematic clinical observations (15 of 75), and review articles (three of 75). It was difficult to compare moist and nonmoist dressings in this review because of the methodological heterogeneity of the included articles. The available evidence suggests, however, that moist dressings are superior in terms of pain.

**Conclusions:** Some weak evidence exists that supports “wet dressings.” To determine the best split-thickness skin graft donor-site dressing, more methodologically sound randomized controlled trials are needed. Trials with parallel economic evaluations should be undertaken to answer this question. (*Plast. Reconstr. Surg.* 124: 298, 2009.)

**S**kin grafting as a reconstructive technique has many benefits, including accelerating the healing of burns and other wounds, and correcting scar contractures. The management of the donor site after harvesting a skin graft is an important issue, as patients often report more discomfort at the donor site than at the recipient site.<sup>1</sup> The ideal split-thickness skin graft donor-site dressing would promote healing and be comfort-

able for the patient, impervious to infectious organisms, easily applied, and cost effective. There is, however, a plethora of dressings available for the treatment and management of donor sites. These dressings can be grossly categorized into moist (e.g., Tegaderm, Aquacel Ag, Kaltostat) and nonmoist dressings (e.g., Scarlet Red, Xeroform, Jelonet). The key difference is that moist dressings can prevent exudate desiccation by retaining moisture.

Two systematic reviews comparing moist and nonmoist donor-site dressings have been published.<sup>2,3</sup> Rakel and colleagues<sup>2</sup> found transparent film to

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be the best dressing in terms of patient comfort, infection rate, healing quality, healing rate, and cost. No indication, however, of study inclusion or quality was mentioned. In the later one, Wiechula<sup>3</sup> examined pain, infection, and healing in a systematic review of two types of studies: intraindividual and prospective randomized controlled trials. Wiechula concluded that moist dressings provided better healing, less pain, and lower infection rates. Although the traditional outcome measures such as infection and healing rates examined by these two reviews are clinically important, they may not accurately represent the patient's perspective. Therefore, it is important to consider patient satisfaction and quality of life when comparing dressings. Unfortunately, this was not examined in either review.

While Wiechula's review noted the importance of cost consideration, the primary studies identified rarely included a cost-effectiveness component.<sup>3</sup> This variable is important in an era of limited healthcare resources. Rakel et al., on the other hand, attempted to synthesize the cost by different treatments by comparing dressings on a "cost per square inch" basis.<sup>2</sup> They also mentioned the possibility of measuring dressing cost per donor site or dressing cost per patient; however, these are only measures of direct medical cost. The ideal method to consider costs is through a proper economic evaluation.<sup>4</sup> Since the last review was published 5 years ago and conducted over 9 years ago,<sup>3</sup> new dressings may have been introduced and higher quality data published. Therefore, it was thought appropriate to reexamine this topic with an up-to-date systematic review. The goal of this review was to determine which donor-site dressing, or generic group of dressings, is associated with the least pain, the lowest infection rate, best healing quality, fastest healing rate, best quality of life, and lowest cost.

## METHODS

### Search Strategy

A literature search of the following electronic databases was conducted: Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, MEDLINE, CINAHL, and EMBASE. The key words used were a combination of "skin graft," "donor," "dressing," with limits, "English," "human," and articles published between 1971 to May of 2008. The year 1971 was chosen as it was the year of the first published discussion of split-thickness skin graft donor-site management.<sup>5</sup>

### Article Eligibility

Two reviewers (S.V. and O.A.) independently scanned the retrieved articles' abstracts for potential relevance. To be included, the articles had to: (1) include patients requiring split-thickness skin graft donor dressings, (2) be a review article or a comparative study of wound dressings split-thickness skin graft donor sites, and (3) publish the authors' results as a full report. The exclusion criteria were: articles which only examine pediatric populations, case reports, case series, letters to the editor, abstracts, meeting proceedings, and articles that studied other variables beside dressings such as a specific application or procedural technique (i.e., ice packs, polydeoxyribonucleotide cream). If there was disagreement among reviewers on the potential relevance of an article, an arbitrator (A.T.) was recruited to resolve the dispute.

### Dressing Classification and Outcome Measures

Split-thickness skin graft donor-site dressings were classified as either moist or nonmoist based on the state of the dressing upon initial application. For example, sulfacrate-soaked gauze dressing would be classified as a moist dressing, despite drying out as time goes on. The results of each study were examined with regard to six clinical outcome measures: pain (reported using different rating scales); infection rate (clinical signs of infection by wound swabs or other undefined method); healing quality (thickness of skin surface, disruption of skin upon dressing removal, Vancouver Scar Scale, or other method); healing rate (a temporal scale); quality of life (relative to the patient's expectations and experience, quality of life scales); and cost (from direct costs of split-thickness skin graft dressings to cost-benefit analysis).

### Assessment of Methodological Quality

The methodological quality of randomized controlled trials was assessed independently by two reviewers (O.A. and S.V.) using the Jadad scale.<sup>6</sup> Briefly, the Jadad scale assesses the quality of reports of randomized controlled trials by addressing three items that are directly related to bias reduction: (1) randomization, (2) blinding, and (3) description of withdrawals and drop-outs. Presented as questions to elicit "yes" or "no" answers, the scale produces scores from 0 to 3, with the opportunity to add/subtract up to 2 additional points based on quality of the study description, thus producing overall scores of 0 (low quality study) to 5 (high quality) (see Appendix I for further description). It was decided, a priori, to

classify studies with a score of 2 or more on the Jadad scale as good quality. It should be made clear that the Jadad scale is used specifically to assess the quality of randomized controlled trials per se and is not related to assessing the six clinical outcome measures listed above.

### Data Extraction

The following data were extracted from each primary article and used for descriptive comparisons: author, journal, year of publication, gender, sample size, clinical setting, study design, dressing(s) utilized, outcome measures, study results, and recommendations.

### Data Analysis

All data are summarized descriptively. A kappa statistic, a measure of chance-corrected agreement, was calculated to provide an estimate of agreement between reviewers with regard to the final list of articles reviewed.

## RESULTS

### Characteristics of Included Studies

The literature search identified 472 potential articles. After removal of duplicates and application of the inclusion and exclusion criteria, 75 articles were deemed relevant and were included into the final analysis (kappa 0.81).<sup>1-3,7-78</sup> Over 50 different dressings were used in the 75 studies. The most commonly used nonmoist dressings

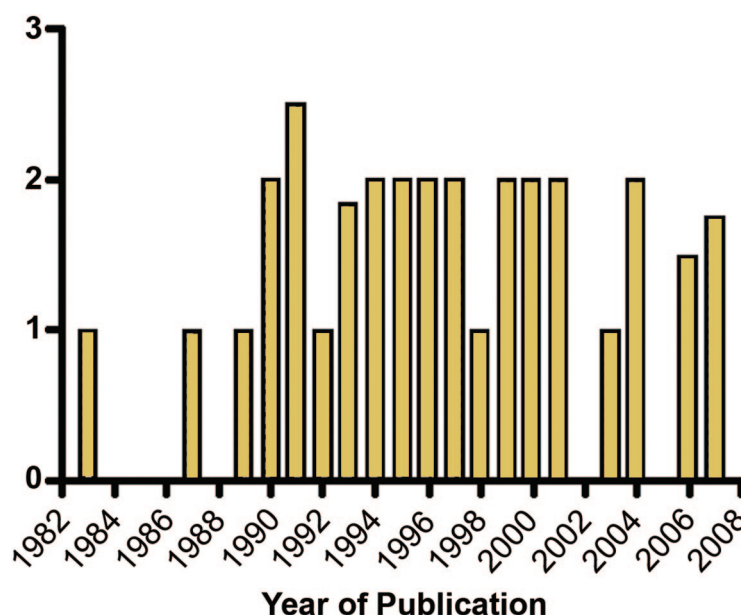
were Xeroform, Scarlet Red, and Jelonet. Common moist dressings included Kaltostat, Opsite, Duoderm, and Allevyn. The most common dressing assessment in these studies (31 of 75) compared moist and nonmoist dressings. The remaining studies compared moist with moist (11 of 75), moist with no dressing (eight of 75), nonmoist with nonmoist (five of 75), nonmoist with no dressing,<sup>1</sup> or a novel dressing type with either moist, nonmoist, or no dressing. Examples of novel dressing types included banana leaves,<sup>33</sup> aluminum foil,<sup>52</sup> and beeswax.<sup>56</sup>

The most common study designs used were as follows: randomized controlled trials (35 of 75), observational studies (22 of 75), unsystematic clinical observations (15 of 75), and review articles (three of 75). Two of the three identified reviews were systematic reviews.<sup>2,3</sup> Of the 59 studies that compared two or more dressings, 38 (64 percent) were conducted via intraindividual comparisons.

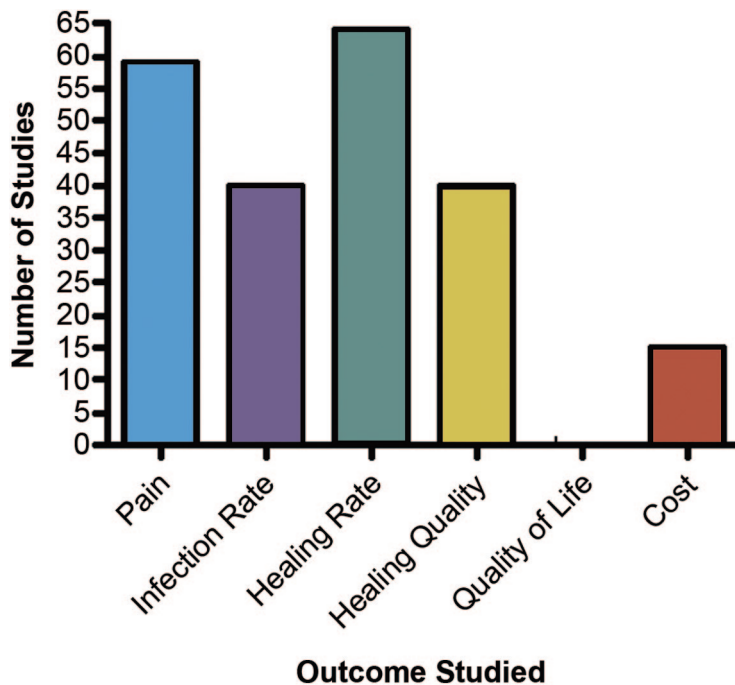
The methodological quality of the randomized controlled trials using the Jadad scale is seen in Figure 1. The mean quality score was  $1.7 \pm 0.7$ .

### Outcome Measures

The majority of studies measured the outcomes of pain, infection rate, healing quality, and healing rate (Fig. 2). No studies measured quality of life, and very few studies measured cost as an outcome (Fig. 2). The time horizon (time required to measure outcomes) in studies ranged from 1 week to 1 year. The majority of studies



**Fig. 1.** Methodological quality of randomized clinical trials comparing donor-site dressings using the Jadad scale.



**Fig. 2.** Absolute number of studies examining each outcome measure.

measured outcomes in the first 2 weeks after harvesting. In several studies, the time horizon was not defined, or the authors reported the time horizon as “until healed.”

*Pain* was examined in 58 of the 72 nonreview articles. Twenty-eight of the 72 studies did not report their methods used to measure pain. Of the remaining 30 articles, pain was measured using various scales or questionnaires, the most common being a visual analogue scale, others are shown in Table 1. Regardless of the method of measurement, 25 of the 27 studies that compared moist with nonmoist dressings reported moist dressings were associated with less pain.

Forty of the 72 nonreview articles measured *infection rate* as an outcome. Of these articles, only 19 provided an explicit definition of infection rate in their methods. Infection rate was defined either qualitatively (i.e., inflammation, redness, swelling, heat, discharge, exudate) or quantitatively (i.e., bacterial count) or using a combination of both. There was no evidence to support the superiority of moist to nonmoist dressings or vice versa.

*Healing quality* was evaluated in 40 of the 72 included articles. Healing quality was assessed by the appearance, patient’s satisfaction, and sensation of the scar as well as the appearance of the donor site. It was unclear which dressing provided the best healing quality. Eleven studies favored moist dressings, five favored nonmoist dressings,

**Table 1. Methods of Pain Measurement**

Method of Pain Measurement	No. of Studies (n = 58)
Pain not measured with a scale	28
Visual Analogue Scale*	15
Numerical Rating Scale*	9
Verbal Rating Scale*	3
Faces Pain Rating Scale*	1
Authors’ own questionnaire	2

\*Denotes validated scale.

and 14 studies found no difference between moist and nonmoist dressings.

The most common outcome assessed was *healing rate*, which was reported in 64 of the 72 studies. In contrast to infection rate, the majority of the studies (55 of 64) provided a definition of a healed donor site. Definitions included epithelial cover, presence of exudates, scarring appearance, and various aesthetic descriptors (i.e., hypertrophy, color, texture, return of hair growth) or sensation (i.e., tenderness, numbness) and proportion of the wound healed. The majority of studies (57 percent) that compared moist with nonmoist dressings found moist dressings to be associated with a faster healing rate, while most of the remaining studies (32 percent) found no significant difference between the two dressing types.

While none of the 72 included articles measured patient *quality of life*, 15 of the 72 articles examined *cost* (Fig. 2). In all 15 studies, only direct

costs were measured from the hospital perspective. Four studies concluded that nonmoist dressings were less expensive on a per square inch basis; one study found moist dressings to be less expensive.

### Overall Dressing Recommendations

There was consistency in the dressing preference recommendations, regardless of study design. Specifically, of the observational studies that compared moist with nonmoist dressings, the trend in the data shows a preference toward the use of moist dressings. Of the randomized controlled trials that compared moist with nonmoist dressings, the majority of investigations concluded that moist dressings were favorable in the measured outcomes.

## DISCUSSION

The aim of this systematic review was to identify the split-thickness skin graft donor-site dressing that is associated with the least pain, lowest infection rate, improved healing quality, fastest healing rate, best quality of life, and lowest cost. The majority of primary studies regardless of study design found moist dressings to be associated with less pain and a better healing rate; these findings are consistent with the results of Wiechula's systematic review.<sup>3</sup> The findings of our systematic review, however, do not support these findings, with the exception of the pain variable, for which 25 of the 27 studies support the salutary effects of wet dressings. Even with this variable, however, uncertainty exists, as often the pain scales used in the primary studies were not validated. Nonetheless, our study adds to the literature by being a systematic review that critically assessed the methodology of each article examined, thus minimizing selection bias, as well as addressing endpoints such as quality of life and cost-effectiveness.

The three main outcomes studied were pain, infection rate, and healing rate. With the exception of pain, these outcome measures are typically made based on the surgeon's perspective, which may be very different from the patient's perception of the outcome. When measuring surgical outcomes, it is important to consider the patient's satisfaction and how an intervention affects the patient's quality of life. This systematic review revealed that no investigators have formally measured quality of life in patients with split-thickness skin graft donor sites despite the fact that there are many well-developed, validated, and reliable patient-reported questionnaires available to assess the quality of life.<sup>79</sup>

It remains unclear which type of dressing is superior in terms of infection rate, healing quality, quality of life, and cost. It was difficult to compare moist and nonmoist dressings in this review because of the heterogeneity of the included articles. For example, over 50 different dressings were used in the 72 nonreview articles. In addition, the definitions and measurements of outcomes were highly variable. For example, the definitions of a healed donor site included absence of pain, patient discharge from hospital, and full epithelial cover. Many articles did not provide a definition of healing quality yet reported qualitative results of healing.

In terms of the specific outcome measures, there was little consistency in the methods for measuring pain. A variety of pain scales were used, many of which lacked proper methodological development. In studies where similar pain scales were used, comparisons remained difficult due to temporal differences in pain measurements. Future studies should aim to explicitly report the definitions of the outcomes and exactly how those outcomes are measured. There are several instruments available for measuring pain that have undergone rigorous development and testing. One such tool is the McGill Pain Scale. The questionnaire consists of three major classes of word descriptors (sensory, affective, and evaluative) that are used by patients to specify subjective pain experience, thus providing quantitative measures of clinical pain that can be treated statistically.<sup>80</sup>

Fifteen of the 75 studies compared the costs of moist and nonmoist dressings on a per square inch basis. These studies only compared the direct costs of the different dressings and ignored other indirect and intangible costs that may have been absorbed by the patient (i.e., days off work, unpaid family assistance). When performing an economic evaluation, it is necessary to state explicitly who is benefiting from the intervention, as the benefits will not be the same across all possible beneficiaries.<sup>4</sup> There are several possible perspectives, including the patient, the hospital, the third party payer (i.e., Workers' Compensation Board, Medicare, Health Maintenance Organizations, Ministry of Health, National Health Service), and society. The perspective taken will depend on the question being asked. The ideal study would be a randomized controlled trial with a parallel economic evaluation in which multiple perspectives were considered. In an era of limited health care resources, there is a need to be accountable for resource use. This requires determining the cost effectiveness of any new procedure compared with the current

standard of care, as often novel procedures prove to be more costly yet more effective.

The major strength of this review is that it was a systematic review of all the available literature. The articles were selected according to specific criteria decided a priori and reviewed by two independent reviewers to minimize selection bias. This review included observational studies and randomized controlled trials. Observational studies are considered lower-level evidence as they are subject to many biases, including selection bias, and often overestimate treatment effects. The best evidence evaluating surgical interventions is obtained from methodologically sound randomized controlled trials. The randomized controlled trials included in this systematic review did not prove to be of high methodological quality, according to the Jadad scores. Therefore, it is difficult to make a recommendation of which dressing or dressing type provides the best outcomes for patients. It is recognized that the findings of unpublished negative studies could effect the conclusions of a systematic review. A funnel plot is a plotting device used in meta-analysis to detect publication bias. The estimate of risk is plotted against sample size.<sup>81</sup> As no statistical pooling was possible in this systematic review (i.e., calculation of effect size) due to the heterogeneity of the studies, a funnel plot was not appropriate. Nevertheless, the vast majority of studies included in the final analysis of this review were comparative in nature (i.e., comparing performance of dressing A with dressing B); we do not believe there would be a preponderance of nonpublished studies. That is, such comparative studies would, arguably, be published regardless of whether dressing A was superior (i.e., positive result, relative to dressing A) or dressing B was superior (i.e., negative result, relative to dressing A). Furthermore, a number of studies included in this systematic review demonstrated either negative or inconclusive results.

This systematic review concludes that there is no clear evidence of the superiority of the wet dressings over the dry ones as espoused by previous publications. We believe that a state of equipoise exists.<sup>82</sup> This systematic review highlights the need for more methodologically sound randomized controlled trials to assess split-thickness skin graft donor-site dressings. Skin graft donor dressings are associated with disparate outcomes (i.e., pain, healing, costs, etc.). Therefore, it is important that future investigators clearly define their research question and primary outcome. It is imperative they provide a rationale why their question is clinically relevant and should be answered.<sup>83</sup> They also need

to provide a rationale for the perspective taken. Is it the patient, third party payer, or society? Future randomized controlled trials need to clearly define the primary outcome. Attention should be paid in the selection of existing valid measurement scales to assess: pain and quality of life. Intraindividual studies comparing two or more dressings, where possible, will aid in diminishing interpatient variability and substantially lower the required sample size. A useful tool when designing randomized controlled trials is the CONSORT (Consolidated Standards of Reporting Trials) Statement. It is an evidence-based, minimum set of recommendations for reporting randomized controlled trials.<sup>84,85</sup> More detailed than the Jadad scale, investigators and editors have developed a revised CONSORT statement to help authors improve reporting by using a checklist and flow diagram.<sup>85</sup> Finally, we believe that economic evaluations “piggy backed” to randomized controlled trials will provide us with best evidence to adopt in our practices.

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## REFERENCES

1. Feldman DL, Rogers A, Karpinski RH. A prospective trial comparing Biobrane, Duoderm and xeroform for skin graft donor sites. *Surg Gynecol Obstet.* 1991;173:1-5.
2. Rakel BA, Bermel MA, Abbott LI, et al. Split-thickness skin graft donor site care: A quantitative synthesis of the research. *Appl Nurs Res.* 1998;11:174-182.
3. Wiechula R. The use of moist wound-healing dressings in the management of split-thickness skin graft donor sites: A systematic review. *Int J Nurs Pract.* 2003;9:S9-S17.
4. Thoma A, Strumas N, Rockwell G, McKnight L. The use of cost-effectiveness analysis in plastic surgery clinical research. *Clin Plast Surg.* 2008;35:285-296.
5. Ousterhout DK, Tumbusch WT, Margetis PM, Leonard F. The treatment of split thickness skin graft donor sites using n-butyl and n-heptyl 2-cyanoacrylate. *Br J Plast Surg.* 1971; 24:23-30.
6. Jadad AR, Moore RA, Carroll D, et al. Assessing the quality of reports of randomized clinical trials: Is blinding necessary? *Control Clin Trials* 1996;17:1-12.
7. Akita S, Akino K, Imaizumi T, et al. A polyurethane dressing is beneficial for split-thickness skin-graft donor wound healing. *Burns* 2006;32:447-451.
8. Attwood AI. Calcium alginate dressing accelerates split skin graft donor site healing. *Br J Plast Surg.* 1989;42:373-379.
9. Azad AK, Sermsintham N, Chandkrachang S, Stevens WF. Chitosan membrane as a wound-healing dressing: Characterization and clinical application. *J Biomed Mater Res B Appl Biomater.* 2004;69:216-222.
10. Barnea Y, Amir A, Leshem D, et al. Clinical comparative study of aquacel and paraffin gauze dressing for split-skin donor site treatment. *Ann Plast Surg.* 2004;53:132-136.

11. Barnett A, Berkowitz RL, Mills R, Vistnes LM. Scalp as skin graft donor site: Rapid reuse with synthetic adhesive moisture vapor permeable dressings. *J Trauma* 1983;23:148–151.
12. Barnett A, Berkowitz RL, Mills R, Vistnes LM. Comparison of synthetic adhesive moisture vapor permeable and fine mesh gauze dressings for split-thickness skin graft donor sites. *Am J Surg*. 1983;145:379–381.
13. Bergman RB. A new treatment of split-skin graft donor sites. *Arch Chir Neerl*. 1977;29:69–72.
14. Birdsell DC, Hein KS, Lindsay RL. The theoretically ideal donor site dressing. *Ann Plast Surg*. 1979;2:535–537.
15. Blight A, Fatah MF, Datubo-Brown DD, Mountford EM, Cheshire IM. The treatment of donor sites with cultured epithelial grafts. *Br J Plast Surg*. 1991;44:12–14.
16. Borowka S, Gubisch W. Synthetic wound dressing (Epigard SYSpur-derm). *Chirurgia Plastica* 1982;7:83–86.
17. Brady SC, Snelling CF, Chow G. Comparison of donor site dressings. *Ann Plast Surg*. 1980;5:238–243.
18. Breach NM, Davies DM, Yiacomettis A. Study of effects of porcine skin and bovine dermis on the healing of split-skin graft donor sites in humans. *Plast Reconstr Surg*. 1979;63:546–549.
19. Brotherston TM, Lawrence JC. A comparison of a hydrocolloid dressing and non-medicated tulle gras in the treatment of split-thickness skin graft donor sites. *J Wound Care* 1993; 2:84–88.
20. Butler PE, Eadie PA, Lawlor D, Edwards G, McHugh M. Bupivacaine and Kaltostat reduce post-operative donor site pain. *Br J Plast Surg*. 1993;46:523–524.
21. Cadier MA, Clarke JA. Derasorb versus Jelonet in patients with burns skin graft donor sites. *J Burn Care Rehabil*. 1996; 17:246–251.
22. Cihantimur B, Kahveci R, Ozcan M. Comparing Kaltostat with Jelonet in the treatment of split-thickness skin graft donor sites. *Eur J Plast Surg*. 1997;20:260–263.
23. Civelek B, Inal IH, Ozdil K, Celebioglu S. The effect of sucralfat, an agent for gastroprotection on the healing of split thickness skin graft donor sites. *Eur J Plast Surg*. 2007; 30:25–28.
24. Demetriades D, Psaras G. Occlusive versus semi-open dressings in the management of skin graft donor sites. *S Afr J Surg*. 1992;30:40–41.
25. Dinner MI, Peters CR, Sherer J. Use of a semipermeable polyurethane membrane as a dressing for split-skin graft donor sites. *Plast Reconstr Surg*. 1979;64:112–114.
26. Disa JJ, Alizadeh K, Smith JW, Hu Q, Cordeiro PG. Evaluation of a combined calcium sodium alginate and bio-occlusive membrane dressing in the management of split-thickness skin graft donor sites. *Ann Plast Surg*. 2001;46:405–408.
27. Donati L, Viganò M. Use of the hydrocolloidal dressing duoderm for skin donor sites for burns. *Int J Tissue React*. 1988; 10:267–272.
28. Fechner MR, Kon M. The treatment of donor sites with polyvinylalcohol hydrogelfim (Cutinova). *Eur J Plast Surg*. 1990;13:43–46.
29. Feldman DL. Which dressing for split-thickness skin graft donor sites? *Ann Plast Surg*. 1991;27:288–291.
30. Gajiwala K, Gajiwala AL. Evaluation of lyophilised, gamma-irradiated amnion as a biological dressing. *Cell Tissue Bank* 2004;5:73–80.
31. Gawley B, Gould LJ. Evaluation of a low profile noncontact normothermic wound dressing for split-thickness skin graft donor site healing. *Wounds* 2006;18:294–299.
32. Giele H, Tong A, Huddleston S. Adhesive retention dressings are more comfortable than alginate dressings on split skin graft donor sites—a randomised controlled trial. *Ann R Coll Surg Engl*. 2001;83:431–434.
33. Gore MA, Akolekar D. Banana leaf dressing for skin graft donor areas. *Burns* 2003;29:483–486.
34. Hansbrough JF. Use of Biobrane for extensive posterior donor site wounds. *J Burn Care Rehabil*. 1995;16:335–336.
35. Harding KG, Richardson G, Hughes LE. Silastic foam dressing for skin graft donor sites: A preliminary report. *Br J Plast Surg*. 1980;33:418–421.
36. Hickerson WL, Kealey GP, Smith DJ Jr, Thomson PD. A prospective comparison of a new, synthetic donor site dressing versus an impregnated gauze dressing. *J Burn Care Rehabil*. 1994;15:359–363.
37. Horch RE, Stark GB. Comparison of the effect of a collagen dressing and a polyurethane dressing on the healing of split thickness skin graft (STSG) donor sites. *Scand J Plast Reconstr Surg Hand Surg*. 1998;32:407–413.
38. Hormbrey E, Pandya A, Giele H. Adhesive retention dressings are more comfortable than alginate dressings on split-skin-graft donor sites. *Br J Plast Surg*. 2003;56:498–503.
39. Innes M, Cartotto R, Fish J, Gomez M, Tilley R. A prospective randomized matched pair evaluation of a silver coated dressing (Acticoat) on human skin graft donor sites. *Wound Repair Regen*. 2001;9:149.
40. James JH, Watson AC. The use of Opsite, a vapour permeable dressing, on skin graft donor sites. *Br J Plast Surg*. 1975;28: 107–110.
41. James MI, Stevenson JH. Reduction of open wound contraction in humans with a synthetic dressing. *Eur J Plast Surg*. 1990;13:189–191.
42. Jonkman MF, Bruin P, Pennings AJ, Coenen JM, Klasen HJ. Poly(ether urethane) wound covering with high water vapour permeability compared with conventional tulle gras on split-skin donor sites. *Burns* 1989;15:211–216.
43. Lawrence JE, Blake GB. A comparison of calcium alginate and scarlet red dressings in the healing of split thickness skin graft donor sites. *Br J Plast Surg*. 1991;44:247–249.
44. Leicht P, Siim E, Sorensen B. Treatment of donor sites: Duoderm or Omiderm? *Burns Incl Therm Inj*. 1989;15:7–10.
45. Malpass KG, Snelling CF, Tron V. Comparison of donor-site healing under Xeroform and Jelonet dressings: Unexpected findings. *Plast Reconstr Surg*. 2003;112:430–439.
46. Maroon H. A multicenter clinical evaluation of sterile Stomahesive skin barrier protection around stomas, fistulas, drains, and skin-graft donor sites. *Curr Ther Res Clin Exp*. 1982;31: 251–255.
47. Martini L, Reali UM, Borgognoni L, Brandani P, Andriessen A. Comparison of two dressings in the management of partial-thickness donor sites. *J Wound Care* 1999;8:457–460.
48. Melandri D, De Angelis A, Orioli R, et al. Use of a new hemicellulose dressing (Veloderm) for the treatment of split-thickness skin graft donor sites: A within-patient controlled study. *Burns* 2006;32:964–972.
49. Muhart M, McFalls S, Kirsner RS, et al. Behavior of tissue-engineered skin: a comparison of a living skin equivalent, autograft, and occlusive dressing in human donor sites. *Arch Dermatol*. 1999;135:913–918.
50. Persson K, Salemark L. How to dress donor sites of split thickness skin grafts: A prospective, randomised study of four dressings. *Scand J Plast Reconstr Surg Hand Surg*. 2000; 34:55–59.
51. Phillips TJ, Provan A, Colbert D, Easley KW. A randomized single-blind controlled study of cultured epidermal allografts in the treatment of split-thickness skin graft donor sites. *Arch Dermatol*. 1993;129:879–882.

52. Poole MD, Kalus AM, von Domarus H. Aluminum foil as a wound dressing. *Br J Plast Surg*. 32:145–146, 1979.
53. Porter JM. A comparative investigation of re-epithelialisation of split skin graft donor areas after application of hydrocolloid and alginate dressings. *Br J Plast Surg*. 1991;44:333–337.
54. Prasad JK, Feller I, Thomson PD. A prospective controlled trial of Biobrane versus scarlet red on skin graft donor areas. *J Burn Care Rehabil*. 1987;8:384–386.
55. Rennekampff HO, Rabbels J, Reinhard V, Becker ST, Schaller HE. Comparing the Vancouver Scar Scale with the cutometer in the assessment of donor site wounds treated with various dressings in a randomized trial. *J Burn Care Res*. 2006;27:345–351.
56. Robinson L, Cawthorne J, Parys H, Howells B. The use of beeswax as a dressing. *Nurs Mirror* 1983;157:25–26.
57. Sanford S, Gore D. Unna's boot dressings facilitate outpatient skin grafting of hands. *J Burn Care Rehabil*. 1996;17:323–326.
58. Sawada Y, Yotsuyanagi T, Sone K. A silicone gel sheet dressing containing an antimicrobial agent for split thickness donor site wounds. *Br J Plast Surg*. 1990;43:88–93.
59. Schow SR, Shelton DW, Billingsley ML, Newhouse RF. Expansion meshed skin grafts in care of the donor site in skin grafting vestibuloplasty. *J Oral Surg*. 1981;39:26–29.
60. Smith D, Peterson LJ. Treatment of skin graft donor sites with a semipermeable polyurethane dressing. *J Oral Maxillofac Surg*. 1983;41:61–65.
61. Smith DJ Jr, Thomson PD, Bolton LL, Hutchinson JJ. Microbiology and healing of the occluded skin-graft donor site. *Plast Reconstr Surg*. 1993;91:1094–1097.
62. Steenfos HH, Agren MS. A fibre-free alginate dressing in the treatment of split thickness skin graft donor sites. *J Eur Acad Dermatol Venereol*. 1998;11:252–256.
63. Stone CA, Wright H, Clarke T, Powell R, Devaraj VS. Healing at skin graft donor sites dressed with chitosan. *Br J Plast Surg*. 2000;53:601–606.
64. Summer GJ, Hansen FL, Costa BA, Engrav LH, Sharar SR. The Unna “cap” as a scalp donor site dressing. *J Burn Care Rehabil*. 1999;20:183–188, discussion 182.
65. Tan ST, Roberts RH, Blake GB. Comparing DuoDERM E with scarlet red in the treatment of split skin graft donor sites. *Br J Plast Surg*. 1993;46:79–81.
66. Tan ST, Roberts RH, Sinclair SW. A comparison of Zeno-derm with DuoDERM E in the treatment of split skin graft donor sites. *Br J Plast Surg*. 1993;46:82–84.
67. Teepe RG, Koch R, Haeseker B. Randomized trial comparing cryopreserved cultured epidermal allografts with tulle-gras in the treatment of split-thickness skin graft donor sites. *J Trauma* 1993;35:850–854.
68. Terren J, Serna C, Tejerina C, et al. A comparative study of three new occlusive dressing for healing of graft donor sites versus conventional therapy. *Eur J Plast Surg*. 1993;16:98–103.
69. Uysal AC, Alagoz MS, Orbay H, Sensoz O. An alternative dressing material for the split-thickness skin graft donor site: Oxidized regenerated cellulose. *Ann Plast Surg*. 2006;57:60–64.
70. Vaingankar NV, Sylaidis P, Eagling V, King C, Elender F. Comparison of hydrocellular foam and calcium alginate in the healing and comfort of split-thickness skin-graft donor sites. *J Wound Care* 2001;10:289–291.
71. Vanstraelen P. Comparison of calcium sodium alginate (KALTOSTAT) and porcine xenograft (E-Z DERM) in the healing of split-thickness skin graft donor sites. *Burns* 1992;18:145–148.
72. Vartak AM, Keswani MH, Patil AR, Savitri S, Fernandes SB. Cellophane: a dressing for split-thickness skin graft donor sites. *Burns* 1991;17:239–242.
73. Weber RS, Hankins P, Limitone E, et al. Split-thickness skin graft donor site management: A randomized prospective trial comparing a hydrophilic polyurethane absorbent foam dressing with a petrolatum gauze dressing. *Arch Otolaryngol Head Neck Surg*. 1995;121:1145–1149.
74. Yamada N, Uchinuma E, Kuroyanagi Y. Clinical evaluation of an allogeneic cultured dermal substitute composed of fibroblasts within a spongy collagen matrix. *Scand J Plast Reconstr Surg Hand Surg*. 1999;33:147–154.
75. Hermans MH. Results of an internet survey on the treatment of partial thickness burns, full thickness burns, and donor sites. *J Burn Care Res*. 2007;28:835–847.
76. Schwarze H, Kuntscher M, Uhlig C, et al. Suprathel, a new skin substitute, in the management of donor sites of split-thickness skin grafts: results of a clinical study. *Burns* 2007;33:850–854.
77. Beam JW. Management of superficial to partial-thickness wounds. *J Athl Train*. 2007;42:422–424.
78. Lyall PW, Sinclair SW. Australasian survey of split skin graft donor site dressings. *Aust N Z J Surg*. 2000;70:114–116.
79. Thoma A. *Clinics in Plastic Surgery: Evidence-Based Plastic Surgery: Design, Measurement, and Evaluation*. Vol. 35, 1st ed. Philadelphia: Saunders; 2008.
80. Melzack R. The McGill Pain Questionnaire: Major properties and scoring methods. *Pain* 1975;1:277–299.
81. Dickerson K, Berlin JA. Meta-analysis: State of the science. *Epidemiol Rev*. 1992;14:154–176.
82. Freedman B. Equipoise and the ethics of clinical research. *N Engl J Med*. 1987;317:141–145.
83. Thoma A, McKnight L, McKay P, Haines T. Forming the research question. *Clin Plast Surg*. 2008;35:189–194.
84. Moher D, Schulz KF, Altman DG. The CONSORT statement: Revised recommendations for improving the quality of reports of parallel group randomized trials. *BMC Med Res Methodol*. 2001;1.
85. The CONSORT Statement Website. Available at: [www.consort-statement.org](http://www.consort-statement.org). Accessed December 16, 2008.

## APPENDIX

### The Jadad Scale

Please read the article and try to answer the following questions:

1. Was the study described as randomized (this includes the use of words such as randomly, random, and randomization)?
2. Was the study described as double blind?
3. Was there a description of withdrawals and dropouts?

### Scoring the Items

Give a score of either 1 point for each “yes” or 0 points for each “no.” There are no in-between marks.

Give 1 additional point if for question 1, the method to generate the sequence of randomization was described, and it was appropriate (table of random numbers, computer generated, and so on).

And/or if for question 2, the method of double blinding was described, and it was appropriate (identical placebo, active placebo, dummy, and so on).

Deduct 1 point if for question 1, the method to generate the sequence of randomization was described, and it was inappropriate (patients were allocated alternately or according to date of birth, hospital number, and so on).

And/or if for question 2, the study was described as double blind, but the method of blinding was inappropriate (e.g., comparison of tablet versus injection with no double dummy).

### Guidelines for Assessment

1. Randomization: A method to generate the sequence of randomization will be regarded as appropriate if it allowed each study participant to have the same chance of receiving each intervention and the investigators could not predict which treatment was next. Methods of allocation using date of birth, date of admission, hospital numbers, or alternation should be not regarded as appropriate.

2. Double blinding: A study must be regarded as double blind if the phrase “double blind” is used. The method will be regarded as appropriate if it is stated that neither the person doing the assessments nor the study participant could identify the intervention being assessed, or if in the absence of such a statement the use of active placebos, identical placebos, or dummies is mentioned.
3. Withdrawals and dropouts: Participants who were included in the study but did not complete the observation period or who were not included in the analysis must be described. The number and the reasons for withdrawal in each group must be stated. If there were no withdrawals, it should be stated in the article. If there is no statement on withdrawals, this item must be given no points.

Modified from “Assessing the quality of reports of randomized clinical trials: Is blinding necessary?” by Jadad et al.<sup>6</sup>

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