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PRACTICE

THERAPEUTICS

Dressings for venous leg ulcers

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What you need to know

- The cornerstone of treatment for venous leg ulcers is compression therapy, but dressings can aid with symptom control and optimise the local wound environment, promoting healing
- There is no evidence to support the superiority of one dressing type over another when applied under appropriate multilayer compression bandaging
- When selecting a dressing, look at the wound bed, edge and surrounding skin and decide on the goal of the dressing: for example, if there are signs of localised infection consider an antimicrobial dressing, if there is heavy exudate consider an absorbent dressing

A 65 year old man presents with a two month history of a wound in the gaiter area of his left leg. He has a history of a left leg deep vein thrombosis after a long flight but is otherwise fit and well. He had been self-managing with dressings bought over the counter, but the wound has gradually increased in size. The wound is not painful but is weeping serous fluid, causing irritation of the surrounding skin. Examination shows a 4×3×0.1 cm wound above the left medial malleolus. There is haemosiderin deposition, venous flare, and moderate oedema in the limb. The ankle-brachial pressure index (ABPI) is normal at 1.0. He is diagnosed with a venous leg ulcer, which is managed with dressings and compression bandaging.

The cornerstone of venous leg ulcer treatment is compression therapy, which increases venous return and reduces venous hypertension.[1] However, dressings are important because they can provide symptom control and optimise the local wound environment to promote healing. This article provides an overview of the dressings that may be used in venous leg ulcers and guidance on selection.

About 1% of the adult population in Westernised countries are affected by venous ulcers on the leg or foot.[2] The prevalence increases with age to 1.7% in people over 65 years old.[3] Between 26% and 69% of those affected will have recurrent ulcers.[4] Ulcers have a marked impact on patients' quality of life, and can cause chronic pain, impaired mobility, social isolation, and restricted activities of daily living.[5] The annual cost of managing venous leg ulcers has been estimated to be between £500m and £900m in the UK, with most of the spend in the community.[6]

What types of dressing are available for venous leg ulcers and how do they work?

The infographic and table 1 on bmj.com summarise the different types of dressings that may be used for venous leg ulcers. These are usually classified by dressing material, and each class has different properties and mechanisms of action. There are many potential options, and availability may depend on the healthcare organisation's local formulary.

How well do dressings work?

We searched the *Cochrane Database of Systematic Reviews* for relevant publications. Table 2 on bmj.com summarises the Cochrane reviews regarding dressings for venous leg ulcers published to date. A further Cochrane review of dressings and topical agents for treating venous leg ulcers is in progress.[15]

There is no evidence to support the superiority of one dressing type over another when applied under appropriate multilayer compression bandaging. Overall, high quality evidence of effectiveness from well conducted, large, randomised controlled trials is lacking.[16] This may in part be due to dressings being classed as medical devices, which require less evidence for approval than medicines.[17] Problems with previously conducted trials on dressings for venous leg ulcers have included small sample sizes, small ulcer sizes, and uncomplicated patients (that is, no comorbidities, no concurrent wound infection).[16] Furthermore, using "healed wounds" as the primary outcome measure may be an unrealistic target in the context of a time-limited study for the range of venous leg ulcers seen in clinical practice. The effects of dressings on patients' quality of life and symptom control have not been adequately studied.

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This is one of a series of occasional articles on therapeutics for common or serious conditions, covering new drugs and old drugs with important new indications or concerns. The series advisers are Robin Ferner, honorary professor of clinical pharmacology, University of Birmingham and Birmingham City Hospital, and Patricia McGettigan, clinical senior lecturer in clinical pharmacology, Queen Mary's University, London. To suggest a topic, please email us at practice@bmj.com.

How safe are dressings?

Cautions for specific dressing types are listed in table 1 on bmj.com. Patients with venous leg ulcers are at risk of developing allergic contact dermatitis to allergens found in dressings,[18] such as preservatives, emulsifiers, latex, and lanolin. Refer patients with persistent dermatitis or eczema of the skin surrounding the wound (which does not respond to topical corticosteroid treatment) to dermatology for patch testing.[19]

How cost effective are dressings?

Assessing the cost effectiveness of a dressing is complex. The unit cost of the dressing is important, but there are also many other variable costs such as ancillary supplies required, adjunctive treatments such as analgesia, and caregiver time. Data from a regional audit of wound care practice in the UK[20] estimated that only 17-22% of the costs could be attributed to the dressings themselves. The greatest cost was hospitalisation as a result of complications from a wound, with nursing time for dressing changes the next most important factor. The authors concluded that selecting the most effective treatment, to heal the wound quickly and prevent complications, had the greatest potential to save money. A health economics study that used linked routine data for 78 090 patients with chronic wounds to estimate the total cost of chronic wounds in Wales also found that the cost of dressings was far outweighed by the cost of nursing time, GP visits, and inpatient episodes.[21] Therefore the unit cost of a dressing must be balanced against other factors such as how often it requires changing and how it affects the patient's symptoms.

How do I choose a dressing?

Select a dressing based on the properties of the wound (location, size, depth, exudate level, presence of infection) and of the surrounding skin. Patient factors such as allergies and concurrent medical conditions also need to be considered. Localised assessment and management of a venous leg ulcer is described in the infographic (adapted from Dowsett et al[22] and incorporating the authors' own practice and advice from National Institute for Health and Care Excellence (NICE)[17 23-25] and Scottish Intercollegiate Guidelines Network (SIGN)[19] guidelines).

Given the lack of evidence on superiority of any one dressing type, the SIGN[19] and NICE[17] guidelines recommend low adherent dressings. The ideal condition for wound healing (in the absence of gangrene) is a moist environment, and wounds that are too dry or too wet have impaired epithelialisation.[17 26 27] Dressings can be used to promote the moist wound environment (infographic). The effects of different dressings on the wound are described in table 1 on bmj.com.

The frequency of dressing changes should be tailored so that the dressing is neither oversaturated nor dry and adherent to the wound when it is removed. Some wounds will require daily dressing changes, whereas others may only need new dressings once or twice a week. It is our practice to use dressings continually until the wound has healed, and occasionally they may be used after healing to protect fragile scar tissue.

It is not possible to say how long an ulcer takes to heal as there are many factors that can influence this. Arrange regular reassessment to ensure that the treatment is appropriate. At each review, check the wound bed, surrounding skin, and patient factors and adjust the dressing type as necessary. Serial measurements of a wound surface area should be used as an objective measure of healing in clinical practice.[19] There are different methods for this, and using one consistent method is most important.

When the dressing is changed, wash the wound gently with warm, clean tap water or saline and then dry it to remove loose slough and necrotic tissue.[17] Offer oral analgesia as required for dressing changes. There is no evidence to support the routine use of antibiotics for venous leg ulcers, and they should be reserved for infected wounds.[11]

Most venous leg ulcers can be managed successfully in the community with appropriate expertise, but referral to secondary care may be needed if, for example, the diagnosis is unclear or the ulcer is not responding to treatment.

Tips for patients

- Venous leg ulcers are generally treated with compression bandaging, but dressings are used to cover the wound, control symptoms, and keep the wound moist to help healing
- Many different types of dressing are available
- Your nurse or doctor will assess the wound and ask about your symptoms, such as pain, discharge, and smell, which will help them select a dressing
- Wounds can be safely washed with clean tap water
- Consider taking pain killers before having your dressings changed so that they are working by the time of your appointment
- Adhesive dressings and tape can cause problems in fragile or sensitive skin, and there are usually non-adhesive alternatives which can be held in place with a tubular bandage if this is the case for you
- Allergies to dressings are common in patients with venous leg ulcers, and so you may need to be referred for allergy testing if this is suspected

Relevant guidelines

- *National Institute for Health and Care Excellence*—There is no formal NICE guideline on the choice of dressing for venous leg ulcers, but this Clinical Knowledge Summary describes managing venous leg ulcers:
  - NICE. Clinical Knowledge Summaries. Leg ulcer - venous. 2015. https://cks.nice.org.uk/leg-ulcer-venous.[25]
- *Scottish Intercollegiate Guidelines Network* provides guidance on the assessment and treatment of venous leg ulcers, as well as preventing recurrence:
  - SIGN. Management of chronic venous leg ulcers. 2010. www.sign.ac.uk/sign-120-management-of-chronic-venous-leg-ulcers.html.[19]
- *Wounds International Consensus Documents*—There are multiple documents compiled by international expert working groups on a range of topics, including venous leg ulcer management and wound infections:
  - Harding K, Expert Working Group. Simplifying venous leg ulcer management: consensus recommendations. Wounds International 2015. www.woundsinternational.com/consensus-documents/view/simplifying-venous-leg-ulcer-management.[28]
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- *European Wound Management Association* published a comprehensive review of the assessment, diagnosis, management and prevention of venous leg ulcers based on clinical practice guidelines published between 2010 and 2015 and the opinion of the expert committee:
  - Franks PJ, Barker J, Collier M, et al. Management of patients with venous leg ulcer: challenges and current best practice. *J Wound Care* 2016;25(Suppl 6):S1-67.[16]

Education into practice

- How do you assess a wound to choose the appropriate dressing? Does this article offer ideas on how to change your practice?
- What did you understand about dressing choice before reading this article? Is there anything you might do differently now?
- How do you involve patients when considering what types of dressings to use? Can you think of ways to offer patients a greater role?

How patients were involved in the creation of this article

We asked five patients in our outpatient clinic if they had tips for other patients who needed dressings and incorporated these into the "Tips for patients" box where possible. We also asked a patient with longstanding venous leg ulcers to review the article, and he did not suggest any changes.

Contributors: KH (guarantor) accepts full responsibility for the work and controlled the decision to publish. He also guided the planning and structure of the article and edited the completed manuscript. ST and AP collated the relevant source data and compiled the manuscript.

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Tables

Table 1| Available dressings for the management of venous leg ulcers[7 8]

Dressing type	Examples	Mechanism	Applications and cautions	Effects on wound environment
Hydrocolloid sheets	Granuflex bordered, Biatain Super, Hydrocoll Border, Ultec Pro, ActivHeal Hydrocolloid, DuoDERM extra thin, Flexigran, Nu-Derm	The hydrocolloid layer absorbs water and forms a gel in the presence of exudate.	Shallow cavities or flat wounds	Will maintain a moist wound environment in lightly to moderately exuding wounds, and promote autolytic debridement in dry, sloughy, or necrotic wounds. Also promote granulation
Hydrocolloid fibrous	Aquacel, UrgoClean pad	Hydrocolloid dressings made from modified carmellose fibres, enabling greater water absorption	Flat wounds, cavities, and sinuses, safe under compression	Highly absorbent, so can control moderate to high exudate
Hydrogel sheets	ActiForm Cool, Aquaflo, Coolie, Gel FX, Geliperm, Hydrosorb, Intrasite Conformable, Novogel, SanoSkin NET, Vacunet	Made from a matrix of insoluble polymers with a high water content, enabling them to donate fluid to the wound	Dry to minimally exudative sloughy wounds. Not recommended in infected or gangrenous wounds	Promote autolytic debridement of dry slough
Alginates	Sorbsan, Kaltostat, Algisite	Non-woven or fibrous dressings made from calcium alginate or calcium sodium alginate, which is derived from brown seaweed. They form a soft gel in contact with wound exudate	Cavities and sinuses. Secondary dressing required. Can be used if haemostasis required (such as after biopsy or debridement)	Highly absorbent, so suitable for all highly exudative wounds. Promote autolytic debridement. Some types are haemostatic
Low adherent dressings	Atrauman, Cuticell, Jelonet, Paragauze, Paranet, Neotulle, N-A dressing, N-A Ultra, Profore WCL, Tricotex	Dressings are either tulle or textiles, usually made of cotton or viscose fibres, and impregnated with white or yellow soft paraffin to prevent adherence	Flat or shallow wounds with minimal to low exudate. Usually used as an interface dressing under an absorbent dressing	Low adherence minimises trauma on dressing changes
Soft polymer dressings	*Plain*—Adaptic touch, Askina Silnet, Mepitel, Physiotulle, Silflex, Sorbion Contact, Tegaderm Contact, Urgotul. *With foam pad*—Advasorb border, Allevyn gentle border, Cutimed Siltec	Made of a soft polymer, often silicone. The silicone makes them gently adherent. Some have an absorbent polyurethane foam pad backing	Can be used on delicate skin. The plain sheet dressings can be used in combination with an absorbent secondary dressing.	Generally suitable for light to moderately exudative wounds; foam-backed polymer dressings have more intrinsic absorbency
Protease modulating matrix dressings	Catrix, Promogran, Tegaderm Matrix, Urgostart	Dressings reduce the activity of proteinases in the wound exudate by absorbing exudate, removing enzyme cofactors, or releasing inhibitors	Chronic wounds with evidence of prolonged inflammatory phase	Different forms with varying levels of absorbency available
Semipermeable films	Mepitel film, Mepore film, Leukomed T, OpSite Flexifix, Suprasorb F, Tegaderm, Vellafilm	Flexible sterile sheets of polyurethane coated with a hypoallergenic adhesive. They are impermeable to liquids and bacteria, but variably permeable to air and water vapour	Flat or shallow wounds	No intrinsic absorbency and enclose the local wound environment, so only suitable for wounds with minimal to low exudate
Foam dressings	*With adhesive*—Allevyn adhesive, Biatain adhesive, Kendall Foam Island, PermaFoam, Polymem, Tielle *Non-adherent*—Allevyn non-adhesive, ActivHeal foam non-adhesive, Advazorb, Askina foam, Biatain non-adhesive, Kerraheel, Polymem	Hydrophilic polyurethane foam dressings with or without adhesive	Flat or shallow wounds	Some foams are absorbent, so can control exudate. Provide a degree of cushioning
Antimicrobial dressings for locally infected wounds:				
Polyhexamethylene biguanide (PHMB)	Suprasorb X+PHMB	PHMB is an antimicrobial agent which works by disrupting cell membrane integrity	Available in impregnated dressings but also as a gel and cleanser form	

Table 1 (continued)

Dressing type	Examples	Mechanism	Applications and cautions	Effects on wound environment
Silver	Alginates e.g. Sorbsan silver, hydrocolloid e.g. Aquacel Ag, foam e.g. Allevyn Ag, low adherence e.g. Acticoat, soft polymer e.g. Mepilex Ag, with charcoal e.g. Actisorb Silver.	Silver ions have an antimicrobial effect in the presence of exudate	Numerous silver dressings with different properties. Silver sulfadiazine is contraindicated in pregnancy and in patients with significant renal or hepatic impairment, sensitivity to sulfonamides, or G6PD deficiency	All silver dressings have an antimicrobial effect. Other effects on the wound environment are determined by the type of dressing
Iodine	Iodoflex, Inadine, Iodosorb.	Cadexomer-iodine and povidone-iodine release free iodine when exposed to wound exudate, which has a wide spectrum of antimicrobial activity	Iodoflex and iodosorb are contraindicated in patients receiving lithium or with thyroid disorders, and during pregnancy and breast feeding. Inadine is contraindicated in pregnancy, breast feeding, and renal failure, and caution should be used in patients with thyroid disease	Little or no absorbency, so for use on wounds with low exudate
Dialkylcarbamoyl chloride	Cutimed Sorbact	Physical hydrophobic reaction between the dressing coating and any bacteria or fungi on the wound surface	Does not use any antimicrobial or antiseptic so often tolerated by patients with sensitivities to other antimicrobials	Comes in different forms with varying levels of absorbency
Honey	Activon Tulle, Actilite, Algivon Plus, L-Mesitran.	Medical grade honey has antimicrobial and anti-inflammatory properties. It is osmotic so promotes autolytic debridement	Dry, sloughy wounds. Contraindicated in patients allergic to bee stings or honey. Blood sugar levels should be monitored in diabetic patients applying honey dressings	Osmotic properties increase moisture levels in the wound environment, so suitable for dry wounds or those with low-moderate levels of exudate
Chlorhexidine	Bactigras	Gauze-based dressing impregnated with soft paraffin and chlorhexidine antiseptic	Do not use on more than 10% of body surface area. Some patients are allergic to chlorhexidine	Low adherent dressing. Little or no absorbency, so for use on wounds with low exudate or with an absorbent secondary dressing

Table 2| Summary of Cochrane reviews related to dressings for venous leg ulcers

Title	Year	No of		Problems	Conclusions
		RCTs	Participants		
Topical agents or dressings for pain in venous leg ulcers[9]	2012	2	470	Variable pain assessment method and outcome reporting. Potential risk of bias. Trials of short duration	Some evidence that ibuprofen dressings may reduce pain in venous leg ulcers
Foam dressings for venous leg ulcers[10]	2013	12	1023	High or unclear risk of bias. Multiple different comparators	Foam dressings are not more effective than other dressing types
Antibiotics and antiseptics for venous leg ulcers[11]	2014	45	4486	Mostly small RCTs. Most trials had a high or unclear risk of bias. Multiple comparators. Variable duration of follow-up. Unclear whether wounds were infected in many trials	Antibacterial agents should only be used for cases of clinical infection, not for bacterial colonisation. Cadexomer iodine improves healing *v* standard care but is associated with a higher rate of adverse events such as pain or rash. No evidence to support the routine use of silver or honey based preparations
Alginate dressings for venous leg ulcers[12]	2015	5	295	High or unclear risk of bias	Alginate dressings not more or less effective than hydrocolloid or plain non-adherent dressings
Honey as a topical treatment for venous leg ulcers[13]	2015	2	368	High risk of bias and imprecision. Different durations of treatment.	Unclear whether honey improves healing
Protease-modulating matrix (PMM) treatments for healing venous leg ulcers[14]	2016	12	784	Most studies had high risk of bias. Multiple different comparators.	Unclear whether dressings with PMM activity influence healing, adverse events, or costs *v* non-PMM dressings

RCT=Randomised controlled trial.

Figure