

Handy hints when treating venous leg ulcers and using compression therapy

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Abstract

This article has been drawn from a workshop presentation of the same name given at the *First World Wound Healing Congress* in Melbourne, September 2000. The thoughts and concepts presented within this article are offered as a means of assisting clinicians who work primarily within the community to marry the theoretical management of venous leg ulceration (VLU) with the reality of clinical practice. When it comes to assessing each individual patient, adjustments to clinical practice guidelines sometimes need to be made in order to provide individualised patient care. This article is a selection of handy hints gained from clinical experience that may be useful for other clinicians to consider in the management and education of patients with VLU.

In this article, the causes of lower leg ulceration, venous ulceration and the principles of VLU management and compression therapy will be discussed. Handy hints related to the use of moisturisers, padding under bandages, itchy skin, zinc impregnated bandages and ways to facilitate easy donning of compression stockings will also be discussed.

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Introduction

There are many known causes of ulceration of the lower extremities (Table 1). Greater focus, however, is generally placed on ulcers of venous origin as they account for over 70 per cent of all leg ulcers (Figure 1)¹.

There is still debate over what causes venous leg ulcers (VLU) but there is a consensus of opinion that venous hypertension is the single most important factor. Venous hypertension is characterised by high pressure being exerted in the superficial venous system as a result of incompetent valves in the deep or perforating veins. This causes the small holes in the semi-permeable walls of the veins to distend, thereby allowing large molecules, such as fibrinogen and other substances, to leak out into the tissues^{2,3}.

The question as to what causes venous hypertension is generally answered by saying that humans were not designed to stand on two feet all day. If we stand still for long periods of time, the pressures in our distal veins is increased. I explain to my patients that:

You have two pumps in the body to push your blood around. One is your heart – this pushes the oxygen containing red blood around. Once the oxygen has been used it, becomes blue blood, which is returned to the heart and lungs for re-oxygenation by the pumping action of veins deep in your legs when you walk. So we encourage people to avoid standing or sitting for long periods of time. You have to keep your legs and feet moving in order to keep pumping the blood around.

Table 1. Causes of lower leg ulceration.

- Venous insufficiency
- Arterial insufficiency
- Mixed arterio-venous insufficiency
- Vasculitis
- Dermatological conditions
- Infection
- Auto-immune insufficiency
- Trauma – mechanical, thermal, chemical
- Tumours
- Metabolic disorders

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The classic signs and symptoms of a VLU are:

- Oedema (Figure 2).
- Inverted 'champagne bottle' leg (Figure 3).
- Brown/blue pigmentation of the skin (heamosiderin staining) (Figure 4).
- Ulcer located on the lower third of the leg, usually medially but sometimes laterally.
- Dry scaly skin surrounding the ulcer.
- Lipodermatosclerosis (indurated erythematous hyperpigmentation) of the tissue (Figure 5).
- Shallow ulcer with irregular edges.
- Eczematous areas.
- Little slough but fibrin deposition evident.
- Wet, with moderate to heavy exudate.
- Generally little pain.
- A tired heavy feeling of the legs which improves once the legs are elevated⁴.

Figure 1. Venous leg ulcer.

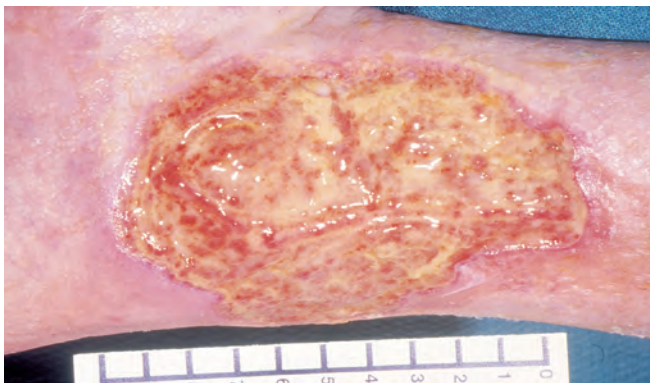


Figure 2. Oedema.



Figure 3. Champagne bottle leg.

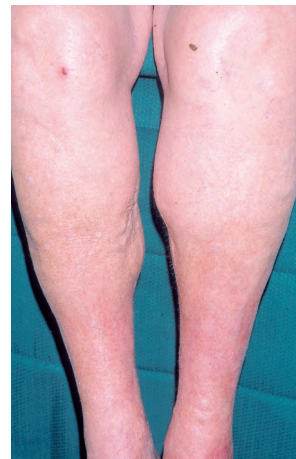


Figure 4. Pigmentation.



Figure 5. Lipodermatosclerosis.



Management of VLU

The principles of management of VLU are well described in the literature. It is essential that clinicians have a sound knowledge of why VLUs occur and what must be done to support the distended veins of the venous system in the lower extremities to improve their function. In addition, the basic principles of wound management must always be observed. In this situation the primary factors to consider include the following.

Defining the aetiology

This is very important. It is critical that a thorough clinical and diagnostic assessment of the lower limb occurs to determine whether the ulcer is of venous, arterial or of mixed origin as the aetiology of the ulcer will guide the treatment prescribed. For instance, arterial ulcers would fail to heal and possibly deteriorate if the same degree of pressure required to treat venous ulcers was applied.

Control factors affecting healing

Multiple factors affect the healing of VLU including diabetes, oedema, obesity and poor dietary intake. The amount of exudate lost from VLUs is often significant. In the presence of oedema there may also be leakage of fluid through the pores of the skin. In this situation there is the real potential for protein to be depleted secondary to wound drainage. If protein deficiency is not detected and reversed, then compression therapy will have little effect, as protein is essential for tissue repair.

Select appropriate topical therapy

One of the primary aims of treating VLU is to improve venous return. This is achieved by compressing the venous system in the lower extremities. The application of compression bandaging and the degree of compression applied to the affected limb requires a sound knowledge of the various products available and skill in applying compression therapy. It goes without saying that an equally sound knowledge of dressing products is required so that local management of the ulcer bed promotes healing in conjunction with compression therapy.

Listening to the patient and any concerns that they may have about their ulcer and the treatment recommended is also very important^{2,5}.

Compression therapy

Compression therapy is thought to reduce venous hypertension². The recommended pressures required to treat venous disease are 30-40mmHg at the ankle, graduating up the leg to approximately 50 per cent of the figures at the knee³. Some authors have achieved healing with lower levels of compression⁶.

Factors to consider when prescribing and applying compression therapy are the:

- Elasticity or non-elasticity of the bandage.
- Number of layers of bandaging applied.
- Tension of the bandage.
- Circumference of the limb.
- Bandaging technique.
- Use of compression stockings³.

Unfortunately, for a variety of reasons, nurses are sometimes forced to modify the pressure recommended to treat VLU due to the nature of the ulcer, be it a mixed arterial/venous leg ulcer or patient tolerance/intolerance to the treatment prescribed.

Alternative products to achieve lower compression

Straight tubular elastic type products generally will give approximately 6mmHg if fitted according to ankle size and product information re medium/high pressure. Graduated tubular elastic type products, when fitted according to the manufacturers' sizing instructions, will give between 18-24mmHg of pressure at the ankle⁷. A class 1 stocking will also provide lower compression of 18-24mmHg.

Some people have used three separate pieces of straight, tubular support bandage of decreasing length, one from toes to knee, a second from over the foot to lower calf, and a third over the ankle only. This graduation up the leg delivers the appropriate pressure gradient of higher pressures at the ankle reducing up the leg; however, it must be remembered that these pressures are half of those recommended for venous disease management (approx. 18mmHg).

One marked feature of this system has been patient compliance. The patient is told that they may remove the outer two layers at night, provided these are replaced first thing in the morning. This sense of control or empowerment encourages patients to participate in their care and seems to have positive effects.

The company SSL also have a bandage, Elset™, which will deliver approximately 17mmHg of pressure at the ankle when applied as instructed. The lightweight bandage in the Profore™ range will also deliver this pressure. These two bandages are very comfortable and allow the clinician to introduce compression gradually.

Having the knowledge of how to achieve other lower levels of graduated compression gives the community nurse flexibility in order to slowly increase pressure or adjust pressure according to patient comfort and compliance.

Zinc impregnated bandages

These have been used in dermatology for centuries. The difference now, however, is that we seek these products without preservatives, if possible. It appears there is less sensitivity to these products if the preservative is removed. Nevertheless, some people may still be sensitive to the product and if there is any doubt it is probably better to test patch the product first. Also note that as all these products have slightly different constituents; a patient may be sensitive to one brand and not another.

Applying these products does require you to read the manufacturers' instructions carefully. If the product is gauze impregnated, then it may have to be fan-folded or even cut at each wrap – if oedema occurs, there is little give in the gauze and constriction bands may occur and damage good tissue. There are zinc impregnated products that are slightly stretchy and will have some 'give'; therefore, different application techniques may apply. Some of these zinc bandages will remain moist and some actually dry out and set and thereby themselves give pressures of 6mmHg, (Gelocast™ and Varolast™). For ease of use, the ZipZoc™ has taken the 'worry' out of just how to apply their zinc bandage. They have introduced a tubular bandage impregnated with zinc which is eased up over the entire lower leg.

Compression hosiery and application techniques

We are fortunate to have many brands of good quality compression hosiery available in Australia (Figures 6 & 7). Most products have been well tested overseas and come in many sizes to cater for all the unusual leg shapes and sizes seen. The major stumbling block is to know where to purchase these. Listed in Table 2 are some of the Free call numbers of companies from where further information regarding these products can be obtained. I am sure this list is by no means exhaustive; however, just to know that there are many different types, styles and fabrics available allows clinicians to assist the patient to make informed choices.

The greatest difficulty after obtaining the stockings or socks is getting them on. It is essential that no patient be sold a product that they cannot use. Patients should be given the opportunity to try to put them on first. Also, it is worth mentioning that patients who attend a specialist for fitting should attend very early in the day e.g. 9am appointment. This is to avoid incorrect measurements of the leg being taken due to dependent oedema that may occur as the result of ambulation.

All manufacturers of compression hosiery have application devices. These range from silk over-toe garments to frames and slip easy pads. When dealing with the compression hosiery company, ask about the availability of these devices. It is also useful to look at some of the ways in which patients with

Table 2. Distributors of compression bandages.

Product	Distributor	Contact
Jobst	Smith & Nephew	1800 021 815
Venosan	Biomet	1800 251 201
Varisma	Barmed	1800 803 662
Medistrumpf	Reis Orthopaedic & Surgical	(02) 9643 1444
Ibici	Extra Depth Footwear	(03) 9528 5774
Juzo		(02) 9319 1955
RxFit		(02) 9436 0444
Humphrey Law Socks (Australian made 20mmHg at the ankle, cotton socks)		(03) 9729 5222

lymphoedema manage their compression garments. People with arthritis sometimes can benefit from using the dimpled washing up gloves to obtain a better grip on the stocking.

Another thought is that if the patient is unable to apply the hosiery, it may be worthwhile considering intermittent pneumatic compression therapy. Huntleigh Healthcare has several of these products.

Padding under bandages

Most manufacturers of compression bandages recommend the use of some form of padding under their bandages to reduce damage to superficial skin layers and spread the tension of the fabric more evenly across the area⁸. Most manufacturers actually have a compatible product. Some of the criteria for quality padding are that they are:

- Natural or synthetic fibres.
- Able to breathe.
- Absorbable.
- Conformable.
- Re-usable.
- Non-flammable.

Cost is always an issue, particularly for those working out in the community. Clinicians are faced with having to decide between good practice guidelines, company recommendations for product use, available funds and common sense. Patients and nurses sometimes seek other non-medical products to meet their needs.

The manufacturers of Gumboots™ gave us some lining to try, as it appeared to meet the above requirements and conformed well to all leg sizes. The patients who tried this product reported it to be very comfortable, absorbent, cost effective and washed well.

Manufacturers of some socks are also looking at this area. A product that looks very much like our thick Explorer™ sock is currently being evaluated. A similar product, used quite commonly by community nurses is Same Frotte™ by Salzmann. Reports on this product have been positive.

Direct padding of specific areas

It will be obvious to some of you that, when treating a patient with a very prominent malleolus, the posterior surface receives no pressure as the bandage or stocking bridges across this area. Unfortunately sometimes this is the area where the ulcer is located. Several companies have produced foam products that conform perfectly to this area and thus ensure even distribution of pressure. Jobst has Stasis Pads™ and Lohmann has Komplex Foam Rubber Pads™.

I have to say I did have one patient who purchased some foam from the outdoor hiking store (like the dense foam sleeping mats) and made his own. What was interesting here is that he achieved the required density and managed to get a profile to suit his exact needs. Please note these products are not used in direct contact with an open wound, they are placed over the dressing in primary contact with the wound in order to disperse the pressure of the bandage more evenly and give more direct pressure to the bulging perforator.

When looking at some severely damaged veins it is possible to see bulbous perforators. If these areas are palpated, you can feel your fingers sink deep into the vein and valve. The foam pad product is placed on top of the padding over these areas and under compression. Obviously we monitor for signs of too much pressure. Interestingly, patients with this type of perforator incompetence have reported improved comfort.

Moisturisers

Patients with VLU's often have dry scaly skin which is very vulnerable to cracking and irritation. Moisturisers need to be applied regularly, usually on a daily basis. It is a good idea to apply the moisturiser at night as this allows the moisturiser to be absorbed without damaging the fibres in bandages or compression stockings. While the skin is relatively scale free, a light easily absorbed moisturiser is appropriate. Sometimes the scale is thick and plaque like, preventing absorption of the nutrients from the moisturiser. Every attempt should be made to soften and remove the scale. Once this has occurred, the regimen of applying a moisturiser to maintain skin integrity can resume.

The key to choosing a moisturiser is to choose as passive and non-irritating product as possible, which meets the needs of each individual's skin⁸. The general rules are to choose moisturisers that are perfume free and with as few parabens (preservatives) as possible. In cases of extreme thick

Figure 6 and 7. Compression hoisery.



dehydrated keratin, we have found the Eucerin™ from Smith+Nephew very successful, especially when the leg remains wrapped in bandages undisturbed for one week.

VLU patients develop allergies quite quickly so many people try to alternate the moisturisers and not use one continuously. In view of these requirements, it is of some interest to review the agents commonly found in moisturisers and identify their function or purpose (Table 3).

The function of individual groups of agents found within moisturisers are:

- *Antioxidants*: prevent or retard spoilage from rancidity.
- *Chelating agents*: inactivate metallic ions in order to prevent their adverse effects on the stability or appearance of cosmetic products.
- *Fatty alcohols*: are higher molecular weight non-volatile alcohols used as emollients.
- *Humectants*: retard moisture loss from the product during use. The efficacy of humectants depends to a large extent on the ambient relative humidity.
- *Surfactants*: are cleansing agents.

As can be seen, it is essential to have some knowledge about the type of moisturiser you are recommending.

Peri-ulcer itch

The peri-wound skin around venous ulcers is often very itchy. Topical steroid creams and ointments are useful short-term measures. 10% urea creams and oral medication are also effective. Some simple remedies include cooling the affected limb - most patients complain of the itch at night whilst in bed when they get warm. Patients have reported success in reducing the itch by using cold packs from the freezer (like those used in sports medicine) applied directly over the affected area or over the bandages. Other patients have used packets of frozen peas in the same way, stating they conform more easily over the area.

Table 3. Agents commonly found in moisturisers.

Chemical agent	Mode of action or purpose	Chemical agent	Mode of action or purpose
Ascorbic palmitate	Antioxidant	Octyl palmitate	Skin conditioning agent – emollient
Benzalkonium chloride	Surfactant-suspending agent	Peg-8	Humectant, solvent
Betaglucan	Bulking agent	Peg-100 stearate	Surfactant – cleansing agent
Caprylic/capric triglyceride	Skin conditioning agent – occlusive	Poylsorbate	20 surfactant – emulsifying agent, surfactant – solubilising agent
Cetearyl methicone	Skin conditioning agent – occlusive	Propylene glycol	Humectant, solvent, viscosity decreasing agent
Cetyl alcohol	Emulsion stabiliser, opacifying agent, viscosity increasing agent (aqueous/non aqueous)	Propylparaben	Preservative
Citric acid	pH adjuster	Sodium magnesium silicate	Binder, bulking agent
Diazolidinyl urea	Preservative	Gylceine soja oil	Skin conditioning agent – occlusive
Dimethicone	Skin conditioning agent – occlusive	Stearic acid	Surfactant – cleansing agent, surfactant – emulsifying agent
Dipotassium glycyrrhizate	Skin conditioning agent – miscellaneous	Stearyl alcohol	Emulsion stabiliser, surfactant – emulsifying agent, viscosity increasing agent – aqueous and non-aqueous
Glycerin	Denaturant, humectant, viscosity decreasing agent	Tocopherol	Antioxidant, skin conditioning agent – occlusive
Glyceryl stearate	Skin conditioning agent – emollient, surfactant-emulsifying agent	Triethanolamine	pH adjuster
Hydrogenated lecithin	Skin conditioning agent – miscellaneous, surfactant-emulsifying agent, suspending agent – non-surfactant	Xanthan gum	Binder, emulsion stabiliser, viscosity increasing agent
Methylparaben	Preservative		

Summary

This article was not designed to have a wholly technical approach to the diagnosis and management of VLU. There are numerous texts and articles on this subject that can be referred to for this information. This article, along with the workshop, was about giving nurses who work in community settings and are managing patients with VLU some tips and hints about some aspects of patient care in this area. Innovation and trial by error sometimes are the only options left when conventional therapies fail or are not affordable by the patient in the community.

In my experience, I have found that a holistic approach to this problem is needed. If the issues of diet, exercise, venous hypertension, depression, mobility and belief in self are addressed, clinicians can make a difference to the healing of most patients with VLU. It is the combination of all these factors that makes the difference.

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