AETIOLOGY, ASSESSMENT & MANAGEMENT OF LEG ULCERS

This article outlines the main issues in leg ulcer management, with a particular emphasis on venous leg ulcers. Currently there are three national guidelines for leg ulcer care (Royal College of Nursing [RCN], 1998; Clinical Resource Efficiency Support Team [CREST], 1998; Scottish Intercollegiate Guidelines Network [SIGN], 1998) and their recommendations have formed the basis of this article.

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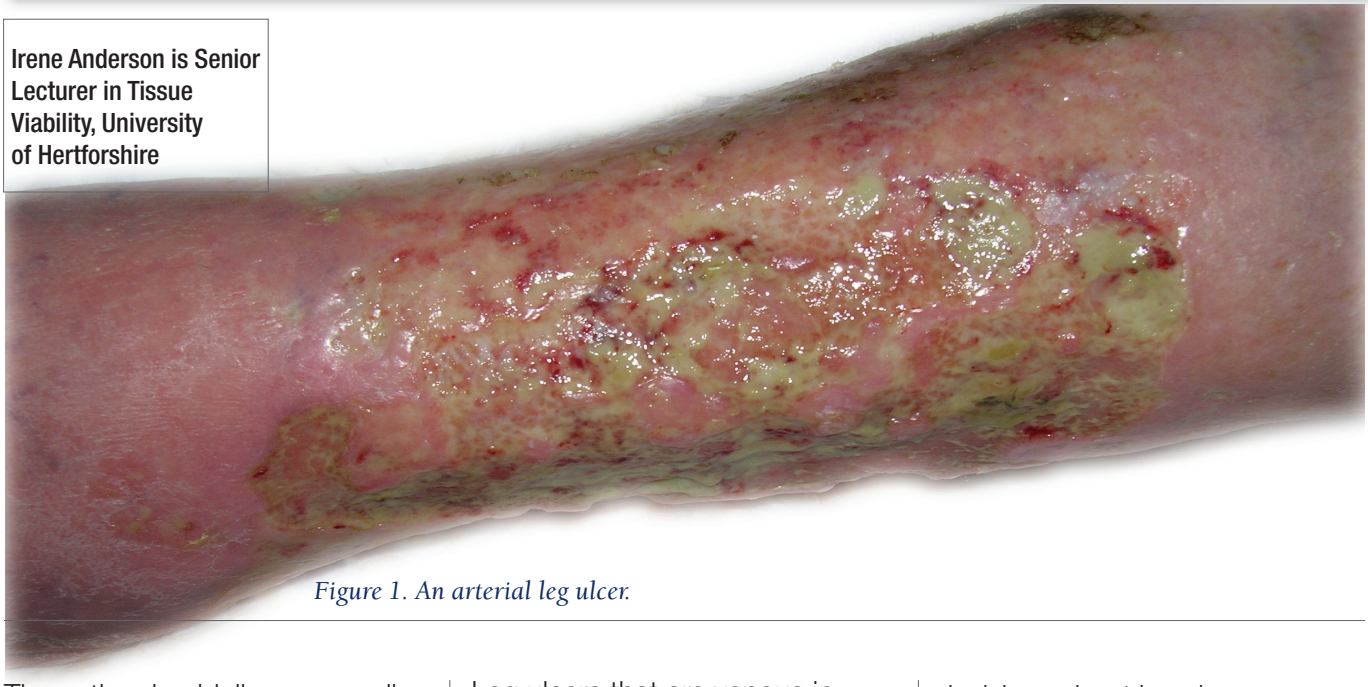

Figure 1. An arterial leg ulcer.

The national guidelines generally define a leg ulcer as a break in the skin of the lower leg which takes more than 4–6 weeks to heal (Royal College of Nursing [RCN], 1998; Callam, 1999). Briggs and Closs (2003) reviewed many papers with the aim of determining the extent of the problem of leg ulcers in the Western world. They concluded that 0.11–0.18% of the general population have an open ulcer, and that approximately 1–2% of the population will suffer a leg ulcer at some point in their lives.

Leg ulcers can take a long time to heal and the recurrence of leg ulceration is a significant problem for many (Morison and Moffatt, 2004).

Leg ulcers that are venous in origin (70%) are most commonly encountered, followed by arterial (15–20%). Less commonly, leg ulcers can be caused by conditions such as rheumatoid arthritis, other vasculitis disorders, and malignancy (Moffatt, 2001). It is important to know the underlying cause of the ulcer because the treatment varies according to the disease process. Sometimes an ulcer can arise as the result of a combination of diseases, which makes management very complex; these ulcers are referred to as being of mixed aetiology (Morison and Moffatt, 2004).

It is very important that the practitioners making clinical decisions about leg ulcer management are experienced and knowledgeable in leg ulcer care, have the appropriate assessment and bandaging skills and are willing to involve other members of the multidisciplinary team as necessary (Anderson, 2003).

What causes venous leg ulcers?

Veins in the lower leg carry blood back to the heart. The venous network comprises deep veins, which carry blood under relatively high pressure, and superficial veins, which are under lower pressure. The capillaries, which provide the skin with oxygen and nutrients, drain into the superficial veins. Small vessels called perforators join the deep and superficial systems.

The blood in the leg veins is pushed upwards partly by the action of the foot and by the calf muscle pump as the leg moves (Lindsay et al, 2003). On movement of the leg, contraction of the calf muscle squeezes the veins, forcing the blood up towards the heart. One-way valves within the veins stop the blood flowing back down the veins again when the muscle relaxes (Tortora and Grabowski, 2000) (*Figure 2*).

However, if the valves are damaged through trauma, e.g. surgery or bone fracture, or are unable to close because the vein is swollen due to congestion in the lower leg, they can no longer prevent the backflow of venous blood and this results in pooling of excess blood volume. This situation can be made worse if the foot and calf muscle pump

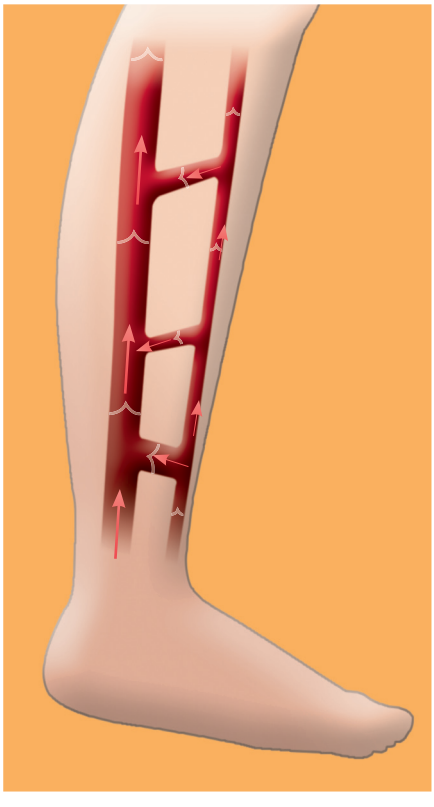

Figure 2. Venous blood flows up the leg and blackflow is prevented by one-way valves.

are not working effectively. If the muscle is weak or has limited movement such as in immobile or elderly people, it will not squeeze the veins sufficiently to push the blood upwards (Moffatt, 2001). The backflow of blood results in extra blood volume in the lower leg (*Figure 3*), which causes raised pressure in the blood vessels. As a result, the walls of the vein stretch, allowing leakage of fluid, red cells and protein into the tissues. The extra volume of blood and fluid leakage causes the pressure in the veins to rise. This condition is called chronic

The blood in the veins is pushed upwards partly by the action of the foot and by the calf muscle pump as the leg moves. On movement of the leg, the calf muscle squeezes the veins, forcing the blood up toward the heart.

venous hypertension and is the main underlying cause of venous leg ulceration (Morison and Moffatt, 2004).

The pathophysiology of venous leg ulceration is characterised by the following events:

- Valves within the leg veins become damaged and are less able (or completely unable) to prevent the backflow of blood
- The calf muscle pump may not be strong enough to push the blood upwards
- The venous blood volume increases in the lower leg veins resulting in pooling of blood
- The walls of the veins stretch allowing fluid, including proteins and red cells, to leak out into the tissues
- The cells in the tissues become filled with fluid and they swell and may leak
- The lymphatic system (fluid drainage system) is unable to cope with the extra volume of fluid (lymphoedema)
- The resulting venous congestion and hypertension means that nutrients do not get to the tissues and skin, which results in dry skin, and often eczema (varicose eczema)
- The fluid in the leg is at risk of infection (cellulitis) and the skin and tissue are at high risk of trauma (leg ulcer).

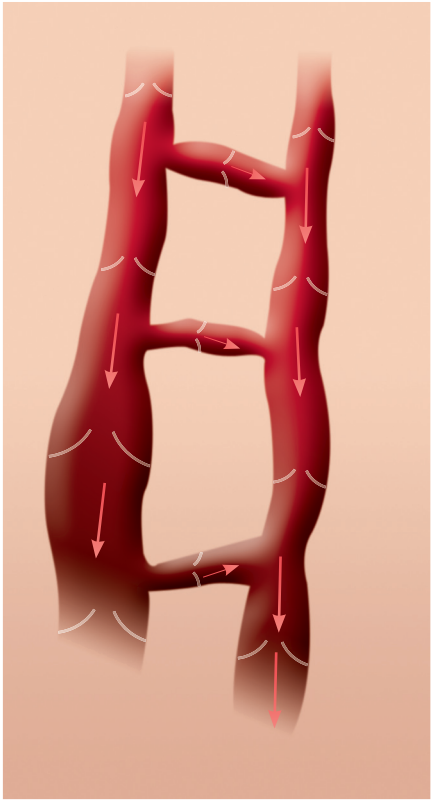

Figure 3. Chronic venous hypertension: backflow of venous blood increases the blood volume in the leg veins forcing the one-way valves apart.

What causes arterial leg ulcers?

Arteries carry oxygenated blood from the heart to the tissues. They are strong vessels with elastic walls and carry blood under high pressure (Tortora and Grabowski, 2000).

Figure 4. A venous leg ulcer. Note the varicose veins, ankle flare and haemosiderin staining.

Arterial ulcers (*Figure 1*) are caused by a reduction in the arterial blood supply to the lower limb, usually as a result of atherosclerosis (the build up of a fatty plaque on the inner artery wall which leads to hardening and loss of elasticity in the artery). The consequence of reduced arterial flow is that tissue is starved of oxygen (ischaemic), and relatively minor trauma to the skin can result in a significant wound that is less likely to heal because it lacks the blood supply carrying the oxygen and nutrients required for healing (Herbert, 1997).

Mixed aetiology ulcers

Approximately 20% of patients with leg ulcers develop them as a result of mixed arterial and venous disease. The prevalence of mixed aetiology leg ulceration is likely to increase as the population becomes older as elderly people are more likely to have arterial disease (Moffatt, 2001). As stated earlier, there are other causes of leg ulceration and it is important that the underlying causes are identified to ensure the patient receives effective and safe care.

Diagnosing ulcer aetiology

Thorough assessment of the patient, the underlying ulcer aetiology, skin and the wound condition are vital in order to make rational, safe and effective treatment decisions. In simple terms, the overall assessment should look for clues as to the aetiology of the ulcer.

In general, venous ulcers tend to be large, shallow and irregular in shape, often occurring around the inner ankle (medial malleolus) (*Figure 4*). Arterial ulcers tend to be smaller and deeper with a more defined shape which is often described as looking 'punched out' (*Figure 5*) (Dealey, 2005). However, it is dangerous to decide the aetiology of an ulcer based on appearance alone as ulcers present in many different forms, especially when mixed disease is present.

In reality, the assessment is rarely straightforward and becomes more complex where there is mixed disease. The following key assessment points are presented individually as venous and arterial components. The extent of overlap needs to be evaluated carefully.

Assessment key points

Assessment of a patient should begin with baseline measurements and investigations of general health. For instance, measurement of blood pressure, heart rate, and body mass index should be taken, and the patient

Figure 5. The 'punched out' appearance of an arterial ulcer.

should be screened for diabetes. Family history is also important, as arterial and venous disease tend to have familial links (RCN, 1998).

Key points of note when looking for signs of venous disease

- A history of deep vein thrombosis is significant, since it may have resulted in obstruction of the vein and valve damage (Vowden and Vowden, 2001)
- Previous surgery or trauma may have damaged the leg veins and valves
- Trauma or surgery to the ankle may result in a lack of ankle flexibility reducing the action of the calf muscle pump (*Tip 1*).

Skin examination

Congestion in the lower leg builds up over a long time and the consequences can be seen when the skin is observed.

- Ankle flare: venous congestion and chronic venous hypertension will impact on the tiny capillaries in the skin causing them to swell. Tiny, swollen, thready veins are visible through the skin and this is termed 'ankle flare' (*Figure 4*).
- Varicose veins: as hypertension builds up over time, larger veins become affected and visible through the skin. Sometimes the veins are not visible, but are palpable, and will be obvious to the patient because they can be uncomfortable or painful, especially after long periods of standing (*Figure 4*).
- Haemosiderin staining: as the capillaries swell as a result of extra blood volume, red cells leak out into the tissues. The red pigment stains the tissue and discolours the skin in the lower leg (Dealey, 2005) (*Figure 4*).
- Oedema: as capillaries swell they allow fluid to leak into the tissues. Plasma protein molecules in the blood encourage further fluid to filter out of the capillaries into the tissue (Tortora and Grabowski, 2001). Normally this fluid would be reabsorbed into the capillaries but as these are congested this does not happen. The tissue then begins to swell and the ankle circumference increases. Assessment of oedema should include measurement of the ankle circumference. Note the changes in circumference at different times of the day, and how it reduces following a period of elevation of the ankle above the level of the hips (postural drainage). This reduction in limb volume is also evident following effective compression therapy. In order to be meaningful, measurement should be taken from the same position on the ankle and calf at each assessment
- Varicose eczema: skin starved of nutrients and oxygen (malnourished) often becomes dry and flaky. Dryness can frequently become extreme and manifests as varicose eczema. A significant build up of dry skin is called hyperkeratosis (*Figure 6*). Skin that is very dry is more susceptible to cracking and is invariably itchy. The inevitable scratching as a result of these conditions increases the risk of infection and skin trauma (Moffatt, 2001). Eczematous

Tip 1

Move your ankle up and down and feel your calf muscle change shape. Now shuffle forward keeping your ankles still. You will notice that as you move, your calf muscle hardly changes shape at all. This means that the venous blood is not being squeezed up your leg effectively. It is important to observe the way that a patient walks and the flexibility of their ankle joint. Daily mobility (how often they walk, and how far) should be recorded.

Figure 6. A venous leg ulcer with hyperkeratosis.

skin is very hypersensitive and many substances can cause irritation and allergic responses (Cameron, 1998). It is important to document any known allergies the patient may have and to be aware of products used by the patient, such as soaps and moisturisers. In addition, any complementary therapies that the patient may be using on the skin or wound, or taking internally, should be documented in the notes.

- Lipodermatosclerosis: malnourished tissue can become progressively fibrosed. The limb becomes hard and 'woody' to touch. In time the gaiter area (the lower third of the leg beneath the knee) can become thinner and the calf increases in size up to the knee. The leg shape resembles an inverted champagne bottle shape (Moffatt, 2001). This becomes significant when applying compression bandages (see section on compression therapy).

Key points of note when looking for signs of arterial disease

- A personal and/or family history of arterial disease, e.g. myocardial infarction, cerebrovascular accident
- Peripheral arterial disease (including any arterial surgery or amputation)
- Diabetes: people with diabetes are more likely to develop arterial disease (Scott, 2005)
- Smoking
- High cholesterol levels
- Hypertension
- Lifestyle: sedentary, overweight, high-fat diet
- Thickened toenails
- Hairless, shiny limbs
- Pale, poorly perfused limb
- Limb pales when elevated
- Pain at night and/or when leg is elevated above hip level
- Pain on walking: make a record of the distance walked before pain is felt (claudication). Is this distance reducing over time? If this is the case, atherosclerosis may be worsening (Moffatt, 2001).

As a minimum, wound assessment should include noting and recording the site and dimensions of the ulcer. The wound bed should be inspected and its appearance documented.

The above are only some of the key assessment points and the following should also be considered:

- A structured and comprehensive leg ulcer assessment form aids clinical decision-making
- Assessment is never a 'one-off' event; it is designed to track changes
- Arterial disease is progressive and structured assessment allows for tracking changes
- There may be a mixture of venous and arterial signs and symptoms
- Leg ulcers of any aetiology can be extremely painful
- Oedema can occur in venous and arterial disease.

Wound assessment

As a minimum, wound assessment should include noting and recording the site and dimensions of the ulcer. The wound bed should be inspected and its appearance documented. For example, is there any black necrotic (dead) tissue, yellow slough (old fibrin and cells), or red granulation tissue? It is useful to record the percentage of each tissue type in the wound. Ideally, the wound should be photographed so that a record is kept for comparison of progress at later assessments. The patient needs to give consent for photography and their confidentiality must be protected if photographs are used for any purpose in the future.

In the absence of photography, it is useful to sketch the wound site and dimensions and to trace the outline in order to evaluate whether the wound is increasing or decreasing in size between assessments. Sketches and tracings need to include a record of the percentage of tissue types in the wound bed (e.g. necrosis, slough, granulation tissue). Wound depth needs to be recorded and a clear description of the wound edges given. The exudate level should also be noted. Although this can be subjective, estimate whether the level is decreasing or increasing between assessments. Record what the exudate looks like and whether the appearance and consistency is changing (Anderson, 2002).

This information helps determine whether the treatment is working, and can indicate the onset of wound infection.

Vascular assessment

In addition to all of the above, there are tests that can aid in determining ulcer type. The hand-held Doppler is used to help confirm or exclude the presence of arterial disease,

and is included in the national guidelines as part of the leg ulcer assessment process. The Doppler test compares the systolic blood pressure at the arm with the systolic pressure at the ankle, giving an ankle: brachial pressure index (ABPI). If the systolic readings are the same, or only slightly different, there is unlikely to be significant arterial disease in the lower limb (Morison and Moffatt, 2004). If the ratio between the readings is significantly different, the lower limb may have such a compromised arterial flow that it would be very risky to apply compression therapy to the leg, as this would reduce the arterial flow even more (Moffatt, 2001).

The Doppler test is not infallible and should never be used as a diagnostic tool in isolation. The patient assessment and the findings of any test have to agree. If this is not the case, then further investigations are required and the multidisciplinary team has to be included in clinical decisions (for an overview of diagnostic vascular tests see the vascular assessment booklet at www.legulcerforum.org). The hand-held Doppler test should only be carried out by a healthcare professional who is specifically trained in the procedure (RCN, 1998). For further information on Doppler examination, see p. 56–60. Duplex scan is a useful method of evaluating arterial and venous disease (Herbert, 1997). Unfortunately, at the moment this entails a visit to a specialist vascular laboratory and is not yet available to all patients.

Leg ulcer management

Once the aetiology of the ulcer is determined, management decisions then need to be made. In general, if the ulcer is predominantly venous, the wound is managed through a combination of compression therapy, exercise and elevation of the limb which helps the venous blood to return to the heart. An arterial ulcer is treated where possible with surgery to clear the blockage or to bypass the blocked artery. Palliative symptom management is given when surgery is contraindicated (Herbert, 1997). All regimes should be combined with lifestyle changes where appropriate.

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In cases of mixed aetiology disease, management is a compromise. It is important to remember that many patients have other diseases (co-morbidities) which make clinical decision-making much more complex. The role of the multidisciplinary team, which must include the patient, is very important. The person with the leg ulcer needs a full explanation of the disease process and the rationale behind treatment plans (Moffatt, 2004). It is clear that this is a challenging area and that patients often do not remember much of the information they are given. For this reason, explanations need to be reinforced frequently and backed up by other sources of information where possible.

Treatment principles

Venous leg ulcers

The most important aspect of venous leg ulcer management is compression therapy. There are various ways of delivering compression, using elastic, or non-elastic bandages, compression hosiery, and by intermittent pneumatic therapy. Evidence suggests that high compression therapy is more effective than lower levels (Cullum et al, 2000) and there is general consensus that pressures in the region of 40mmHg are required at the ankle to reduce venous hypertension (Clark, 2003).

Compression therapy has multiple effects:

- It supports the veins
- It squeezes the veins and makes the valves more likely to close (for those valves that are not completely damaged)
- It speeds up the venous blood flow (velocity)
- The faster flow reduces congestion in the capillaries and veins
- The reduced congestion means that extra fluid can be squeezed from the tissue into the veins, thus reducing oedema
- The decreased venous pressure and the increased blood velocity ensures that more nutrients are able to get to the tissues. This means that the skin condition improves,

dryness reduces and the elasticity of the skin is restored to some extent (Partsch, 2003).

Compression therapy is applied so that the pressure at the ankle is higher than the pressure at the knee (graduated) so that the venous blood is pushed back up the leg towards the heart. The literature often explains this graduated effect using Laplace's equation, which is usually presented as:

$$P = \frac{T \times N \times K}{CM \times W}$$

T = tension at which the bandage is applied (usually 50% stretch)
P = pressure
N = number of layers of bandage (two in a spiral application)
K = a mathematical formula; a constant value
CM = circumference of the limb
W = width of the bandage (Thomas, 2003).

The key principle of this theory is that if the bandage is always applied at a consistent stretch and overlap, then the increasing circumference of the leg will ensure that the pressure at the ankle will be higher than the pressure just below the knee. The equation shows that the changing variable is the limb circumference. The bigger the circumference, the lower the pressure acheived. In a normal leg, the ankle circumference is smaller than the calf so pressure will automatically be greater at the ankle and less at the calf.

Compression therapy delivers relatively high pressures (approximately 40mmHg at the ankle depending on the ankle circumference) to a limb that is very vulnerable to trauma. It is essential that practitioners are specifically trained to apply compression bandages and remain mindful of professional accountability with regard to patient safety and recognising limitations of competence (Anderson, 2003; Nursing and Midwifery Council, 2004).

Compression therapy is applied so that pressure at the ankle is higher than the pressure at the knee (graduated), so that the venous blood in pushed back up the leg towards the heart.

Different ways of delivering compression therapy are as follows:

- Elastic bandages
- Inelastic bandages
- Intermittent pneumatic compression therapy
- Compression hosiery.

Elastic bandages

Elastic bandages exert continuous pressure on the limb, from the base of the toes to just below the knee. The veins are squeezed all the time and when the leg is moved the change in shape of the calf muscle increases the squeeze action, thus pushing the blood even more effectively back up the leg (Moffatt and Harper, 1997).

There are two main designs of elastic compression bandages: multilayer and long stretch.

Multilayer elastic bandages

Through the use of multilayer elastic bandages, the pressure is built up through a series of layers. A layer of padding is applied to protect the limb and help to even out the pressure. A layer of crepe bandage is applied in a spiral with 50% overlap on each turn to smooth out the padding. A third layer of light compression bandage is applied. In order to build up the pressure this layer is applied in a figure-of-eight pattern as this increases the number of layers and so increases the pressure delivered according to Laplace's equation. The fourth and final layer comprises another light compression bandage. This time it is a cohesive bandage (sticks to itself), which is applied in a spiral pattern with a 50% overlap (see p.38–42 for more information). The cohesive outer layer helps to prevent bandage slippage, which is important because the aim is to keep the bandage on for a week at a time where possible.

Possible disadvantages of this system are that it is bulky and the patient may need new and larger footwear throughout the treatment period. Also, in hot weather the system may be uncomfortable. However, compression therapy reduces oedema, which will improve comfort (Moffatt, 2001). The whole system is discarded after each use, which adds to treatment costs.

Long-stretch elastic bandages

Long-stretch bandages are used to deliver compression in two layers. The first layer consists of padding and the second a high-compression bandage applied in a spiral with a 50% overlap. The advantage of this system is that the elastic

bandage can be washed and reused. Disadvantages are that it can be difficult to keep the bandage in place for a week and laundering may be difficult for some patients and in certain care settings. Some modern single-layer bandages have application aids integral to their design which can help guide the practitioner in the 50% overlap technique and in stretching the bandage to the required 50% extension of its length throughout application.

Inelastic (short-stretch) bandages

Inelastic bandages are also used to deliver compression therapy. The mechanism of action is different to that of elastic systems. The short-stretch bandage is made of cotton and stretches little when pulled. First, a layer of padding is applied then the short-stretch bandage is added from the base of the toes to just below the knee at full stretch. As the bandage stretches very little it forms a relatively rigid tube around the leg. When the calf muscle changes shape as the limb is moved, the muscle bulk is resisted by the non-stretching bandage (Lindsay et al, 2003). This means that the pressure of the calf-muscle pump is directed back into the leg and the venous blood is pumped upwards towards the heart. The pressure is lowest when the leg is still and highest when the calf muscle changes shape on movement.

The advantage of this system is that there is less bulk on the leg. A possible disadvantage is that as there is little elasticity in the bandage, a reduction in oedema may make the bandage loose, resulting in the need for increased applications (this becomes less necessary once the oedema reduction stabilises). Immobile patients may not benefit fully from this system unless they are committed to ankle and leg exercises in the absence of walking (Lindsay et al, 2003).

Hosiery can be used to deliver compression in active ulceration as long as there is not a bulky dressing on the ulcer, as this could make application difficult and can affect the level of compression delivered.

Intermittent pneumatic compression therapy

Intermittent pneumatic compression therapy (IPC) is a system that looks like a large, zipped, wellington boot. The boot is applied to the leg and attached by tubing to a pump. The pump applies pressure in a wave-like motion from the ankle to knee over a period of time (generally up to an hour). This helps to speed up venous return and reduce oedema. In between treatments, the patient needs to have compression hosiery or bandaging applied, otherwise the oedema will return and the venous pressure will increase again (Moffatt, 2004). The patient has to sit or lie realtively still during the IPC treatment period. This may be difficult for patients to fit into their day, but it does ensure they have a period of rest.

Compression hosiery

Compression hosiery comes in stocking or sock form and is classed as 1, 2 or 3. The class used is determined mainly by the needs and capabilities of the patient. Class 1 is easiest to apply but delivers low levels of compression, which may not be enough to counteract venous hypertension. Class 3 is most likely to deliver therapeutic levels of compression but the hosiery is quite difficult to apply, requiring good strength in the arms and manual dexterity of the hands and fingers. Class 2 is often used as a compromise measure but can still be challenging to apply for some patients and carers. For more information on applying compression hosiery, please see p. 44–54.

Hosiery can be used to deliver compression in active ulceration as long as there is not a bulky dressing on the ulcer, as this could make application difficult and can affect the level of compression delivered. Most often it is used to help reduce venous hypertension once the ulcer has healed and to prevent recurrence (Bowskill, 2001).

A best practice statement about hosiery has been published (Coull and Clark, 2005) and is essential reading for practitioners involved in this therapy.

Stacey et al (2002), on behalf of the International Leg Ulcer Advisory Board, developed a useful definition table for compression therapy and recommended a care pathway for the treatment of venous leg ulcers. This included suggestions for diagnostic assessment, full and reduced compression therapy and when to make use of specialist referrals.

In mixed aetiology ulcers, as long as the arterial disease is not too prevalent, it may be safe to apply a reduced level of compression therapy to treat the venous component of the disease (Stacey et al, 2002). This is a very skilled procedure and must only be carried out under the supervision of an experienced practitioner and in accordance with local policy.

Exercise and leg elevation

In addition to compression therapy, the patient needs to be encouraged to do exercises which facilitate movement of the ankle and flexing of the calf muscle pump. These include:

- Flexing the foot up and down
- Rotating the ankle
- Standing alternately on tip-toes and flat on the feet
- Walking.

Clearly, not all patients will be able to manage an exercise regime. For many patients, the exercises are physically possible but are not done frequently enough. It can be useful to work out a pattern/timetable with the patient and carers.

Instead of standing for long periods, patients should be encouraged to elevate their feet above the level of their hips whenever possible. A stool, arm of the sofa, or a coffee table with a cushion would suffice. It may be easier for the bottom of the bed to be raised slightly and for the patient to lie on the bed. Elevating the legs reduces both pressure in the veins, and reduces oedema by simple drainage (Dix et al, 2004). Exercise and elevation should be balanced so that the patient gets adequate rest, but increases muscle activity in the leg.

Tip 2

Imagine your legs are very heavy, very wet and cold. You may find it difficult to climb stairs, and to lift your legs into bed, and you may not relish a night in a wet bed, or lying on layers of absorbent pads.

Sometimes, for varying reasons, the patient may spend long periods sitting in a chair with the legs dependent, perhaps even all night. In this case, oedema will not reduce and fluid levels may increase to such an extent that the leg may begin to leak, damaging the skin and causing problems with the patient's footwear and upholstery, thus increasing laundry costs (Anderson, 2002) (*Tip 2*).

Although improved healing rates have been demonstrated in compression therapy studies (Fletcher et al, 1997) there are many factors that delay healing in leg ulcers. This is especially true as the population ages and disease processes become more complex. A recent study highlighted issues such as reduced mobility, co-morbidities, age and nutritional status as some of the factors contributing to delayed healing (Gohel et al, 2005).

Wound care

Compression therapy is the most important aspect of leg ulcer treatment and a simple low-adherent dressing may be all that is required on the ulcer. There is no clear evidence that dressings will significantly impact on healing times (Bouza et al, 2004). People with leg ulcers can develop sensitivities over time, and for this reason, dressings should be kept as simple as possible and their effectiveness monitored closely. There are times when the wound circumstances mean that more complex dressing materials are required. In this case they must be appropriate to use under compression therapy (e.g. they are able to hold fluid in their structure so the surrounding skin does not become wet). Other considerations are:

- The dressing must be able to stay in place for seven days under the compression system (however, sometimes dressings and bandages need to be changed more often, e.g. when exudate levels are very high, or in cases of clinical infection)
- Painful wounds may benefit from more complex dressings which keep the nerve endings in the wound moist, and which are less likely to stick to the wound. These include hydrogels (including gel sheets), silicone-based dressings, alginates, hydrofibres, foams or hydrocolloids. Dressing choice depends on wound circumstances, e.g. exudate level and the condition of the surrounding skin. Care needs to be taken with adhesive dressings to ensure they do not damage the skin (see the dressing section on p178–98 for more detailed information).

Patients should have their legs washed, at least weekly. This is done by immersing the leg in a bucket or bowl of warm water. The container is lined with a plastic bag to minimise cross-infection. Sometimes an emollient is added to the water

to moisturise the skin but this must be done cautiously to avoid sensitivity reactions. The leg must not be soaked for too long — a few minutes is sufficient. The leg should be patted dry but the wound bed must not be dried as this risks damaging granulation tissue, if present (Moffatt and Harper, 1997). A moisturiser is applied to the skin, usually a 50:50 mix of white soft paraffin and liquid paraffin (Cameron, 1998). It is important to apply any substance to the leg in the direction of the hair growth to avoid causing inflammation of the hair follicle (Cameron, 1998).

Often in patients with leg ulceration, it is necessary to remove the thick layers of dry skin that develop. Cleansing and moisturising the leg can help to treat dry skin and to prevent it recurring. Picking the skin off with forceps is often carried out but there are problems associated with this process, as it is a form of debridement and carries a risk of damaging tissue (Anderson, 2006). An ulcer has already occurred through skin trauma and any skin breaks could result in further ulceration. Debridement is a skilled procedure and practitioners should be sufficiently skilled and competent to carry it out (Tissue Viability Nurses Association [TVNA], 2005).

Complications of venous leg ulcers

A common complication of ulceration is the development of cellulitis or erysipelas caused by *Streptococcus* spp. or *Staphylococcus aureus* (Seal et al, 2000). Erysipelas develops rapidly as an acute onset of inflammation with a firm red margin and blistering of the inflamed area. Cellulitis has a slower onset with ill-defined margins and is less likely to exhibit blistering. In both cases, the patient is unwell and febrile, although a rapid response to antibiotic treatment (initially intravenously) is usually evident (Seal et al, 2000). Unfortunately, the recurrence rate for both conditions is significant (Moffatt and Harper, 1997; Dupuy et al, 1999) and therefore management should centre on reducing the cause of the oedema where possible.

The impact of pain, and its extent, is often underestimated in patients with leg ulcers. Pain can range from the acute pain of ischaemia or infection to the persistent dull ache of an oedematous limb, and can sometimes be a combination of these.

Both conditions are extremely painful and make the skin very fragile. During the acute stage of infection, the patient is unlikely to be able to tolerate compression therapy. Sometimes light support bandaging is possible but treatment priorities are to manage infection, and pain. Photography and clear documentation, complemented by illustrations of the extent of the cellulitis, facilitates monitoring of the effectiveness of treatment.

Another complication of leg ulceration is wound infection. Clinical infection should be managed with systemic antibiotics. In addition, dressings such as those containing silver, or modern types of iodine, are effective antimicrobials for infected ulcers, and those at high risk of infection (Lansdown, 2005).

Pain

The impact of pain, and its extent, is often underestimated in patients with leg ulcers. Pain can range from the acute pain of ischaemia or infection to the persistent dull ache of an oedematous limb, and can sometimes be a combination of these (Nemeth et al, 2003). In addition to the systemic factors resulting in pain, it is clear that treatment can add to the burden of pain (EWMA, 2002). It is vital that dressings, and dressing techniques, are selected carefully and the limb is treated gently. Effective compression therapy can relieve pain by reducing oedema and giving support to the limb, but this is not always the case.

Healthcare professionals must listen to patients and be prepared to offer them treatment choices (Moffatt, 2004). Sometimes it is necessary to change the type, or to reduce the level, of compression. This may result in a longer healing time but will help patients to remain engaged in their care and will reduce pain and discomfort (Moffatt, 2001). The literature suggests that the impact of ulceration on patients' lives and well being is now more appreciated and it is also common for patients to feel powerless and frustrated about their care (Charles, 1995; Walshe, 1995; Brown, 2005).

Preventing recurrence

Many leg ulcer patients have very complex needs and a range of

Key Points

- Leg ulcers can take a long time to heal and recurrence of ulceration is a significant problem for many patients.
- Leg ulcers are mainly venous in origin (70%) followed by arterial (15–20%).
- It is important to know the underlying cause of the ulcer because the treatment varies according to the disease process.
- It is important that practitioners are experienced and knowledgeable in leg ulcer care, and involve members of the multidisciplinary team as necessary.

people are involved in their care, each having an important role. It is important that each referral, intervention and outcome is clearly documented. Healing of a leg ulcer can take considerable time and the recurrence rate is high (Bowskill, 2001), even with intervention. It is vital, therefore, that patients remain involved in their care and have clear instructions on how and when to report problems. Engaging the patient and being prepared to negotiate and compromise with regard to treatment plans (concordance) is more likely to lead to a successful long-term result (Royal Pharmaceutical Society, 1997). In order to encourage concordance, a few key principles should be borne in mind:

- Discuss the disease process with the patient and be prepared to repeat this information as often as necessary
- Reinforce verbal information with written material
- Expect the patient to take some responsibility in his/her treatment
- Offer informed choices where possible
- Maintain a positive attitude and praise small successes such as oedema reduction or wound improvement
- Recognise pain and actively treat it (EWMA, 2002)
- Consider a chart or something similar to serve as a record and reminder of exercise and rest. Dix et al (2004) found that patients elevated their legs for only a small percentage of time per 24 hours but this increased when patients were asked to keep a diary.

Leg ulcer services

Leg ulcer services mostly take place in the community and there are an increasing number of leg ulcer clinics available. Some patients may prefer to be treated in their own home, but clinics do offer advantages. It is more cost effective to have trained personnel and resources available in one area (Stevens et al, 1997; Ellison et al, 2002). A clinic setting gives staff the chance to share ideas and good practice. Patients get the opportunity to meet other people and build supportive networks. An effective clinic-based service is only possible if staff are competent and there is the equipment and time available to conduct full assessments and deliver appropriate therapy. A new assessment, including Doppler ultrasound will take a minimum of an hour. This may pose problems for personnel such as practice nurses who traditionally work on much shorter appointment times (Schofield et al, 2000). It is important that all community practitioners are aware of the issues in leg ulcer assessment and management so that services are allocated and organised appropriately.

Once the ulcer has healed the guidelines suggest that reassessment, including Doppler assessment, should take place at 3 months. However, this places a burden on stretched services and it is likely that most clinics reassess every 6 months (Jones and Nelson, 1998).

Conclusion

Leg ulcers are common and cause huge problems for patients because of pain and limitations on lifestyle. Practitioners must try to keep up-to-date with developments in leg ulcer management. An effective way of doing this is to be familiar with national and local leg ulcer guidelines. These documents can help to make sense of the vast array of literature available and can contribute to evidence-based practice. Practitioners should take advantage of study days and updates, and endeavour to read at least one wound care-related publication regularly. It may also be worth joining one (or more) of the tissue viability societies in order to take advantage of their resources. Developing skills and knowledge, and being prepared to encourage colleagues to do the same, will result in patients receiving more effective treatment, which will impact on healing rates, and improve patients' quality of life. **WE**

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