THE MANAGEMENT OF VENOUS LEG ULCERS

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Chronic leg ulceration affects 150,000 people in the UK and costs the health service between £300 million and £400 million each year. Until fairly recently leg ulcers have been regarded as an unpleasant and unprofitable branch of medicine. Delegation of treatment has in many instances devolved to nurses who still regard ulcers as an intractable problem.

Moffat et al. assessed the burden of leg ulceration in community clinics. They found that district nurse spend up to half of their time treating leg ulcers. Half the patients are seen more than twice weekly and over a fifth are treated every day. In today’s climate of restricted resources, it is important to establish a more cost-effective service with better use of district nursing time.

Recently, however, the outlook for these patients has improved. Venous ulceration can be dramatically improved using a research-based approach to assessment, adequate compression bandaging and the implementation of appropriate management strategies.

Service provision requires organisation and coordination in order to increase effectiveness. The community clinic approach provides a focus for nurse training in leg ulcer assessment and management whilst offering structured patient assessment followed by research-based treatment to all patients with leg ulceration. Community nurses are the key to the success of any such programme.

Chronic venous insufficiency is not the only cause of leg ulceration, and compression bandaging is not without risks. It is important to assess patients carefully, to manage any other pathology and to monitor progress in case a different approach is advisable.

ASSESSMENT

It is no longer acceptable to offer ‘leg ulcer’ as a diagnosis. The ulcer is not a disease but a manifestation of underlying pathology. Accurate initial assessment is essential so that the appropriate therapy may be instigated.

All too frequently leg ulceration is viewed as part and parcel of the ageing process and there is a resigned attitude to treatment. Referral is unlikely and patients may not receive the standard of assessment and treatment they deserve. It is therefore the nurse’s responsibility to conduct an accurate nursing assessment to reduce the risk of inappropriate treatment and maximise benefit to the patient. If diagnosis is uncertain the patient should be referred to a specialist practitioner or consultant.

HISTORY

This is very important in the establishment of the correct diagnosis.

General
• Has the patient had any episodes of cellulitis?
• Are there any signs of varicose veins?
• Is there a family history of varicose veins or leg ulcers?
• Occupation: does the patient spend long periods of time standing?
• Gender: more common in women than men with increasing age
• Pregnancy: may be a contributory factor
• Low fibre diet
• Obesity

Previous thrombogenic events
• deep vein thrombosis
• thrombophlebitis
• leg or foot fracture in the affected limb

EXAMINATION

Pigmentation – ‘staining’ of the skin around the ulcer. This is due to the leakage of red cells which deposit their haemoglobin content into the interstitial spaces. The discolouration may vary greatly between patients.

Lipodermatosclerosis – hardening of the dermis and underlying subcutaneous fat which may feel ‘woody’. This is due to fibrin linking itself around the tiny capillaries in the skin. The leg often assumes the shape of an inverted champagne bottle.

Oedema – patients with venous incompetence develop venous hypertension when the superficial venous system is under increased pressure. The pressure in the capillaries is usually less than 30mmHg but when venous hypertension occurs it may rise to over 90mmHg. The capillaries attempt to compensate for the increased pressure and become tortuous and dilated. Eventually they fail and fluid leaks into the subcutaneous cells and interstitial spaces, causing oedema. In the more severe cases fluid leaks through skin pores.

Stasis eczema – this may be more troublesome than the ulcer itself. The oedema fluid contains proteolytic enzymes which
act as irritants. Bacteria often colonise leg ulcers leading to a wet, irritable, eczematous area.

**Prominent superficial veins or symptoms of varicose veins**
- the patient may complain of aching or heaviness in the legs, mild ankle swelling, itching over varices, or symptoms due to thrombophlebitis. Any of these may be indicative of valve incompetence.

**Site of ulcer**
- the ulcer is frequently situated near the medial malleolus and sometimes near the lateral malleolus but may manifest anywhere on the lower leg.

**BLOOD INVESTIGATIONS**

Blood sugar: to exclude diabetes
ESR: to exclude vasculitis
Haemaglobin: to exclude anaemia, as this will hinder healing
Profile: to identify other problems which may contribute to poor healing

When a full history has been obtained, then a Doppler assessment should be carried out. Diagnosis should not be made on Doppler assessment alone. The Doppler assessment is carried out to exclude severe arterial disease as a cause of leg ulceration and to ensure there is not sufficient arteriopathy to contraindicate pressure bandaging.

The above history, signs and symptoms and an ankle brachial pressure index of 0.8-1.6 are indicative of venous ulceration. The most appropriate treatment is sustained graduated compression.

Although the clinical appearance of leg ulceration may be similar, the underlying aetiology of ulcers may vary greatly and the use of compression therapy may aggravate ulcers with other causes. Consideration must also be given to ulcers of other aetiologies.

**OTHER TYPES OF ULCER**

**Mixed aetiology ulcers** These are ulcers caused by a combination of chronic venous hypertension and poor peripheral arterial circulation. It is the degree of arterial insufficiency which will determine whether or not it is safe to apply compression.

**Diabetic ulcers** True diabetic ulceration has a different pathogenesis but diabetics can develop ulcers which are due to chronic venous hypertension. Effective wound management and the eradication of infection are of the utmost importance. A correct diagnosis must be made prior to the application of compression, because sensory neuropathy may mask complications.

**Rheumatoid arthritis and vasculitic ulcers** Leg ulceration is common in patients with rheumatoid arthritis, with up to 10% of patients developing an ulcer at some stage. Although often attributed to vasculitis the aetiology may be multifactorial. Studies carried out by Pun et al found vasculitis to be the cause in only 18.2% of cases. The most common causes were venous insufficiency, trauma or pressure.

**Malignant ulcers** Malignancy is an uncommon cause of ulceration but the possibility of malignancy should not be overlooked in patients whose ulcers fail to respond to treatment.

**COMPRESSION BANDAGING**

It has been well documented for some time that sustained graduated compression is the most effective treatment for venous ulcers. Gradual compression reverses chronic venous hypertension by:

- transferring the tissue fluid back into the vascular and lymphatic systems
- reducing the pressure in the superficial venous system
- aiding venous return by increasing the velocity of flow in the deep veins
- reducing oedema by reducing the pressure difference between the capillaries and the skin
- reducing inflammation

There has, however, been much debate as to how much external compression is required to reverse venous hypertension. Stemmer advocated that 40mmHg of pressure applied at the ankle, reducing by 50% at the knee, is sufficient to reverse the process. At present this appears to be the general consensus. It is imperative that anyone applying
compression bandages understands Laplace's law to attain correct pressures. This states

\[ P = T \times N \times \text{constant} \]

\[ \frac{P}{C \times W} = \text{bandage pressure} \]

\[ T = \text{tension} \]

\[ W = \text{width of bandage} \]

\[ P = \text{sub-bandage pressure} \]

\[ N = \text{number of layers} \]

\[ C = \text{limb circumference} \]

\[ = \text{pressure exerted by the bandage} \]

\[ \text{bandage tension depends on the elasticity of the bandage ie how much stretch is applied on bandage application} \]

\[ \text{the more layers applied, the higher the sub-bandage pressure, as in the multi-layer systems} \]

\[ \text{only variable sub-bandage pressure is inversely proportional to the circumference of the leg, so it is important to measure the ankle circumference, just above the malleolus (2cm).} \]

\[ \text{ankle circumference will determine the regime of bandaging according to manufacturer's instructions} \]

\[ \text{the narrower the bandage width, the more compression applied} \]

\[ \text{more layers are applied with narrower width} \]

\[ \text{generally a 10cm bandage is used} \]

\[ \text{Table 1} \]

Indications for its use with compression bandages:

- conclusive history with ankle brachial pressure index of 0.8 or above may have full compression applied.
- reduced compression may be considered in selected patients with a pressure index of 0.6-0.7. This must only be carried out by a specialist practitioner and under close supervision.
- no patient with a pressure index of 0.5 or less should receive compression bandaging.
- diabetic patients with an elevated pressure index must be monitored closely when on compression therapy. Diabetics with reduced pressure indices must not have compression bandages applied.
- compression should be applied with great care in heart failure. A sudden return of fluid to the heart will exacerbate the condition and could be fatal.

Graduated compression follows the normal shape of the leg, ie narrower at the ankle than at the calf. As the sub-bandage pressure is inversely proportional to the limb circumference, a bandage applied with constant tension will exert different levels of pressure at various points of the leg, ie a higher pressure at the ankle than at the calf, because of the difference in circumference.

If the sub-bandage pressures are incorrect, treatment will be unsuccessful and possibly harmful. For example, higher pressures will be achieved on thin legs, which may in turn result in pressure narcosis, especially over bony prominences. Conversely, fibrosis and thickening at the ankle may lead to inverse graduation unless orthopaedic wool is applied to ‘normalise’ the shape of the leg.

**TYPES OF BANDAGES**

There are many bandages available to apply compression to patients with venous ulcers but only a minority give adequate sustained compression. Setopress, Tensopress and Surepress are all bandages available on an FP10. They are claimed to give sustained compression over a period of time. Up to 50 mmHg of pressure may be exerted depending on the ankle circumference and the amount of extension applied during application.

Caution should be exercised when single layer compression bandages are used. There is anecdotal evidence that non-compliant patients may remove and reapply these bandages between nursing visits. Self harm may occur if the patients reapply their own bandages at dangerous sub-bandage pressure levels.

Unlike many bandage regimens where the applied pressure decreases, the four layer bandage has been shown to achieve pressures of 40mmHg at the ankle, graduating to 17mmHg below the knee and to sustain these therapeutic pressures for at least a week.

The four layers consist of:

- the inner, wadding layer of orthopaedic wool which serves to absorb exudate and redistribute pressure away from the bony prominences
- a crepe bandage to compress the wadding and maintain the elastic energy of the third, main compression layer
- Elset or Litepress elasticated bandage which applies the compression
- a cohesive layer which is applied to provide further compression which will help maintain the integrity of the combination for a week or longer

Blair et al highlighted dramatic improvements in the outcome of treatment for patients with venous ulceration using this multi-layer system. Seventy-four percent were completely healed within twelve weeks. These results have almost been duplicated within our own district in areas which use the multilayer bandage system. Patient compliance with this technique has been good, and patients have found it to be comfortable. Any initial reservations were resolved by the rapid improvement of the leg ulceration.

Another advantage of the multi-layer system identified by Freak and McCollum is that mistakes in tension in any one layer will tend to be averaged out, whereas a single high compression bandage is prone to deliver a greater variation if constant tension and degree of overlap are not maintained.

**Alternatives to bandages**

Compression hosiery may be used for the treatment of venous leg ulcers and for the prevention of recurrence. The ease of removal, however, makes it more difficult to ensure compliance. Also, as many patients are elderly, their dexterity when applying the hosiery may be impeded.

Hosiery should always be applied following healing of the ulcer, as the underlying venous problems still exist and therefore prevention of recurrence is necessary.
Primary ulcer care

Good wound hygiene is important but need not be complicated. Desloughing agents for the removal of necrotic tissue in venous ulcers are normally unnecessary. Adequate compression will achieve this by autolysis and the formation of healthy granulation. Cleansing the leg in warm tap water is good practice and most patients find this acceptable. Immersion of the leg in a bowl of water helps to remove dry skin and any creams or ointments which may have been applied. It also offers an ideal opportunity to assess progress, examine the patient’s feet and reinforce the exercise of ankle rotation.

It is usually necessary to use a primary dressing applied directly to the ulcer under the compression but the vast array of wound care products available can sometimes make choice difficult. It must be remembered that compression therapy is the key to the treatment of venous ulcers. Trials comparing simple nonadherent dressings with antibacterial and occlusive dressings have not shown any significant differences in healing when used with compression10. Other types of wound care products, however, may be useful in some patients:-

• alginate dressings will help to absorb excess exudate
• charcoal dressings will help to counteract odour
• hydrocolloids may be soothing if the wound bed is very dry

Care of the wound bed should be planned and treatments evaluated, as constant changing of products is unsettling for the patient.

Wound infection

The two main considerations in the management of leg ulcers are control of any underlying pathology and good wound care. Antibiotics are only of value when the wound is infected. The diagnosis of infection is a clinical decision taken after assessing the condition of the ulcer and considering the following factors:

• redness around the ulcer
• pain
• sudden deterioration
• fever

If these are not present, there is not much point in taking a swab. Cultures can show a very mixed growth. In these cases, detailed identification and antibiotic sensitivities are misleading so the laboratory will tend to issue a generalised report without sensitivities. Antibiotic selection will tend to be highly empirical.

There are four main types of report:

Normal skin organisms – coagulase negative staphylococci, commensal corynebacteria (diptheroids), commensal streptococci. These are not likely to be associated with signs of infection, and do not usually require antibiotics.

Gram-negative organisms – coliforms (E coli, Klebsiella, Proteus), pseudomonads etc. These come from the gut, are usually just colonising the area and are not particularly associated with signs of infection. They may indicate poor wound hygiene or a wound which is kept too moist. Since they tend to be antibiotic and antiseptic-resistant, they will colonise patients who have had antibiotic therapy or topical antiseptics. In the unlikely event that antibiotics are needed, Co-amoxiclav 750mg bd or Cephalexin 500mg bd will cover the coliforms and Ciprofloxacin 500mg bd or Ofloxacin 400mg bd will cover the pseudomonads.

Gram-positive organisms – Staphylococcus aureus, beta haemolytic streptococci. These have more capacity for causing harm and are more likely to be associated with signs of infection, so antibiotics are more likely to be of use. Fluclaxacillin 500mg qds or Erythromycin 500mg qds are the most appropriate.

Anaerobes – Bacteroides, anaerobic streptococci, clostridia. These also have more invasive potential and can be associated with a rapid deterioration with necrosis and a foul smell. The best antibiotics are Co-amoxiclav 750mg bd or Metronidazole 400mg tds.

In leg ulcers, infections are opportunistic in the sense that they are determined by the host rather than by microbial factors. Antibiotics are likely to be disappointing if the underlying causes of the ulcer are not addressed at the same time.

ADVICE FOR PATIENTS HAVING COMPRESSION

Patients who have not had compression therapy before may be apprehensive about the new treatment.

Extra time should be allocated to help to allay these fears. Patients should be instructed

• not to push down the bandages as this will have a tourniquet effect
• not to cut the bandages as this will affect sub-bandage pressures
• to wear larger shoes or slippers to promote comfort
• that the bandages may feel tight initially but should become more comfortable
• to elevate legs when possible, and move the ankle joint as much as possible
• to walk as much as possible, as the calf muscle pump action promotes venous return
• to contact the nurse if there are any worries about bandaging.

Many patients have had their ulcers for many years and have adapted to their condition. Self-treatment is common and usually inappropriate (if not harmful), but patients can be very resistant to new ideas about management. Non-compliance is not unusual, especially in longstanding ulcers. Patients can present a variety of reasons, some spurious, for removing the bandage themselves. It is important for the nurse to be very positive and supportive in the early stages. Pain is commonly cited. Initial discomfort, possibly quite severe, is well recognised. This is transient and the approach should be to support the patient, possibly with analgesia or by reducing the compression.

FOLLOW-UP VISITS

It has been found that when a patient commences compression therapy, the frequency of visits diminishes until the patient may only be redressed on a weekly basis. During
these weekly visits, however, patient education is essential. Holistic care must be addressed throughout the episode of treatment. One major area which deserves mention is attention to nutrition. Whilst obviously important, it is useless if the factors affecting nutritional intake are not also explored. Advising someone on the most appropriate food to eat is not helpful if the person is unable to shop or cook.

Provision must also be made for ulcers which suddenly deteriorate. If this is due to a worsening arterial component then prompt referral to a vascular clinic should be available.

CONCLUSION

In the right situations, compression bandaging is highly effective in reducing patient morbidity and releasing nursing time. Like any other effective treatment, it has side effects and even causes harm if used inappropriately. There are many horror stories about inappropriate treatments resulting in limb loss and these have made many nurses shy away from compression therapy. It should be remembered, however, that a nurse not using compression therapy when it is clinically indicated can be accused of negligence.

Encouragement should be given to nurses to increase their skills and knowledge in relation to the treatment and care of patients with venous leg ulcers. Specific educational needs of nurses relating to leg ulcer management need identification and an education strategy devised to meet these needs. The Riverside study\(^9\) is one example of innovation, using a new approach to an old problem.

REFERENCES

5. Cornwall J. Venous ulcers and compression J District Nursing 1988;7(3):4-6