BANDAGING: WHICH BANDAGE TO USE AND WHEN

Pauline Beldon is Tissue Viability Nurse Consultant for Epsom and St Helier Hospitals NHS Trust

Compression bandaging has been used as a recognised therapy for venous leg ulcers for the last 20 years. Many nurses, especially those working in primary care, have developed expert knowledge in compression bandaging. However for the novice, the array of bandages can be bewildering. This article demystifies those with little experience in the management of venous leg ulcers by compression therapy.

Bandaging has been used for thousands of years: the ancient Egyptians used bandages which were soaked in various medicaments; Henry VIII was known to have a longstanding leg wound which was treated with what sounds suspiciously like the forerunner of compression bandages — leather straps which were soaked in wine vinegar and applied; these tightened as they dried.

Today there are a huge number and variety of bandages and it is important to understand their use and application in order to select the most appropriate bandage for an individual patient.

Bandage classification

Bandages are classified according to their use. These used to be broadly described as retention, light support and compression of varying degrees (Thomas, 1997). During the last 10 years bandaging has become an essential skill and is viewed as an effective treatment not only for venous leg ulceration, but also for conditions such as chronic oedema, lymphoedema and following lower limb lacerations and other injuries. Consequently, there has been an explosion in the variety and number of bandages available. It is obviously important that any nurse applying a bandage has both the knowledge, skill and proven competency to do so. Anything less is unacceptable as poor or inappropriate bandaging can have severe consequences for the patient, such as pressure damage to the skin over bony prominences, a misshapen limb or the exacerbation of pedal oedema. *Table 1* outlines bandage classification according to the NHS Drug Tariff and gives examples of different types of bandages and the level of pressure they apply.

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Figure 1. Patient with ankle circumference of 16cm; multiple areas of pressure damage caused by compression bandaging.

Table 1.

Bandage classification, function and examples (adapted from Bandage Classification, British Standards, 1995 and Thomas, 1997)

Bandage type	Bandage description	Bandage function	Examples
Sub-compression wadding bandage	Cellulose bandage	Highly absorbent to absorb exudate Highly conformable to protect bony prominences and reshape limb	Advasoft® (Advancis) Flexi-Ban® (Activa) K-Soft® (Urgo) Profore #1® (Smith and Nephew) Surepress® (ConvaTec) Ultra Soft® (Robinsons)
Type 1. Conforming bandage	Lightweight, stretch bandages May be cotton, cotton crepe or cotton with a slight degree of elasticity provided by elastane and polyamide	To conform well to a limb size and shape Used to hold dressings in place Does not apply any compression	Setocrepe® (Mölnlycke Health Care) Soffcrepe® (Smith and Nephew) Hospicrepe (Protecsolutions Limited) Easifix® (BSN medical) K-Band® (Urgo) Stayform® (Robinsons) Slinky® (Mölnlycke Health Care) Kontour (Easigrip) Acti-Wrap® (Activa)
Type 2. Elastomer and viscose bandage	Light support bandage	Limited extensibility or elasticity, enabling application over a joint	Clinilite® (Clinisupplies) K-Lite® (Urgo) Knit-Firm® (Bailey, Robert)
	Short-stretch compression bandages	Limited extensibility enables the reduction of oedema	Actico® (Activa) Rosidal-K® (Vernon-Carus) Silkolan® (Urgo) Comprilan® (BSN medical)
Type 3a	Moderate compression	Provides and maintains low levels of pressure, up to 20mmHg at the ankle Suitable for the management of varicosities (grape-like protruding from a vein) Often used in the very elderly patient who may not tolerate therapeutic compression	Cliniplus® (Clinisupplies) Elset® (Mölnlycke Health Care) K-Plus® (Urgo)
Type 3b	Moderate compression	Provides and maintains pressure of approximately 30mmHg at the ankle Suitable for the treatment of venous ulceration	Veinopress
Type 3c	High compression	Provides and maintains pressure of approximately 40mmHg at the ankle Therapeutic compression	Tensopress® (BSN medical) Setopress® (Mölnlycke Health Care) SurePress® (ConvaTec) Adva-Co® (Advancis)
Multilayer compression bandaging	2 bandage kits providing all bandaging components	Provides and maintains pressure of approximately 40mmHg at the ankle Therapeutic compression	K-Two (Urgo) ProGuide® (Smith and Nephew)

Assessment of leg ulceration

Thorough assessment of a patient with a leg wound, ulcer or oedema is vital to determine the aetiology of the leg ulcer and whether or not therapeutic compression or modified compression might be indicated (Anderson, 2006).

The cause of a non-healing trauma leg wound may be underlying venous hypertension (Anderson, 2008), however, there may be other comorbidities such as severe cardiac failure, which might contraindicate the use of therapeutic compression. Thus, assessment of a lower leg wound/ulcer can be a complicated process and, as such, should only be undertaken by nurses who are not only competent, but have a wealth of knowledge regarding possible comorbidities and how these can impact upon treatment and the choice of bandage regime. It is inappropriate for a student or newly-qualifed nurse to undertake leg ulcer assessment until they have received the necessary training and skills assessment.

Figure 2. Patient with ankle circumference of 29cm; venous ulcer is deteriorating as the compression bandage has not applied sufficient pressure.

Which bandage for which patient?

Compression bandaging has multiple effects:

- It supports the veins
- It squeezes the veins and enables the vein valves to close
- It speeds up the venous blood flow which reduces congestion in the veins
- It reduces congestion in the veins and allows fluid to move from the tissues into the veins, thus reducing oedema
- It decreases venous pressure and increases blood supply to the skin allowing more nutrients and oxygen to reach the skin, thus improving its condition (Anderson, 2006).

Different types of bandages may apply compression in different ways, either by an accumulative effect in multiple layers, vigorous constant application of pressure in a long-stretch bandage, or by varying resting and working pressures via a short-stretch bandage.

Before making a decision on the most appropriate bandage to treat the patient, it is vital that the nurse considers the patient. Patients deserve and expect information and a degree of choice within their treatment. Often there is more than one type of compression bandage which may be appropriate for a patient, offering the patient the choice may make the difference between compliance and non-compliance. Consideration of footwear, the shape of the limb, ankle circumference, degree of exudate and the patient's lifestyle are also vital for successful treatment (Beldon, 2008).

Ankle circumference

One important aspect of leg ulcer assessment which may direct the nurse in bandage selection is the patient's ankle circumference measurement. Most bandages are developed to apply the correct amount of pressure for an ankle range between 18–25cm, which covers the greatest percentage of patients with venous leg ulceration (Moffatt, 2007). However, since the pressure applied by a bandage is inversely proportional to the ankle circumference, i.e. the smaller the ankle, the greater the pressure (*Figure 1*), it can be deduced that the patient with a small ankle circumference of 16cm would be in danger of pressure damage if a long-stretch bandage of type 3c were applied, and so a type 3a bandage might be more appropriate.

The patient's skin may be protected by the addition of extra wool padding. This extra layer should cover the whole limb, thereby keeping it in proportion and maintaining the graduation of compression (Beldon, 2008). If the patient's ankle circumference is greater than 25cm (*Figure 2*), the amount of compression will be reduced and so either a short-stretch bandage applied in two layers or a long-stretch bandage may be appropriate, depending on the cause for the enlarged

ankle. If the patient has an underlying problem of congestive heart failure, reduction of oedema must occur gradually to prevent any cardio-pulmonary distress.

Skin sensitivity

One important consideration is whether the patient has previously had any skin reactions to dressings or bandages. It is vital to avoid skin sensitivity or allergy, as if this occurs the patient's skin may deteriorate dramatically, leading to increased ulceration and loss of confidence in the nurse by the patient (*Figure 3*).

Many common allergens may be avoided by judicious questioning of the patient and using bandages which avoid recognised allergens, such as latex.

Long-stretch bandages (type 3a–3c)

Long-stretch or elastic bandages contain elastomeric fibres and are capable of stretching and then returning to almost their original size. These bandages can sustain pressure up to a week due to their ability to accommodate changes in limb shape and movement (World Union of Wound Healing Societies [WUWHS], 2008). While a pressure of 40mmHg or more is recommended for the treatment of venous leg ulceration (WUWHS, 2008), it should be remembered that the frail or elderly patient, whose skin has naturally deteriorated with age and in whom the tibial crest bone is nearer the surface, or who perhaps has hypersensitivity of their skin, will not be able to tolerate this pressure. This again highlights the need for leg ulcer assessment to be performed by an experienced and competent practitioner who will recognise the potential difficulties and tailor compression therapy to meet the needs of the individual patient (Konecne and Perdomo, 2004). For the frail/elderly patient with a narrow ankle circumference, rest with legs elevated above hip height and regular dorsiflexion exercises and the use of a type 3a bandage, e.g. Elset® (Medlock) applied in either a spiral or figure-of-eight application to achieve pressures between 18–20mmHg, may be more appropriate to enable the elderly person to tolerate compression, as the therapeutic level of 40mmHg may be too robust if their skin is fragile or hypersensitive. While the ulcer may be slower to heal, the patient will appreciate that the nurse has met their needs which will greatly enhance their concordant relationship.

However, the individual who has a robust skin, with no hypersensitivity, may tolerate a bandage which applies a pressure of 40mmHg, particularly if the patient has severe varicose veins which protrude or have led to ulceration. Patients report these as aching and the cause of much misery and discomfort. The application of a type 3c bandage, e.g.Tensopress® (Smith and Nephew), will rapidly control and reduce the size of varicose veins and so relieve the discomfort. However, these bandages are applied in a single layer over the wool padding bandage, and can cause pressure damage to the bony prominences of the tibial crest of the malleolus (ankle) if not expertly applied (Beldon, 2008).

Short-stretch bandages (type 2)

Short-stretch or inelastic bandages contain little or no elastomeric fibres and subsequently have little extensibility or stretch. These bandages can achieve resting pressures between 30–60mmHg, in other words, when the patient is not mobilising or exercising but resting with legs elevated, but this is not sustained and decreases over the first 24 hours with movement or as oedema decreases (WUWHS, 2008). However, the working pressure tends to decrease less, i.e. the pressure achieved as the patient mobilises/exercises and, consequently, the bandage achieves tolerable resting pressure, but sustains high working pressure.

This group of bandages (*Table 1*) is appropriate for many different patients: from the very mobile and active who receive a high working pressure as they mobilise, which rapidly reduces their oedema necessitating frequent bandage reapplication, to the relatively immobile patient, for example, an individual who has sustained a stroke and is wheelchair-dependent and as a result of lower limb dependency has developed chronic oedema, with or without ulceration (*Figure 5*). Reduction of oedema and consequent ulcer healing can be achieved for both the mobile and immobile (Green, 2007).

Multi-layer compression bandage systems

These are available in kits which may have two or four bandages, which when applied achieve a therapeutic pressure of 40mmHg

at the ankle. The four-layer compression bandage system was devised to apply a high level of compression (35–40mmHg) using weak elastic bandages applied in layers to give an accumulative pressure that could be maintained up to one week, e.g. Profore® (Smith and Nephew) (Moffatt, 2007). Moreover, due to the pressure being diffused through layers of bandaging, rather than a single bandage, this does not feel as tight to the patient. However, due to its bulk this mode of compression bandaging can be problematic for patients' footwear.

Industry has recognised this problem and a 2-layer bandage system now exists, e.g. K-Two (Urgo) where the padding layer not only protects the skin, but also applies a degree of pressure, which, when added to the outer bandage, combine to provide up to 40mmHg pressure. This is claimed to eliminate the problems regarding footwear, while safely applying a therapeutic layer of pressure through two layers (Benigni et al, 2007).

Competency in bandaging

Any registered nurse performing a task or procedure has a personal responsibility to ensure that they are competent to do so (Nursing and Midwifery Council [NMC], 2008). Nelson et al (1995) demonstrated that bandaging techniques could be improved by training. Nurses tend to believe that they are more proficient than they actually are (Reynolds, 1999). This is a dangerous attitude and can have serious consequences, such as bandages being applied too tightly leading to pressure

Figure 3. The patient's ulcer is surrounded by an outline of skin which has reacted to the adhesive border of a dressing applied under compression bandaging.

Figure 4. Patient has reacted to the wool padding layer under compression bandaging, necessitating application of a tubular cotton layer before applying wool bandage layer.

Figure 5. Patient has chronic oedema due to immobility and legs being dependent.

Key points

- Bandages vary in their elasticity and are categorised accordingly.
- Nurses should receive training and be considered competent before applying bandages to patients.
- Compression bandaging should be individually selected for each patient.
- The nurse–patient relationship is vital in ensuring successful management of venous leg ulceration.

damage, or too slack so insufficient pressure is applied. This reflects poorly on the nurse and may lead to loss of faith by the patient (*Figure 6*).

Training in leg ulcer bandaging should not happen in isolation. It is imperative that nurses understand the theory and practice together with the aetiology of leg ulcer disease and the complications which can arise. It is vital that any nurse caring for patients with venous leg ulcers has been appropriately trained and can demonstrate, knowledge, capability and competence in assessment of the patient, their limb and ulcer, and in selecting appropriate means of compression therapy based upon that assessment (Henderson et al, 2007). This is essential to ensure that appropriate, safe, clinical- and cost-effective care are delivered.

Furthermore, training alone is not enough, and skills need to be maintained to ensure continued competency.

Conclusion

Leg ulcer assessment and compression bandaging are complex skills which necessitate a skilled and knowledgeable nurse who will engage with the patient and develop a therapeutic relationship whereby, together, they will select the appropriate compression bandage for that individual patient.

The lead nurse must also ensure that those within the nursing team are capable of both applying compression bandaging in a safe and appropriate manner and of recognising possible complications so that prompt action can be instigated to safeguard the patient. WE

Figure 6. Pressure damage due to inappropriate application of a compression bandage. The distal aspect of the anterior tibial tendon is exposed.

Anderson I (2006) Aetiology, assessment and management of leg ulcers. *Wound Essentials* 1: 20–37

Anderson I (2008) Understanding chronic venous hypertension. *Wound Essentials* 3: 20–32

Benigni JP, Lazereth I, Parpex P, et al (2007) Efficacy, safety and acceptability of a new two-layer bandage system for venous leg ulcer. *J Wound Care* 16 (9): 385–90

British Standards (1995) Bandage Classification 7505

Beldon P (2008) Compression bandaging; avoiding pressure damage. *Br J Community Nurs* 13(6): S6–S14

Green T (2007) Leg ulcer management in patients with chronic oedema. *Wound Essentials* 2: 46–58

Henderson V, Hodgson C, Milne J, Robson J, Stevens H (2007) Development of a pathway of care for venous leg ulcer management. *J Wound Care* 16 (7): 303–6

Konecne SM, Perdomo M (2004) Lymphoedema in the elderly; a special needs population. *Topic Geriatr Rehab* 20(2): 98–113

Moffatt C (2007) *Compression Therapy in Practice*. Wounds UK, Aberdeen, UK: 43

Nelson ES, Ruckley CV, Barbenel JC (1995) Improvements in bandaging technique following training. *J Wound Care* 4(4): 181–4

Nursing & Midwifery Council (2008) *The Code; standards of conduct, performance and ethics for nurses and midwives*. NMC, London

Reynolds S (1999) The impact of a bandage training program. *J Wound Care* 8(2): 55–60

Thomas S (1997) *Compression Bandaging in the Treatment of Venous Leg Ulcers*. World Wide Wounds. Available online at: www.worldwidewounds.com/1997/september/Thomas-Bandaging/bandage-paper.html (accessed online 18 April, 2009)

World Union of Wound Healing Societies (2008) *Principles of Best Practice; Compression in venous Leg Ulcers. A Consensus Document*. MEP Ltd, London