

Innovations in compression for chronic oedema



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Contents

| | |
|--|-----------|
| Foreword | 01 |
| Compression bandaging for chronic oedema: Applying science to reality | 02 |
| Using specialist bandage techniques to improve outcomes | 07 |
| Case reports | 12 |
| Case study 1. Effective management of lower limb lymphoedema using Actico and Rosidal soft | 12 |
| Case study 2. Managing chronic oedema and associated ulceration and lymphorrhoea using Actico specialist bandaging techniques | 15 |

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Foreword: Introducing innovations in an old area of care

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Welcome to this supplement on innovations in compression bandaging for chronic oedema. Today, there are a number of approaches available to manage this condition; however, compression bandaging is probably still the most effective in reducing and decongesting tissues. The history of bandages spans thousands of years, to the Egyptian, Greek, and Roman civilizations. How much has truly changed from those very early days and concepts?

Today, in the UK, we tend to have departments, specialist fields, and specific areas of medicine ... if only it was simple enough to be able to categorise the parts of our bodies according to how our medical models operate! People who need compression bandages do not have one specific condition, but often have a multitude of needs. Moreover, different areas of the same limb can differ from each other, sometimes only 10 cm proximal to each other. Over the last 50 years, investment from clinicians, scientists, and industry has been larger than ever before in the field of compression bandaging. Different systems have been tried and tested with varying numbers of layers. In the early years of bandage systems, the science did not always shine through; nevertheless, the application techniques were farmed out in a specific manner. I am mainly referring to compression bandage systems related to venous leg ulcers, where routinely mid dorsum of the foot to below knee was the standard application, using a combination of long-stretch bandages. This not only healed a great many leg ulcers, but also caused problems for some patients, as one would expect when a compromised system is only partially compressed. Education is now improving this situation as differential diagnosis is implemented within daily practice.

Managing lymphoedema, however, has taken a different approach to that of leg ulcers. Some of the main differences between these two approaches begin with a bandage that includes the digits and, in almost every instance, finishes at the top thigh and onto the trunk. The

materials used include foams of different densities and shapes; undercast padding; liners; cotton inelastic (short-stretch); and, more recently, the addition of cohesive inelastic bandages. A lymphoedema specialist has always had a toolkit that, at times, resembled a craft cupboard rather than the neat standard little box with a bandage kit in it. A combination of these items is adapted on the basis of a very individualised patient approach prior to the compression being applied. Personally, I do not think some of this has changed very much over the years; what has changed, instead, is the way we hunger for 'evidence-based practice'.

Chronic oedema encompassing lymphoedema, lymphovenous oedema, dependency oedema, and lipo-lymphoedema presents with a number of challenging aspects that make even the most experienced specialised therapists scratch their chin at times! One of the biggest challenges to overcome is the reshaping of a limb as well as understanding exactly what type of tissue the clinician is trying to influence in what part of the limb; how managing this will affect the area proximal to it; and, of course, the effect on the lymphatic and circulatory systems. As wonderful as it would be to have X-ray vision, to see exactly what is going on under the skin and what type of tissue we are dealing with so we can get it right the first time, sadly, we do not have these skills. What we do have is expertise in clinical examination and differential diagnosis. What this supplement contains is not necessarily new concepts, but what is very exciting is that, for the first time, these concepts have been published and backed with evidence. The fact that what we have always had results from is now being proven scientifically is a very positive achievement. I am sure our ancestors would be proud and excited; after all, after 25 years in the field, I certainly am! I am sure there is something for every level of clinical practice in this supplement, so take from it what you can because your patients will benefit greatly from it.

Compression bandaging for chronic oedema: applying science to reality

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Abstract

Among other risk factors, chronic venous insufficiency predisposes an individual to chronic oedema. The use of compression bandaging in the intensive phase of treatment is indicated to reduce distortion, lymphorrhoea, and achieve wound healing. When applying a compression bandage, it is essential that the clinician considers the laws that underpin the theory of compression. Owing to the physical properties of the bandages, the use of inelastic compression is favoured for the management of chronic oedema, in view of the high static stiffness index achieved on application. It is essential that the bandaging regime is individualised to meet the specific needs of the patient. This includes the frequency of bandage change, while considering the extent of oedema reduction and holistic needs of the patient.

Key words

Compression bandage • Chronic oedema
• Lymphoedema • Inelastic compression

Chronic oedema is the build-up of fluid within the tissues, and is caused by a functional deficiency of the lymphatic system (Moffatt and Partsch, 2012). The lymphatic dysfunction is often acquired secondary to lymphatic damage or trauma (e.g. during surgical procedures) or, commonly, secondary to chronic venous insufficiency (Bianchi et al, 2012). Chronic venous insufficiency predisposes an individual to chronic oedema because of increased venous hypertension and subsequent increased capillary filtration, resulting in an increase in fluid in the interstitial spaces. The increase in fluid, which is rich in proteins and other macromolecules, increases the lymphatic load and can result in lymphatic dysfunction

(Williams, 2009). Chronic skin changes, shape distortion, and increased risk of cellulitis associated with chronic oedema can have a considerable effect on the individual's quality of life (Whitaker et al, 2015).

Moffatt and Partsch (2012) indicated that compression therapy is considered the most important component of care for ongoing management of chronic oedema. This is commonly in the form of inelastic compression bandaging in the intensive phase of treatment to reduce distortion and lymphorrhoea and aid wound healing. Hosiery is used in the long term to maintain the results achieved and prevent deterioration of the limb shape or skin condition (Lymphoedema Framework, 2006; World Union of Wound Healing Societies (WUWHS), 2008). Compression therapy, however, should not be used in isolation; it should be one component of a care plan that is based on a full holistic assessment. An individualised plan of care for those with chronic oedema should also incorporate skin care to minimise risk of infection, mobilisation to facilitate lymphatic drainage via muscle pumping and skin stretching, as well as psychosocial support to facilitate compliance (Lymphoedema Framework, 2006; Whitaker et al, 2015).

While there are an array of compression bandage systems available, the goal of application should be common, that is, to reduce oedema by (Partsch and Moffatt, 2012; Whitaker et al. 2015):

- Lowering capillary filtration
- Improving uptake via the lymphatics
- Moving fluid from oedematous to non-oedematous areas of the body
- Softening tissue fibrosis and maintaining skin integrity.

With the variety of compression systems available, selecting the most appropriate system to achieve the above goals can prove challenging for the clinician; therefore, a full understanding of the bandage materials, laws of compression, and how this can be applied to deliver best practice to those with chronic oedema is essential.

Laws of compression

According to Laplace's Law (Box 1), the pressures exerted by a compression bandage are directly proportional to the tension and layers, but inversely proportional to the circumference of the limb (Todd, 2011; Thomas, 2014). This law has provided the underpinning for the development of compression systems, and using which we apply the science of compression to patient care.

More recently, Pascal's Law has been cited to underpin the application of some compression systems. Pascal's Law is based around the principle that when pressure is applied on fluid in a closed container (i.e. the limb), there is an equal increase in pressure at all other points in the container (Schuren and Mohr, 2010).

The debate as to which law of compression bears relevance to clinical application can potentially lead to confusion among clinicians when selecting compression. While there is limited evidence to directly apply the science of Pascal's Law to the delivery of compression therapy, Laplace's Law has long been cited as a reliable equation to estimate the level of compression applied to the limb. The validity of Laplace's Law equation in relation to compression has been supported in a recent study, demonstrating that the modified equation (Figure 1) can be used to predict pressure produced by a compression bandage when applied to a cylinder, provided the bandage tension and circumference can be quantified (Thomas, 2014). It is important that the clinician understands both laws and their effect in terms of delivery of compression and what pressures are being applied to the limb (Cooper, 2015).

Inelastic vs elastic compression

Compression bandages can be categorised in a number of ways. With regard to extensibility, they can be placed into one of two categories: elastic (often referred to as long-stretch) and inelastic (often referred to as short-stretch).

The elasticity affects the way in which compression is delivered to the limb and hence the expected outcome, which should influence the clinician's bandage selection following a full holistic assessment.

Elastic compression

The elastic yarns within an elastic bandage allow the bandage to be stretched by up to 120% of its original length. Application at 50% stretch is generally indicated, requiring a high level of skill to apply correctly (Ashby et al, 2014). Their extensibility potentially allows the bandage to yield to expansion of the limb (Todd, 2011). Elastic bandages deliver a sustained level of compression, with little fluctuation during periods of activity or rest (Todd, 2011; Williams, 2012). While elastic bandages are suitable for the management of venous leg ulceration in the absence of oedema, their properties do not make them

Box 1. Modified equation of Laplace's Law

$$\text{Pressure (mmHg)} = \frac{\text{Tension (KgF)} \times \text{number of layers} \times 4620}{\text{Circumference (cm)} \times \text{bandage width (cm)}}$$

the ideal choice when oedema management is required (Williams, 2014).

Inelastic compression

Inelastic compression bandages do not contain elastic fibres and are less extensible than elastic compression bandages. They are applied at 100% stretch, thereby reducing the risk of inaccurate tension (Todd, 2011). Inelastic bandages form a more rigid cuff around the limb. As the calf muscle pumps, the bandage does not yield as elastic bandages do (Muldoon, 2010), thereby facilitating safe and rapid oedema reduction (Box 2).

Static stiffness index

Inelastic compression bandages deliver therapeutic high working pressures and tolerable lower resting pressures, ideal for the management of chronic oedema (Todd, 2011). The static stiffness index (SSI) applied by a compression bandage refers to the difference in the working pressures exerted to the limb while standing and the pressures exerted by the bandage while resting (Whitaker et al, 2015).

A higher SSI created by the variable pressures exerted by an inelastic compression bandage is favourable to stimulate lymphatic flow and venous return. The pressure peaks on movement provide a massaging effect on the lymphatics (Williams, 2012) and mimic short venous occlusions that would be achieved by a healthy valve (WUWHS, 2008), thereby facilitating rapid oedema reduction and wound healing (Foldi et al, 2005; Damstra et al, 2008). The cohesive properties of an inelastic compression bandage provide a higher level of stiffness along with the practical benefit of reducing slippage (WUWHS, 2008; Muldoon, 2010).

Box 2. Benefits of inelastic cohesive compression

Applied at 100% stretch and preventing tissue expansion

Working and resting pressures provide a massage effect, stimulating lymphatic uptake

Low resting pressures facilitate comfort, especially at night time

System can be adapted to meet individual patient needs

Continued optimal pressures

Inelastic compression bandages are known to provide intermittent working pressures greater than 60 mmHg, with lower, comfortable pressures of 30–60 mmHg during periods of rest (WUWHS, 2008). Partsch and Moffatt (2012) (2012) indicated that such pressures are optimal for the management of chronic oedema.

As the use of inelastic compression facilitates rapid oedema reduction, the pressures exerted to the limb are likely to reduce within the first 24 hours. The working pressures reduce to a lesser extent than the resting pressures, resulting in a system that continues to deliver tolerable resting pressures and therapeutic high working pressures.

Damstra et al (2008) conducted a study to determine the relationship between limb-volume reduction and the pressures delivered by inelastic bandages. Those with leg lymphoedema who went through a significant reduction in limb volume experienced a greater drop in pressures over 24 hours, compared with those with healthy non-lymphoedematous limbs who felt little change in volume. It was concluded that the therapeutic intention of limb-volume reduction, rather than poor application, is the main reason for a reduction in sub-bandage pressure.

Hence, it is evident that individuals experience volume reductions at differing rates, since volume reduction is dependent not only on the movement of fluid but also on other factors such as the presence of fatty tissue or tissue density (Williams et al, 2015). This highlights the need to provide an individualised programme of care that involves bandage reapplication determined by the patient's need rather than a regime that is prescriptive and driven by process. This will result in a successful and timely outcome for the patient and clinician.

Mobility

It is acknowledged that the ability to mobilise in order to maximise the effect of muscle activity (particularly the calf and foot muscle pump) will improve outcomes while using any form of compression (Lymphoedema Framework, 2006). The reality is that many patients with chronic oedema are less mobile, or immobile, as this predisposes them to the development of dependency oedema.

Inelastic cohesive compression can play a vital role in the management of chronic oedema for those who are immobile or who have reduced mobility. For such patients, the pressure peaks exerted by the bandage will be lower than those experienced if worn by a more mobile individual. However, the pressure fluctuations will be relative to the individual's level of activity, thereby stimulating venous return and lymphatic flow (Partsch and Moffatt, 2012). Incorporating even gentle exercises into an individual's programme of care will assist in delivering

effective working and resting pressures while wearing inelastic compression.

A number of clinical studies and cases document success (in terms of oedema reduction and wound healing) using inelastic compression on those who are immobile or have limited mobility (Campbell and Coulter, 2008; Damstra et al, 2008), thus dispelling the notion that inelastic compression is only suitable for those who are mobile. Further, the European Wound Management Association (2005) indicates that inelastic compression bandages are the most appropriate for chronic oedema.

For those who are mobile, where possible, compression bandaging should not have a negative effect on mobility (Schuren, 2012).

A recent audit evaluating inelastic cohesive compression bandages (Actico) applied over a foam roll (Rosidal Soft) to deliver a low-profile treatment option for late-stage lymphoedema, showed favourable results for patients in terms of ease of volume reduction, comfort, and ease of movement (Whitaker et al, 2015). This presents the clinician with an alternative method to use an inelastic compression bandage that has a strong evidence base for the management of venous and lymphatic disorders.

Adaptability

The ability to safely adapt a compression system is often necessary to meet the needs of those with chronic oedema. The presence of oedema can have a dramatic effect on the shape of the limb, implying that traditional below-knee bandage application may not address the needs of the individual and, in some cases, might even exacerbate the problem (Williams, 2009).

Adaptations to inelastic cohesive bandage application for those with chronic oedema can include:

- Thigh-length application to effectively manage oedema to the knee and above
- Techniques to manage severe distortion to the forefoot and toes
- Techniques to manage areas of densely fibrotic tissue.

While inelastic cohesive compression bandages have historically been applied successfully in a simple spiral technique, there is now evidence to support the use of a figure-of-eight application for those with late-stage lymphoedema, thus providing more choice to specialist clinicians (Whitaker et al, 2015).

Today's clinical landscape reflects clinical practice with compression that involves input from all professional levels, ranging from the health-care assistant to the specialist nurse (Norris et al, 2012). A system that has the capability to be applied in a variety of ways to meet the diverse needs of the patient population, presents application options that are transferrable to both the specialist and non-specialist clinician, facilitating shared

care within an organisation. This offers a solution that can span disease progression, as it can be both simplified and adapted with the use of specialist techniques. It is vital that the clinician understands the laws of compression along with the properties of different bandage systems in order to translate this into care. This will ensure that compression is safe, effective, and evidence based, rather than being driven by ritualistic practice. For those with chronic oedema, the high SSI and variation in pressures produced are favourable for the management of chronic oedema. Even those with much reduced mobility will benefit from the intermittent pressures delivered by inelastic compression.

In the absence of oedema, compression bandaging for venous leg ulceration is frequently left in situ for up to seven days. For those with chronic oedema, however, it is important that the frequency of bandage change is dictated by the needs of the patient and the extent of volume reduction.

Recent published evidence supports the application of cohesive inelastic compression bandages (Actico) over a foam roll (Rosidal Soft) to provide effective, comfortable compression while reducing bulk. Hence, today, the clinician has more options to meet the wide-ranging needs and presentations of those with chronic oedema.

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Using specialist bandage techniques to improve outcomes

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Abstract

Chronic oedema is a condition that can become more complex to manage if allowed to progress. With the risk of chronic oedema increasing with age, complex presentations may become more commonplace as projections indicate an ageing population. A full holistic assessment is vital, taking into account venous, lymphatic and arterial elements of a vascular assessment, in order to determine the underlying disease process. Competency-based techniques for the application for below-knee and thigh-length application of inelastic cohesive compression exist and support clinicians in the successful management of chronic oedema. In cases of severe or complex chronic oedema, the specialist clinician can adopt strategies to adapt standard application to achieve volume reduction, shape, and tissue improvement.

Key words

- Chronic oedema
- Ageing
- Holistic nursing
- Compression bandage

The term 'chronic oedema' encompasses a variety of conditions, including: lymphovenous oedema, dependency oedema, lymphoedema, and lipoedema (Whitaker, 2012). It is essential that the clinician carries out a thorough assessment in order to identify the aetiology of the oedema, which is often multifaceted. The aetiology can affect clinical presentation, including: the distribution of oedema, volume of oedema, and skin condition. In turn, this affects the selection of appropriate treatment options (Bianchi et al, 2012).

As with many of the risk factors associated with the development of chronic oedema, the increase of risk with age has been well documented. Moffatt et

al (2003) identified that the risk of chronic oedema increases from 1.33 per 1000 in the general population to 5.4 per 1000 in those over 65 years old, increasing to 10.3 per 1000 in those aged over 85 years. It is also evident that the population as a whole is ageing. Projections indicate that the population of those aged over 80 years is likely to double by 2030 (Cracknell, 2010). By overlaying the risk of chronic oedema with the expected population changes, it can be assumed that the challenge of managing chronic oedema will become increasingly apparent. While organisations need to work toward robust strategies of prevention, there also needs to be some focus on those suffering with presentations that are likely to become increasingly complex as individuals live longer with the condition.

Compression bandaging

Inelastic compression bandaging is widely acknowledged to be the most appropriate form of compression to manage cases of chronic oedema in the intensive phase of treatment, where wound healing and/or volume reduction are key goals (Bianchi et al, 2012; Moffatt and Partsch, 2012). Clinical evidence and competency-based guidance exist for both below-knee and thigh-length standard application. The reality is that there are many patients for whom the standard applications need to be adapted to best meet their needs (Elwell, 2014). Historically, this may have been carried out on an ad-hoc basis, with little consensus and supporting evidence, albeit with success. This article highlights some of the techniques used by clinicians with positive outcomes, to offer an appropriate approach for those with complex presentations.

Complex presentations

Foot oedema

Owing to the gravitational effect of oedema, complex foot oedema can be challenging (*Figure 1*). Over time, increasing distortion and digit oedema can greatly affect quality of life, particularly in terms of ability to wear footwear, skin complications, and the risk of cellulitis

(Linnitt, 2007). For the majority of patients, the use of inelastic cohesive compression along with toe bandaging, where necessary, is sufficient to manage oedema to the foot (Elwell, 2014). This is the case because the compression profile with inelastic compression begins at the foot, unlike the use of elastic compression where the compression is commonly applied from the ankle.

In some cases of severe foot oedema, adaptations to standard inelastic bandage application are required, particularly if the toe oedema is severe, altering the shape or skin integrity. In extreme cases, individual toe bandages may be impossible to apply because the toes cannot be separated, intra-digit ulceration is present, or the dorsal oedema covers the digits. Common causes include those with dependency oedema or those who have been treated with inappropriate compression bandage application, which can exacerbate the distortion (Linnitt, 2007).

Fibrotic tissue

In those with chronic oedema, the build-up of protein-rich fluid predisposes the individual to chronic and often complex skin changes. This, along with inflammatory responses associated with chronic oedema, can result in the development of fibrotic tissue (Linnitt, 2007; Whitaker, 2012). Along with scrupulous skin care, inelastic compression can be effective in breaking down fibrosis and, thereby, facilitating volume reduction. It is accepted that this softening of the tissues is often required in order to achieve effective volume reduction (Pidcock and Jones, 2013). This can be facilitated by adapting the bandage technique to deliver areas of increased stiffness to areas of dense fibrotic tissue. Use of a monofilament debridement pad to remove hyperkeratosis, and therefore, softening of the tissues, may also promote volume reduction by improving lymphatic drainage via the superficial lymphatics (Greaves, 2013; Pidcock and Jones, 2013).

Non-healing leg ulcers

In those with chronic oedema, the increased volume of fluid rich in protein and waste products in the tissues can affect the development of ulceration (Figure 2), healing, and exudate levels produced by the wound (Williams, 2009; Whitaker, 2012). Failing to effectively manage the lymphatic as well as the venous element of the disease, particularly in terms of compression selection and application, can affect the treatment outcome and patient's quality of life.

Assessment

As with any compression bandage, the decision to use inelastic compression, incorporating the specialist techniques as appropriate, should be based upon a full

Figure 1. Severely distorted oedema to the dorsum



Figure 2. Ulceration with severe chronic oedema



Box 1. Recommended components of a full vascular assessment

A three-component vascular assessment includes

| | |
|-----------|--|
| Venous | E.g. heaviness, aching, hyperpigmentation, varicose eczema |
| Arterial | E.g. pain on elevation, absent palpable pulses, discolouration, reduced ABPI |
| Lymphatic | E.g. oedema, fibrosis, hyperkeratosis, positive Stemmer's sign |

Source: Wounds UK Best Practice Statement, 2015 | ABPI: Ankle brachial pressure index

Figure 3. Stirrup technique in conjunction with individual toe bandaging



Figures 4 and 5. Before and after utilising the stirrup technique



holistic assessment. This assessment should incorporate a full vascular assessment (*Box 1*).

Following assessment to determine suitability for compression, the clinician must establish if standard application techniques will address the needs of the patient. In cases of the described complex presentations, specialist techniques may provide a viable solution.

The techniques described in this article are intended to be applied in conjunction with the application of chronic oedema bandaging with inelastic cohesive compression, competencies that are available at:

www.Lohmann-Rauscher.co.uk. It is envisaged that the techniques will serve as a valuable resource to those providing specialist care for individuals with chronic oedema of the lower limb. While these techniques are recommended to be initiated by a clinical specialist following a full holistic assessment, they also allow for shared care with community colleagues, with ongoing support from a relevant clinical specialist.

As with any chronic morbidity, long-term maintenance is crucial to prevent exacerbation of the limb. For those

individuals who require intervention with the specialist techniques described within this article, maintenance with flat-knit made-to-measure hosiery would be ideal. Flat-knit hosiery is particularly effective for those who have suffered from significant shape distortion or tissue fibrosis due to the higher fabric stiffness (Journal of Community Nursing, 2015), thus making flat-knit a suitable step-down from inelastic compression bandages.

Technique 1. Stirrup technique for complex dorsal oedema

Following standard application of cohesive inelastic chronic oedema bandaging, over sufficient padding, anchor an 8 cm inelastic cohesive compression bandage at the back of the heel and apply 2 rotations horizontally with tension (heel to dorsum) to ensure that the dorsum is adequately covered and the toes remain visible (*Figure 3*). *Figures 4* and *5* show before and after images, respectively, of when this technique was used.

Technique 2. Stump technique for severe foot and toe oedema

Following standard application of cohesive inelastic chronic oedema bandaging, after padding and protecting the front of the foot appropriately, use an 8 cm inelastic cohesive compression bandage and anchor at the front of the foot. With full tension, cover the front of the foot, folding the bandage each time it reaches the anchor point. Use a 50% overlap. Complete with one turn at tension around the front of the foot (*Figure 6*).

Technique 3. Crisscross technique for areas of severe fibrosis, supporting distortion or non-healing wounds

Following standard application of cohesive inelastic chronic oedema bandaging, using the corresponding size of bandage to that used on that part of the limb, apply strips of bandage at full stretch, in a crisscross fashion, with a 50% overlap. Ensure that the strips cover no more than half of the full circumference of the limb. Finish just above the distorted or fibrosed area (*Figure 7*).

For those patients who are tolerating inelastic compression well, this technique has also been used in clinical practice in order to provide specific areas of extra stiffness to facilitate wound healing. Competencies for the above described techniques are available at: www.Lohmann-Rauscher.co.uk.

Conclusion

As a result of people living longer with long-term conditions, disease progression is inevitable. This, along with population projections, suggests that more complex presentations will become commonplace in the future.

Figure 6. Stump technique



It is the clinician's responsibility to prevent disease progression where possible, through early intervention and by selecting the most appropriate compression system at the start of treatment (Bianchi et al, 2012). However, the reality is that many are suffering with severe oedema and associated complications at the point of referral. Utilising specialist techniques in conjunction with standard, competency-based application will assist in effective oedema management for even the most complex presentations. Achieving the best possible outcome in the intensive management phase of treatment will facilitate long-term success and concordance in the maintenance phase of treatment (Brown, 2014).

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Figure 7. Crisscross technique



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Case reports

Ray Norris, Clinical Nurse Specialist, North East London NHS Foundation Trust

Owing to the varying pathologies associated with the development of chronic oedema, full holistic assessment is vital to deliver effective management (Bianchi et al, 2012). A three-component vascular assessment incorporating venous, arterial, and lymphatic elements will help to confirm suitability for compression and influence the best compression choice (Wounds UK, 2015).

If adaptation to a compression system is required, the laws of compression should be acknowledged to deliver compression that is safe and effective. Laplace's Law, in particular, indicates that bandage tension, number of layers applied, width of bandage, and circumference of the limb are factors that can affect the application of compression (Thomas, 2014; Cooper, 2015), if the amount and type of sub-bandage padding is reduced to minimise bulk.

The following cases are examples of practice where standard application of bandaging has been adapted in view of the findings of a full holistic assessment. The presentation in both cases involve a high volume of oedema, shape distortion, and complex skin changes

that are due to the aetiology of the underlying condition or disease progression. The care described has addressed the multifaceted needs of the patients by providing appropriate skin care, compression choice, and selection of specialist bandage techniques.

Treatment that is part of an individualised and holistic care plan can deliver improved outcomes for those suffering from complex lower-limb presentations, including chronic oedema. In these case studies, the outcomes were achieved in a timely fashion, using regimes that were manageable for both the clinician and the patient. For the specialist, adopting competency-based specialist bandage techniques will ensure that the needs of the patient are met while sharing care with clinical colleagues.

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Case Study 1

Effective management of lower limb lymphoedema using Actico and Rosidal soft

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Background

Mr B presented with unilateral ISL late stage II lymphoedema following an industrial accident in 2000. He had a major artery removed from the limb, and requires regular analgesia (gabapentin 600 mg tds and paracetamol) to manage neuropathic pain in the leg. He had been offered an amputation in view of the weight and pain in the limb, and requires crutches to mobilise.

A full vascular assessment incorporating sonography was carried out. The posterior tibial artery

was absent. However, dorsalis pedis and peroneal pulses were normal. Upon initial assessment, the tissues to Mr B's left leg were densely fibrosed and non-pitting. Owing to the volume of oedema, fibrotic tissue, and limb scarring, the limb was significantly distorted both distally and proximally.

Mr B tried compression bandaging in the past in an attempt to manage the oedema; however, he was unable to tolerate it. He was then offered physiotherapy as part of a holistic plan of care. However, this had to be discontinued after 1 day

because of an exacerbation in nerve pain. In view of his presenting history, particularly the neuropathic pain and artery removal, it was vital that the bandage system used was both tolerable and safe, while providing effective tissue softening and oedema reduction. At the initial assessment, the volume excess compared with the right leg was 39% (78% distally and 17% proximally).

Treatment

A compression system comprising of Rosidal soft to pad the limb beneath inelastic cohesive compression (Actico), in order to provide therapeutic working and low tolerable resting pressures, was selected for Mr B. The bandage was applied to the full leg, toe to thigh, in view of the distribution and extent of the oedema.

The bandage was reapplied twice weekly to accommodate volume reduction. The bandaging continued for 3 weeks. During this period, Mr B found the system tolerable and experienced no slippage.

Following the 3-week period of bandaging, Mr B wears an ActiLymph Dura made-to-measure, Class 3 thigh-length garment, with a Class 1 below-knee garment layered over the top to prevent further build-up of oedema.

Results

During the intensive phase of treatment, the volume reductions were as follows:

- Total volume reduced from 39% to 15%, which is a total volume reduction of 62%
- Distal volume reduced from 78% to 36%, which is a distal volume reduction of 51%
- Proximal volume reduced from 17% to 2%, which is a proximal volume reduction of 88%.

The tissues to the limb were softened, and Mr B has experienced improvements in terms of ease of mobility.

Discussion

The clinicians and patient were extremely satisfied with the tissue softening and rapid volume reduction achieved while using Actico and Rosidal soft. Using Rosidal soft underneath Actico allowed for reduced bulk. The results were achieved while only changing the bandages twice weekly—a regime that could be accommodated by both the service and well tolerated by the patient, while still experiencing no slippage.

Mr B now wears appropriate flat knit, made-to-measure hosiery (Actilymph) in the maintenance phase, ensuring reduced risk of future complications associated with lymphoedema; he continues to enjoy an improved quality of life.

Pre-treatment with Actico and Rosidal soft



Post-treatment with Actico and Rosidal soft



Wearing ActiLymph Dura, class 3 post-bandaging



Managing chronic oedema and associated ulceration and lymphorrhoea using Actico specialist bandaging techniques

Marion Finn, Honorary Contract Tissue Viability and Chronic Oedema Nurse Specialist, East Sussex Community Health Trust

Background

Mr S presented with severe bilateral lower-limb lymphovenous oedema, with associated lymphorrhoea and ulceration to the lateral aspect of the left leg. Both limbs were extremely distorted owing to the presence of oedema, with significant skin changes to the distal portion of the limbs. The lymphorrhoea and ulcer had been present for 2 years; the ulcer was sloughy and measured 12 cm x 12 cm (*Figure 1*).

The goals to treat Mr S included: softening the tissues, reducing the volume of oedema, reducing distortion, and healing the ulcer.

The treatment

Following a full holistic assessment, the following treatment was commenced. Debrisoft, a monofilament debridement pad, was used because of the presence of slough (*Figure 1*). A compression regime incorporating Rosidal soft applied over pillows (stockinette and sub-bandage padding) to reshape areas of severe distortion followed by Actico, was selected to facilitate tissue softening, volume reduction, and wound healing.

The crisscross technique was used over the wound area to provide extra stiffness to reduce oedema, thus promoting wound healing. The stirrup technique was also used during the first two bandage applications, to manage the severe distortion to the dorsum, returning to standard Actico foot application once the distortion was reduced.

Compression bandaging was applied for a total period of 8 weeks, following which ActiLymph Dura made-to-measure flat-knit below-knee hosiery, class 2 layered with a class 1 garment was applied to maintain the volume reduction and tissue improvements achieved during the intensive phase of treatment.

Results

During the first 3 weeks of treatment, the volume reductions were as follows:

- Left limb: total volume reduction was 62%
- Right limb: total volume reduction was 22%.

Throughout the bandaging phase of treatment, reductions of note included a loss of 21 cm from the

Posterior view at start of treatment



Posterior view following bandaging



left ankle and 32 cm from the calf. Wound healing was achieved in 8 weeks, at which point the patient was fitted into hosiery (Figure 8).

Discussion

Rapid volume reduction and wound healing was achieved using a programme of care that incorporated Actico, Rosidal soft, and Debrisoft. The bandaging was adapted according to the patient's needs by adding the crisscross and stirrup technique. The patient was delighted with the results, stating that the treatment transformed his life.

The case studies provide examples of how compression, as part of an individualised and holistic care plan, can deliver improved outcomes for those suffering complex lower limb presentations, including chronic oedema. The outcomes were achieved in a timely fashion, using regimes that were manageable for both the clinician and indeed the patient. For the specialist, adopting the competency-based specialist bandage techniques as appropriate will ensure that the needs of those with complex chronic oedema are met while sharing care with clinical colleagues.





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