

Supervised self-management of lower limb swelling using FarrowWrap

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Lymphoedema and chronic oedema are long-term conditions that can have deleterious effects on the individual's physical and psychological health (Lymphoedema Framework (LF), 2006). Lymphoedema occurs when the transport capacity of the lymphatic system is reduced while the load remains within its normal range (Pallotta et al, 2011). This leads to an increase of fluid in the tissues which, when related to the lymphatic system, can lead to increased swelling, skin changes, recurrent cellulitis and reduced function (LF, 2006). Lymphoedema has two main causes, primary and secondary. Primary lymphoedema is usually present at birth but can develop in later years, and is assumed as a genetic or congenital lymphatic abnormality; secondary lymphoedema results from an extrinsic effect on an otherwise normal lymphatic system (LF, 2006; Connell et al, 2009). Lymphoedema or swelling can be short-term or long-term. Long-term swelling lasting for longer than three months is also known as chronic oedema. Within the community setting, lymphoedema or chronic oedema is commonly caused by patient immobility, venous impairment or increased obesity (LF, 2006). National statistics show a rise in obesity and of the ageing population which will inevitably lead to a higher incidence of chronic oedema (Department of Health (DH), 2009; Fife and Carter, 2009). Furthermore, people with congestive heart failure and those with

chronic kidney and liver disease also frequently have increased rates of chronic oedema.

With an increase in the recognition of lymphoedema and chronic oedema comes the challenge of treating these conditions in a cost-effective way. Early recognition and treatment of chronic oedema reduces the need for complex treatments consisting of daily multi-layered bandaging systems, and of complications such as cellulitis and lymphorrhoea (leaking of lymph fluid from the skin). However, often cases of oedema are not brought to the attention of community specialists or a lymphoedema service until the oedema is well developed and/or complications have occurred.

Treatment of lymphoedema generally consists of the use of compression, good skincare, exercise and rehabilitation including weight control and lymphatic drainage (Wigg and Jones, 2006). Compression is regarded as the mainstay treatment for managing chronic swellings, and can be applied in several ways. This can vary from differing bandaging systems, compression garments, pneumatic compression or manual lymphatic drainage. All compression is designed to have the same effect, which is primarily changing tissue pressure to aid venous and lymphatic drainage (Földi et al 2005; Dennis, 2008).

Use of multi-layer bandaging systems and garments that provide a semi-rigid foundation can benefit the patient by:

- ♦ Increasing venous return
- ♦ Preventing tissue refill
- ♦ Encouraging fluid to the route of the limb
- ♦ Enhancing muscular activity.

Over recent years, in addition to accepting that a short-stretch bandaging system works better for lymphoedema management, there is increasing support for using systems with increased 'stiffness' (Partsch, 2007). Stiffness is a term used to describe sub-bandage or skin interface pressure differences produced by the effect of different bandaging systems at rest and when walking, e.g. when the muscle contracts against the product. It is believed that the bigger the difference, the better the effect of the product (Partsch, 2007). Short-stretch bandaging gives rise to increased resting and working pressures compared to elastic bandages, which can continue to stretch as the limb is flexed, giving a lower working pressure. When carrying out multilayer bandaging it is important to understand the

ABSTRACT

The use of FarrowWrap™ as an alternative to multilayer lymphoedema bandaging (MLLB) can provide an efficient, cost-effective treatment for patients with all types of chronic and lymphoedema oedema. In addition, used within supervised self-management, it allows for the patient to gain control and confidence of their long-term condition, giving greater independence. This article discusses the theory of MLLB and introduces FarrowWrap, an alternative wrapping system offering flexible compression treatment for a range of oedemas. Case studies are included to illustrate varied uses of FarrowWrap and how it can be implemented into clinical practice.

KEY WORDS

Chronic oedema ♦ Static stiffness ♦ Multilayer bandaging ♦ FarrowWrap

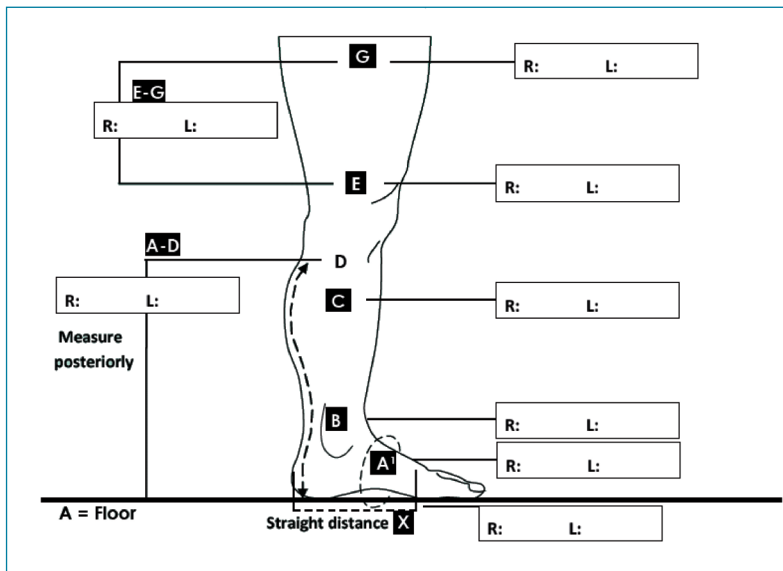


Figure 1. Sizing chart on the FarrowWrap order form

concept of Laplace's law (Thomas, 2003). This dictates that 'compression is greatest over the smallest circumference'. In the context of lymphoedema treatment, compression can be adjusted by modifying the following variables:

- ◆ Number of layers used
- ◆ Width of the bandage used
- ◆ Stretch applied to the bandage
- ◆ Overlap of the bandage, e.g. 25%, 50%, 75%
- ◆ Circumference of the bandaged limb.

Laplace's law means that applying a bandage of uniform width over a cone-shaped limb with the same stretch and overlap will result in graduated compression over the length of the limb. Compression will be highest at the narrowest part of the limb, for example the ankle, and decrease as the limb widens towards the calf. The cone shape can be achieved with the use of padding available from many companies. Alternatively, graduation is commonly achieved by using a narrower bandage at the distal part of the limb and increasing the width of the bandage as the limb circumference increases.

The introduction of FarrowWrap™, which is a velcro wrapping system, provides this same short-stretch technology but in a practical, easy-to-use solution that allows self-application by the patient. FarrowWrap allows for supervised management of chronic oedema patients who, with the correct education regarding their condition and application of the product, can maintain their independence, while saving on nursing time and resources.

What is FarrowWrap?

FarrowWrap is a patented short-stretch compression garment that is available either off-the-shelf or custom-made to fit an individual's limbs. Each FarrowWrap is made with multiple overlapping bands interconnected by a spine and engineered to replicate short-stretch bandaging. FarrowWrap provides high peaks between working and

resting pressure, ensuring that it is an excellent garment for oedema reduction (Humen Davey and Mayrovitz, 2006).

FarrowWrap is an alternative to short-stretch bandaging, and is designed to be easy-to-use and apply by either by the therapist or the patient. The garment is designed to be used in conjunction with a liner which can be impregnated with silver, which is known for its antimicrobial tendencies (Cooper, 2004). The overlapping straps are applied at near end stretch (i.e. almost as tight as possible), ensuring that the correct compression is achieved over the correct circumference of the limb. FarrowWrap can be used instead of short-stretch bandaging for many patients with swelling, for patients post decongestive lymphatic therapy (DLT), and for patients who require compression to maintain limb size. FarrowWrap can also be used instead of or in addition to compression garments to prevent rebound oedema.

Flexible compression options

FarrowWrap is available in two types: Classic and LITE. Having two compression strengths ensures that FarrowWrap is suitable for managing differing types of lymphoedema and patient groups, including elderly, palliative and those with fragile skin (Lawrance, 2008). FarrowWrap Classic is suitable for moderate-



Figure 2. FarrowWrap Classic providing 40mmHg as demonstrated by PressurePal sensor

Table 1. FarrowWrap measurement chart for sizing

Measurement points	Thighpiece (comes with wrap-around kneepiece)				
	XS	S	M	L	XL
(G) Groin	60–70 cm	65–75 cm	70–80 cm	75–90 cm	85–100 cm
(E) Above knee	47–52 cm	53–59 cm	60–66 cm	67–73 cm	74–80 cm
(E–G) Short (+/- 2 cm)	18 cm	18 cm	18 cm	18 cm	18 cm
(E–G) Regular (+/- 2 cm)	23 cm	23 cm	23 cm	23 cm	23 cm
(E–G) Tall (+/- 2 cm)	29 cm	29 cm	29 cm	29 cm	29 cm
	Legpiece				
	XS	S	M	L	XL
(C) Mid-calf	38–45 cm	44–52 cm	50–60 cm	55–65 cm	60–70 cm
(B) Ankle	23–27 cm	28–32 cm	33–38 cm	39–44 cm	45–52 cm
(A–D) Regular (+/- 2 cm)	37 cm	39 cm	41 cm	43 cm	44 cm
(A–D) Tall (+/- 2 cm)	42 cm	44 cm	46 cm	48 cm	49 cm
	Footpiece				
	XS	S	M	L	XL
(A ¹) Mid-foot	22–24 cm	25–27 cm	28–30 cm	31–34 cm	35–40 cm
(X) Regular (-2 cm)	16.5 cm	18 cm	19.5 cm	21 cm	23 cm
(X) Long (-2 cm)	18.5 cm	20 cm	21.5 cm	23 cm	25 cm

to-severe oedema, provides 30–40 mmHg (Figure 2) and is robust and rigid but easy to use. FarrowWrap LITE is suitable for mild-to-moderate oedema, especially dependency, lymphovenous and palliative oedema. It provides 20–30 mmHg and is thinner, cooler to wear, and machine washable.

FarrowWrap is available in several styles to fit different parts of the body, depending on the patient's needs:

- Legpiece (in Classic and LITE) for ankle to knee
- Thighpiece (in Classic and LITE) for knee to groin, including knee wrap
- Footpiece (in Classic and LITE) for applying compression to the dorsum and ankle
- Arm (in Classic as made to measure and in LITE as Trim-To-Fit™) for one arm.

FarrowWrap is available in range of sizes, from 38–70 cm for the calf and 60–100 cm for the thigh. This versatility means that in many cases custom-made garments are not required and the patient's wrap is ready to fit.

The key feature of the FarrowWrap is that, unlike bandaging, it allows the educated patient to easily alter their FarrowWrap fitting throughout the day by tightening the velcro straps. This means that the patient can self-manage the reduction of oedema by altering the FarrowWrap. A cohesive bandaging system, because the bandage is adhered to itself, cannot adjust to the smaller limb size once compression has taken effect. This can allow refill and the limb to swell again. The advantage of FarrowWrap over such cohesive systems is that it can be easily adjusted to the smaller limb size, ensuring that compression is maintained and helping prevent refill.

Selection and fitting

FarrowWrap is easy to measure and fit by the nurse or other health professional. A length measurement of the affected limb is taken to ensure best fit, and circumference measurement is taken at the ankle, calf (widest part and under the knee), and above knee and thigh for a full leg garment. FarrowWrap is available in five limb sizes (XS, S, M, L, XL) and two length measurements (short and regular) for below knee, and three length measurements or the thighpiece (short, standard, tall) (Table 1 and Figure 1). If the patient's measurements are outside the range covered by FarrowWrap's off-the-shelf selection, a custom-made garment can be ordered to fit the shape of the individual's limb. Custom-made garments are usually ready within 2 weeks.

Once measurements are taken and the correct garment selected it is applied by stretching the velcro straps to near maximal (or 'near end') stretch. To achieve near maximal stretch, pull the band from both sides to maximum stretch, reduce a little, and then fasten the velcro. This is easy to learn once shown. Due to the unique engineered design of FarrowWrap, it is difficult to over-stretch the garment and so, correctly prescribed in the appropriate size, it is safe to use. Having taught multi-layer lymphoedema bandaging (MLLB) for many years, it is the author's belief that FarrowWrap is a safer and more efficient treatment and less open to inaccuracies than standard MLLB.

The initial fitting is carried out by a trained health professional. To ensure the patient applies the correct stretch, the garment can be marked showing the application stretch.



Figure 3. Dependency oedema can be suitable for treatment with FarrowWrap LITE



Figure 4. Lymphovenous oedema, suitable for treatment with FarrowWrap

Contraindications

FarrowWrap has similar contraindications to multi-layer bandaging and compression. It is recommended that all patients undergo an arterial doppler assessment prior to the application of FarrowWrap, or that a thorough clinical vascular and arterial assessment is made. FarrowWrap can be used with caution and supervision in some patients with peripheral neuropathy or diabetes, but due assessment and consideration should take place before prescribing. FarrowWrap can be used in patients with well-controlled and compensated heart failure if used under close clinical supervision, but should not be used if the patient has or develops acute exacerbation of their heart condition.

Case studies

The following case studies describe the use of FarrowWrap in a variety of conditions at several lymphoedema clinics

in the UK. All patient names have been changed in accordance with Nursing and Midwifery Council (NMC) best practice (NMC, 2004).

Case study 1: Difficulty applying garment

Many ageing patients or those with arthritic or dexterity/strength problems have difficulty donning and doffing their garments. Mary is 68 years old and has suffered with a lymphovenous oedema for the last 4 years. She has rheumatoid arthritis and had been struggling to apply her conventional compression garments, which led to an increase of swelling. Mary was fitted with a FarrowWrap LITE garment which allowed her to don the garment by herself and maintain her independence. In addition she had a reduction of her soft, pitting oedema, making her more mobile and effectively making the device more effective through increased activity. Mary was able to easily apply the garments and maintain her swelling. Figures 3 and 4 show dependency and lymphovenous oedema suitable for the treatment with FarrowWrap.

Case study 2: Problem-solving compression

Mavis was 78 years old and had chronic venous ulceration (Figure 5). She underwent surgical debridement of her venous ulcers and was maintained in FarrowWrap Classic following discharge (Figure 6a; b). FarrowWrap was selected to prevent the painful application of garments to the healing skin and prevent rolling of traditional garments. The lymphoedema clinic suggested the use of a FarrowWrap Classic with a footpiece and Microfine Toe Cap as an alternative to garments post-bandaging. Mavis found the FarrowWrap comfortable to wear and easy to apply over the silver liner, which also resolved the inflammation of her healing tissues (Figure 6c). Mavis was seen twice per week by community staff who ensured that skincare was carried out and the wrap was applied correctly.

Case study 3: Rebound oedema

Sophie is a 38-year-old lady who developed lymphoedema due to inguinal node removal following cat scratch disease. She had struggled with her stubborn lymphoedema for many years prior to being referred to her local lymphoedema service. Sophie had 44% excess volume to her right leg prior to her decongestive lymphatic therapy (DLT), which consisted of multi-layer lymphoedema bandaging, low-level light therapy (LLLT), LymphAssist therapy, skincare and exercise. This treatment was chosen due to the severe fibrosis of the tissues, the size of the limb and stubbornness of the lymphoedema, which had made it difficult to maintain results from previous DLT. Sophie achieved a 3373 ml reduction following treatment and was fitted with a class 4 flat knit garment. Although wearing a garment post-DLT for 6 weeks, she started to develop rebound oedema because of the stubborn and firm nature of the tissues. Sophie was issued with a FarrowWrap Classic below-knee garment to wear



Figure 5. Mavis before treatment



Figure 6a-c. Mavis after treatment

in addition to her class 4 garments. Sophie remains independent and wears the FarrowWrap when she feels she needs additional support, for example when working (she is a gardener), and at night instead of bandaging. She finds the FarrowWrap versatile and that it maintains the softness of the lower leg. Sophie is maintaining her leg well with this combination of garment and FarrowWrap while waiting for lymph-node transplant surgery (Figure 7).

Case study 4: Stubborn lymphoedema

Daniel is 25 years old and has received treatment for his primary lymphoedema since he was a teenager. He has a very variable lymphoedema which alters depending on activity and garments. Due to the stubbornness of his oedema he wears a class 4 circular knit thigh-length garment (Haddenham Ven) with a grip top, and a class 3 thigh-length second layer. Daniel wears FarrowWrap Classic in addition to his hosiery when he is at home to maintain his oedema, or a class 2 below-knee garment as a third layer. Under the structure of 'supervised self-management', he is aware of how his garments and FarrowWrap work and what he requires of compression in different circumstances. He does not wear the FarrowWrap in addition to his other garments when walking great distances, as it exerts a greater working pressure. Daniel comments that the ease and speed of application of the FarrowWrap is beneficial and more practical to use than a third layer of garment. He finds that FarrowWrap maintains his stubborn lymphoedema extremely well and gives him increased confidence.

Case study 5: Self-management at home

Sarah, a 43-year-old lady, developed unilateral lymphoedema following her third pregnancy. She presented at clinic with

a calf measurement of 101cm. Following three weeks of daily short-stretch multi-layer bandaging her calf had reduced to 89cm (Figure 8). Sarah received modified bandaging for a further three weeks and was then fitted with class 4 made-to-measure flat knit garment (Goldpunkt, from Haddenham Healthcare). Sarah used ongoing self-administered pneumatic compression (Hydroven 12 with LymphAssist), which is designed to mimic manual lymphatic drainage. Following six months' treatment using garments and LymphAssist, Sarah was fitted with a FarrowWrap Classic for ease of application and to continue to reduce the swelling and maintain the results. In this instance the FarrowWrap provides the strong compression required to prevent refill oedema and maintain the excellent results



Figure 7. Sophie before and after treatment with FarrowWrap



Figure 8. Sarah at presentation (left), and 6 months after commencing treatment with multilayer lymphoedema bandaging and FarrowWrap Classic (right)

achieved by the LymphAssist and garments (Wigg, 2009). Sarah continues with her daily routine of class 4 made-to-measure flat-knit and FarrowWrap, and has maintained her condition for two years.

Case study 6: Supervised oedema reduction

John is a 42-year-old IT manager and has lymphovenous oedema. He was offered a course of DLT to reduce his oedema, but declined because of his work commitments. As an alternative, John was offered a course of supervised self-management for his oedema which consisted of skincare, exercise and education in the use of FarrowWrap. John was reviewed by the clinic twice a week for two weeks and then after one month. Through these five appointments John managed his own oedema reduction therapy using Microfine Toe Caps (Haddenham Healthcare) to replace toe bandaging, and wore FarrowWrap Classic. Over the five weeks John lost 1600ml of fluid. He continues to maintain this reduction. The FarrowWrap provided a practical solution to his work commitments and has achieved excellent results (Figure 9).

Case study 7: Post-surgical intervention

FarrowWrap has been used successfully at the Ninewells Hospital, Dundee following the treatment of upper and lower limb lymphoedema with liposuction. Neil had surgery to remove 7.5 litres of fat from his lymphoedematous left leg (Figure 10). Immediately following his operation Neil was provided with a full-leg FarrowWrap Classic garment



Figure 9. John wearing his FarrowWrap Classic during supervised self-management

(Figure 11). The FarrowWrap has continued to reduce the oedema following surgery, has been easier to apply, allows for dressing changes, and has washed well. FarrowWrap has now replaced conventional hosiery postoperatively for many of this centre's post-operative patients.

Palliative care

FarrowWrap LITE and 'Trim to Fit' arm sleeve have been used extensively for patients with palliative oedema who have a soft pitting oedema and fragile tissues. They are particularly useful for reducing and maintaining oedema and preventing lymphorrhoea at end of life, and eradicate the need for pulling on garments or taking time bandaging. The 'Trim to Fit' arm sleeve is also useful for patient with breast cancer-related lymphoedema.

Conclusion

The above case studies demonstrate the variety and flexibility of uses for FarrowWrap. FarrowWrap is demonstrated to provide a high working pressure and low resting pressure as required with multi-layer bandaging. Its increased stiffness gives the high peaks in working pressures that are required from increased stiffness (Humen Davey and Mayrovitz, 2006). FarrowWrap is also useful as an additional layer of compression for rebound oedema and as reduction therapy in supervised self-management. It is a viable alternative to compression garments and can provide problem-solving compression to the foot, knee and thigh, while its availability in two compression strengths makes it suitable for many oedematous swellings.

With cost saving at the forefront of the NHS, it is imperative that nurses work smarter in order to maintain budget constraints. Now available on prescription and requiring fewer visits, FarrowWrap provides this. With careful education of the patient and care workers, FarrowWrap and the Microfine Toe Cap provide a cost-saving compression that can achieve excellent results. FarrowWrap enables patients to become involved in their own care and take ownership of their chronic condition, helping ensure safe and effective treatment of lymphoedema and chronic oedema.

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Figure 10. Neil pre- and post-operation showing reduction to left leg

22 March 2012)

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Figure 11. Neil wearing FarrowWrap immediately post-operation