Adjustable Velcro compression devices and management of lower limb lymphoedema

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Compression is the key to management of lymphoedema and multilayer bandaging has been considered the gold standard. This article looks at adjustable Velcro compression devices as an alternative to multilayer bandaging. The author finds that the devices enable patients to maintain the required pressure in between consultations with healthcare professionals. They also allow for changes in limb volume and can help with concordance, as well as cutting down on the time clinicians need to spend with patients as the devices promote self-management.

KEYWORDS: Lymphoedema • Compression • Velcro compression devices

This article examines the role that adjustable Velcro compression devices (AVCDs) play in the management of lower limb lymphoedema. Current compression methods used for the treatment of lymphoedema in the initial intensive phase and long-term management will be explored.

AVCDs were initially introduced to the UK in the late 1990s and have evolved into the wraps that are used today. Their benefits include improved quality of life for the patient and associated savings in nursing time and resources.

LYMPHOEDEMA

Patients with lymphoedema may experience abnormal swelling and limb distortion, lymphorrhoea, skin changes, feelings of heaviness and pain or discomfort in the affected limb, along with episodes of cellulitis (Woods, 2007). As well as these physical changes to the limb, there may be a psychological element to consider. There is limited research concerning the psychosocial aspects of non-cancer related lymphoedema, especially that of the lower limb. Patients may experience altered body image when swelling occurs and it may become difficult to hide the limb with clothing with compression garments being visible (Green, 2008). Patients can feel embarrassed and conscious of people noticing and drawing attention to their condition and so avoid social occasions, which, in turn, can lead to social isolation.

TREATMENT OF LYMPHOEDEMA

Skin care, manual lymphatic drainage (MLD), compression and exercise form the foundations of lymphoedema care (Woods, 2007). Skin care is essential to maintain the skin barrier function and to help prevent any episodes of cellulitis or fungal infection. A good skin care regimen, including regular washing and application of emollients, will help to combat some of the skin changes commonly associated with lymphoedema, such as hyperkeratosis. Exercise will initiate the muscle pump action and aid lymph flow (Lymphoedema Framework, 2006), and so an exercise regimen tailored to the patient's ability should be implemented. MLD is a massage technique which helps to decongest areas and encourage lymph flow away from the affected areas by increasing the activity of the functioning lymphatics.

These four cornerstones of lymphoedema management must all be considered, assessed and managed if lymphoedema therapy is to be successful (Lymphoedema Framework, 2006).

THE SCIENCE

Lymphoedema is a chronic condition characterised by oedema. It usually affects one or more of the limbs, however the head, neck, genitals and trunk can be affected (Morgan et al, 2005). The aetiology of lymphoedema may be primary, as a result of congenital dysfunction of the lymphatic system, or secondary, as a result of damage to the lymphatic vessels or nodes. In the UK, secondary lymphoedema is commonly associated with cancer and/or its treatment (Tidhar et al, 2014). However, there are other secondary causes of lymphoedema, such as obesity, limb dependency, immobility and trauma (Lee and Wigg, 2012).
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Lymphoedema management usually consists of two phases — the initial decongestive phase and long-term maintenance therapy.

The aim of the decongestive phase is to reduce volume and reshape the limb. This is achieved through a combination of multilayer bandaging (MLB), MLD, patient education (including information on their condition), exercise and skin care, and usually lasts around two to four weeks (Lymphoedema Framework, 2006). Once the limb is stable, the patient moves into the long-term maintenance phase, which aims to maintain limb shape and prevent swelling from recurring and any further deterioration. The patient will usually self-manage with a compression garment and continue to exercise, carry out their skin care regimen and undertake simple lymphatic massage techniques, which they can be taught by a healthcare professional.

The aim of compression is to reduce limb volume and prevent the limb from re-swelling (Mullings, 2012). Compression therapy works in a variety of ways to reduce oedema. The inelasticity of the bandages or garments enhance the action of the calf muscle pump, helping to improve venous return, which, in turn, reduces limb volume (Partsch, 2014). Compression opposes capillary filtration to the tissues, reducing the amount of fluid which helps to alleviate some of the load on the lymphatics (Lymphoedema Framework, 2006). The rigidity of compression therapy encourages the flow of lymph fluid from the tissues to the lymphatic channels (Woods, 2007).

Multilayer bandaging (MLB) is traditionally considered the gold standard to reduce volume in the initial intensive phase of treatment. In a study by Badger et al (2000), it was found that MLB was twice as effective at reducing limb volume in patients with lymphoedema, when compared to compression hosiery.

**USING AVCDS FOR PATIENTS WITH LYMPHOEDEMA**

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straps which are layered to cover the affected limb. The wraps work in accordance with Laplace’s law and deliver graduated compression from the ankle to below the knee (Lund, 2000). They are made of an inelastic material and work in the same way as inelastic bandages, offering low resting and high working pressures (Mullings, 2012). This aids venous return through the action of the calf muscle pump. As the calf muscle is contracted through exercise, the inelasticity of fabric acts as a barrier which increases the pressure exerted on the veins and muscle, which increases venous return and, in turn, reduces oedema. The devices can be removed and reapplied by the patient with minimal training, enabling them to self-manage their condition (Everette, 2016).

Studies have demonstrated significant limb volume reductions in patients using AVCDs when compared with those using MLB. Mosti et al (2015) conducted a randomised controlled trial (RCT) examining the efficacy and comfort of inelastic bandages (IB) and AVCDs in reducing oedema in the initial phase of treatment using 36 patients randomised into two groups. The devices were reviewed after one day of treatment and then again at seven days. The patients wearing the AVCD were advised to readjust the device when it felt loose. The patients in bandages were unable to readjust the bandages, as they were not trained in applying compression bandages. The study found that the pressure of IB dropped by more than 50% after one day of wear, while the AVCDs maintained an average pressure of 43mmHg. After seven days, the median percentage volume reduction was 19% for the patients using IB and 26% for the patients using an AVCD. This study highlights that IB must be changed frequently to maintain a therapeutic level of compression, however the AVCDs offered a consistent level of compression with the patient regularly readjusting the device.

Similar results were demonstrated by Damstra and Partsch (2015) in an RCT comparing the effectiveness of AVCDs with inelastic multi-component compression (IMC) bandages in the initial treatment of lower limb lymphoedema. They demonstrated that AVCDs achieved a significantly higher reduction in oedema than IMC bandages over a 24-hour period. In another study, Ehmann et al (2016) studied 17 patients who used AVCDs for the management of venous disease and lymphoedema and noted a significant reduction in limb circumference over 21 days.

However, it should be noted that these RCTs have relatively small sample sizes and may not be representative. In the author’s clinical opinion, it would be valuable to see larger sample sizes focusing on patients with lymphoedema.

The consensus is that MLB should be changed daily in the first week of intensive treatment, as this helps to reduce bandage slippage and maintain the desired pressure to reduce oedema (Lymphoedema Framework, 2006). However, daily application of MLB is not always possible due to pressures on services and caseload volumes (Morgan et al, 2011).

Lund (2000) reported a reduction in the number of decongestive lymphoedema therapy (DLT) appointments needed for patients using AVCDs, which resulted in time- and cost-savings for patients and nursing staff. This report consisted of a small group of three case studies, where all patients received DLT in conjunction with the use of AVCDs. The reduction in limb volume was attributed to the adjustable straps on the device. As the patient’s limb size decreased, the patient could readjust the straps helping to maintain oedema reduction and continue the reduction in limb size.

Ehmann (2015) evaluated the cost-and time-savings for 26 patients with venous leg ulcers who were being treated in the community and were transferred from MLB to AVCDs. Over a six-month period, a saving of £14,550 on compression bandaging spend was seen. There was also a reduction in nursing visits from 82 to 54 a week, which was attributed to the patient being able to adjust the device themselves.

As said, patients can adjust AVCDs in between visits, which ensures that a therapeutic level of compression is maintained, which has been proven to reduce limb volume (Damstra and Partsch, 2015; Mosti et al, 2015; Ehmann et al, 2016). Furthermore, MLB is a skill which requires specialist training and skills (Lymphoedema Framework, 2006). In areas where the community nursing services assist with the joint management of patients with lower limb lymphoedema, it can be difficult to train and maintain the skills to manage these complex patients. AVCDs offer a solution as nurses can be trained relatively quickly with the skills to apply them (Elvin, 2015). Patients using AVCDs can then be taught how to readjust the devices between visits, which helps to reduce clinic appointments and may be beneficial to patients who work and struggle to attend daily appointments. Patients may also feel empowered if they have some control over the management of their condition. While there is limited evidence of the psychosocial impact of AVCDs on patient quality of life, case studies do mention anecdotal improvements in quality of life (Lund, 2000; Mullings, 2012; Elvin, 2015), and patients have reported feeling more in control when they are taught the skills to self-manage their condition (Tidhar et al, 2014).

LONG-TERM MAINTENANCE

Compression hosiery is commonly used for the long-term maintenance of patients with lymphoedema to maintain limb volume reduction and prevent further swelling (Lymphoedema Framework, 2006). However, if poorly applied, compression garments can be uncomfortable and result in trauma to the skin.
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(Woods, 2007). Selecting the correct size, class and material can be challenging, especially for inexperienced healthcare professionals. Failure to choose the correct garment may result in an increase in oedema, pain, dysesthesia, visible strangulation and pressure damage (Schuchhardt et al, 2008).

Rates of concordance with compression hosiery in patients with venous disease and chronic oedema has been estimated at 33–52% (Jull et al, 2004; Raju et al, 2007). Adherence to compression hosiery for patients with venous disease has been well documented (Anand et al, 2003; Jull et al, 2004; Finlayson et al, 2010). Poor concordance has been attributed to a lack of understanding of the condition, problems with application, body image issues and pain or discomfort experienced while wearing hosiery (Anand et al, 2003; Jull et al, 2004). In the author's clinical opinion, it is reasonable to assume that barriers to wearing compression hosiery in patients with lymphoedema would be comparable to those of patients with venous disease. Finlayson et al (2010) reported that 31% of 122 patients in their study were unable to apply and/or remove compression hosiery. This was attributed to arthritis, weakness, joint problems and poor mobility. Many of these patients were reliant on carers to assist with hosiery application and hosiery was not changed frequently — at times, only weekly.

In focus groups of lymphoedema specialists, poor concordance with compression hosiery has been attributed to low patient satisfaction, increased limb volume, and poor understanding of the condition (Morgan et al, 2011). AVCDs have been identified as a solution for self-care for those patients who cannot manage hosiery, as they can be easier to apply (Linnitt, 2011).

In addition, AVCDs have been proven to be more effective at reducing oedema volume than compression hosiery (Richard and Spence, 1996). This was attributed to the inelasticity of the AVCD, as it was found that compression hosiery was more elastic and stretched, which allowed the limb to swell.

‘AVCDs have been proven to successfully reduce lower limb lymphoedema and should be considered as a viable treatment option for those patients who can play an active role in their own care.’

While AVCDs have the potential to be easier to apply than compression hosiery, their visibility may be a concern for patients who do not want others to see or know that they have lymphoedema (Morgan et al, 2011). Since 2011, there have been some developments in this area. Some AVCDs come with cover up, giving the appearance of a legging. Wraps can also be sourced in black and sand to give the patient more choice.

**AVCDs and Skin Care**

As said, skin care is one of the cornerstone of successful lymphoedema management (Woods, 2007). Regular washing and application of emollients is essential to ensure the skin remains hydrated and intact (Doherty, 2009). Patients with lymphoedema are at increased risk of episodes of cellulitis (Dupuy et al, 1999), and breaks in the skin have also been associated with increased risk of incidence of cellulitis (Björnsdottir et al, 2005).

Patients who are using MLB will be unable to perform skin care between clinic appointments as they cannot remove and reapply the bandages. The use of AVCDs can make skin care easier, as patients can remove the wraps to complete their skin care regimen and then reapply the device. This also allows patients to regularly inspect their skin for any breaks and apply emollients as prescribed, which could help to reduce the incidence of cellulitis (Linnitt, 2011). In the author's clinical opinion, it would be valuable to see more research in this area, particularly exploring whether regular skin care does have an impact on incidence of cellulitis in patients with lymphoedema.

**Conclusion**

No one type of compression therapy will be appropriate for all patients, and each patient should be assessed holistically to gain an understanding of their needs and priorities of care to inform a holistic management plan for lower limb lymphoedema.

Recent studies have shown that AVCDs are better at reducing limb volume than MLB when patients are taught to adjust and manage the device (Damstra and Partsch, 2015; Mosti et al, 2015; Ehmann et al, 2016). AVCDs offer patients the opportunity to play a more active role in their care, which has resulted in improvements in quality of life (Mullings, 2012). When patients are taught to manage their AVCD, the need for clinic appointments is reduced, easing demand on nursing time and equipment (Lund, 2000; Elvin, 2015). They also offer an alternative for those patients who find it difficult to apply compression hosiery (Anand et al, 2003; Jull et al, 2004; Finlayson et al, 2010). AVCDs have been proven to successfully reduce lower limb lymphoedema and should be considered as a viable treatment option for those patients who can play an active role in their own care.

**References**


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Guest et al highlighted only 16% of patients with leg or foot ulcers had an ABPI recorded*

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**KEY POINTS**

- Benefits of AVCDs include improved quality of life for the patient and associated savings in nursing time and resources.
- Skin care, manual lymphatic drainage (MLD), compression therapy and exercise form the foundations of lymphoedema care.
- Lymphoedema management usually consists of two phases — the initial decongestive phase and long-term maintenance therapy.
- Patients can adjust AVCDs in between visits, which ensures that a therapeutic level of compression is maintained, which has been proven to reduce limb volume.
- AVCDs offer patients the opportunity to play a more active role in their care, which has resulted in improvements in quality of life.

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**Revalidation Alert**

Having read this article, reflect on:

- Your knowledge of the different phases of treatment for lymphoedema
- How familiar you are with the different compression therapy options
- Why AVCDs promote patient self-care and improved quality of life.

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