

Managing chronic oedema in a patient with arterial disease and leg ulceration

Robin Cooper

Leg Ulcer and Lymphoedema Specialist, Salisbury District Hospital, Salisbury, England

[Email??](#)

The management of patients with arterial leg ulcers within a community setting poses a multitude of challenges, which, in the case of the patient in this article, are complicated by spinal injury and resulting in secondary lymphoedema. Bell et al (2011) indicated that there is evidence of a greater burden of peripheral arterial disease in the lower extremity arteries of spinal cord injured (SCI) individuals. In their study, 105 SCI patients were compared with 156 able-bodied people. The results showed that ankle brachial pressure index (ABPI) was significantly lower in the SCI subjects vs the control group. One reason for this may be the reduced activity of the legs in SCI individuals. This would also apply to patients who suffer from chronic illnesses such as multiple sclerosis, motor neurone disease, and obesity. Owing to dependant chronic oedema, it is particularly this patient group who require compression therapy.

Full compression may be safely applied in patients with an APBI greater than 0.8 (Scottish Intercollegiate Guidelines Network (SIGN), 2010). Reduced compression may be used in peripheral vascular disease (PVD). Compression therapy is one of the cornerstones of lymphoedema management because it aims to reduce swelling through removal of oedema, as well as improve skin changes and limb shape (Todd, 2015). Compression will aid the breakdown of thickened tissue, improve venous return, assist with the movement of oedema from the affected area, and increase lymphatic reabsorption (Földi et al, 2005). Chronic oedema affects leg ulcer healing and adds to the distress of the patients in terms of increased exudate, immobility, difficulty in putting clothes on (especially footwear), and susceptibility to infection (Williams, 2003).

Patients with chronic oedema are also at risk of infection, such as cellulitis. The cost of treating cellulitis is expensive. The cost of wound care in the UK is estimated to be £5 billion per annum (Guest et al, 2015). Home visits were estimated to cost £10.9 million annually. The same paper reports that 30% of wounds lacked a differential diagnosis, indicative of the practical difficulties experienced by clinicians. Therefore, it will be cost-effective for the

NHS if patients with chronic oedema and wounds are referred to a vascular centre for a clear diagnosis and prompt treatment. This is because wound healing may be accelerated, resulting in reduced dressing costs and nurses appointments/home visits.

This article will describe current methods of assessing arterial disease, and the treatment of lymphoedema in a man who suffers from arterial disease and paraplegia. The combination of accurate assessment and effective treatment resulted in leg ulcer healing and reduction of lymphoedema.

Background

Many patients with venous disease go on to develop lymphoedema. This is owing to ongoing disruption to

ABSTRACT

Treating lymphoedema in patients with critical arterial disease can be contraindicated. This case study describes current methods of managing lymphoedema in a patient with arterial disease and leg ulcers. The patient, a 65-year-old male, had paraplegia and lower-limb lymphoedema with leg ulceration for 18 years, as well as arterial disease. The patient was referred to the lymphoedema/vascular service in 2013. Duplex ultrasound indicated superficial femoral occlusion. The arterial disease was treated with an angiogram and angioplasty, and when the blood supply was improved, the lymphoedema was treated. Emphasis was placed on self-care and reducing the need for community nurse involvement. Self-care included compression bandaging, use of Farrowwrap, low-level light therapy, and ulcer dressings. Outcomes were measured using a telemedicine software programme. The patient's lymphoedema was reduced, leg ulcers healed, and quality of life transformed.

KEY WORDS

- ◆ chronic oedema ◆ arterial disease ◆ leg ulcers ◆ case study
- ◆ low-level light therapy

Accepted for publication: 22 March 2016

the normal flow of venous blood, which results in oedema. If the lymphatic system is unable to remove this excess fluid, lymphoedema will develop. The link between venous disease and lymphoedema led to the introduction of lymphoedema training, and the commissioning of a lymphoedema service at Salisbury District Hospital. At the same time, the Wiltshire Clinical Commissioning Group were exploring ways in which they could commission a lymphoedema service. The service was for primary and secondary lymphoedema and located within the vascular unit at the hospital.

Patients are either referred for the assessment and treatment of lymphoedema, or if they have a leg ulcer, they

are referred to a nurse-led one-stop clinic. Historically, the patient would have had three visits to the hospital: one to see a nurse, the second for a duplex scan, and the third to discuss the results with a consultant. A one-stop appointment is when these three steps are completed in one visit, which results in the patient receiving prompt care and also reduces costs for the NHS. The 1.5 hour appointment at the nurse-led clinic includes:

- ◆ A leg ulcer assessment
- ◆ Photographs and measurement of the ulcers
- ◆ Arterial and/or venous duplex
- ◆ Explanation of a treatment plan
- ◆ Discussion of the results and diagnosis
- ◆ Emphasis on self-care (of the ulcer and lymphoedema), reducing the need for community or practice nurse involvement, where possible.

There are digital copies of all reports, and the software used includes LymCalc (by Haddenham Healthcare), Leg Ulcer Telemedicine (by SaaSsoft Ltd), and VascLab (designed by Charles Ranaboldo, Vascular Consultant, Salisbury District Hospital). To ensure continuity of care and communication with health professionals or other people involved in the patients' care, printed copies of the reports are available.

Case study

This is the case of a Mr K, a 64-year-old man with paraplegia. At the age of 18 years, he was involved in a road traffic accident, which resulted in paraplegia. When he visited the vascular department at Salisbury District Hospital, he was assessed as having bilateral leg ulcers that had been present for 18 years. The lower parts of both his legs were swollen with thickened tissue over his foot and ankle areas. There was no pain owing to a lack of sensation in these areas.

Mr K sat in his wheelchair most of the day as he liked to live as much of a normal life as possible. His legs felt heavy making mobility difficult. If possible, he would elevate his legs to aid venous return, but he then had to deal with backache. He and his wife were both keen to help themselves and concord with any treatment available. They stated that although the community nurses had been professional, they found the regular invasion of personal space (an average of twice weekly visits over the 18 years) immensely difficult, and the lack of any progress or clear diagnosis depressing. If he had been given an earlier diagnosis and treatment, his ulcers may have healed sooner.

His past treatments included two hospital admissions for cellulitis. He was referred to the vascular department at Salisbury District Hospital from the plastic surgery department at the hospital.

The four stages of care

Stage 1

Mr K's arterial colour duplex demonstrated total occlusion of his left superficial femoral artery (SFA)

All images supplied by author



Figure 1. The foot after 4 days of compression



Figure 2. Limb distortion caused by excessive calf limb volume loss

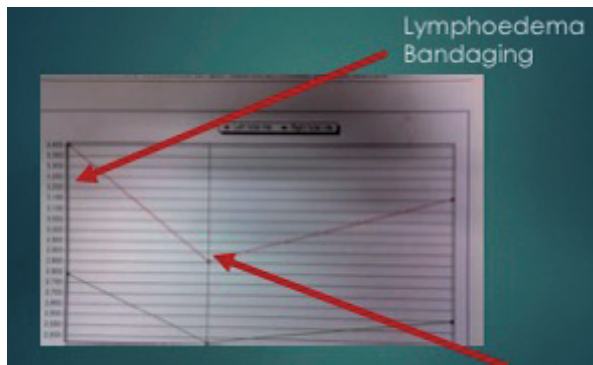


Figure 3. Graph showing increase in in the amount of fluid in the leg

and partial occlusion of his right SFA, which is the largest artery in the thigh (Figure 1). The ABPI on his right leg was 0.7, which was felt to be sufficient for wound healing. The results and treatment were discussed with the patient and his wife, and it was agreed that we would proceed with an angiogram and potential angioplasty for his left leg. This is normally performed in the radiology department under a local anaesthetic (Mals et al, 2014). However, since the patient suffered from involuntary movements of his lower limb, a general anaesthetic would be required to carry out the test. Mr K's case was discussed at the weekly multidisciplinary team (MDT) meeting and a date was agreed. Unfortunately, the atherosclerosis was unable to penetrate with the angioplasty, so a femoral popliteal bypass operation was performed (Figure 2).

Stage 2

Compression, using the 3M Coban 2 Lite System, was commenced. This is a short-stretch bandage and has proved to be useful in patients with moderate peripheral arterial occlusive disease (Ladwig et al, 2014). The reported advantage of this system over others is its lightness, lack of bulk, and the ability to remain *in situ* for longer; therefore, it only requires changing twice a week (Morgan et al, 2011). The vascular consultant advised that the bandage would need to be applied with caution on the left leg so as not to occlude the popliteal anastomosis as a result of the bypass surgery. The foot was measured before and 4 days after compression using a disposable tapemeasure, which demonstrated a 3 cm reduction of oedema on the foot (Figure 3).

However, by week 6, Mr K's foot size had stabilised but the calf limb volume (amount of fluid in the leg) loss was too excessive and resulted in distortion of the limb (Figure 4). There was also some skin damage on the tibial crest. To prevent skin breakdown, it was vital that these issues were addressed.

The Coban 2 Lite was discontinued and a Velcro wrap system (FarrowWrap by BSN Medical) was commenced. Velcro wrap systems are designed to provide easily applicable, graduated support (Lawrence, 2014). Mr K's wife was taught how to apply and change the dressings on the ulcers. No community nurse involvement was required after this time, which gave the patient and his wife the independence they wanted. Monitoring was undertaken by staff at Salisbury District Hospital. Emphasis was placed on providing good compression on the foot and reducing the limb volume at the calf, resulting in an increase in the amount of fluid in the leg and a normal shaped leg (Figure 5). This method of applying compression needs to be undertaken with caution and expertise. The result is sustained graduated compression, from toe to knee, which reverses venous hypertension and chronic oedema in the lower leg.

The left leg ulcer healed in 6 weeks and healing continued to progress on the right leg.



Figure 4. The healed left leg ulcer

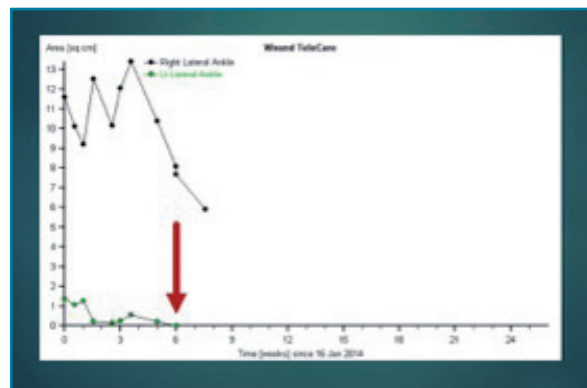


Figure 5. Graph showing healing in left leg

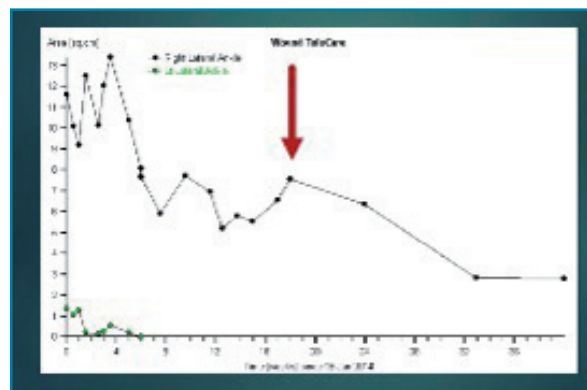


Figure 6. Graph showing effect on leg with low-level laser therapy

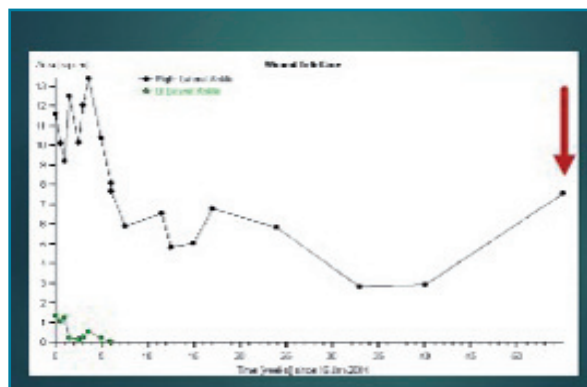


Figure 7. Wound healing that became static at 14 weeks

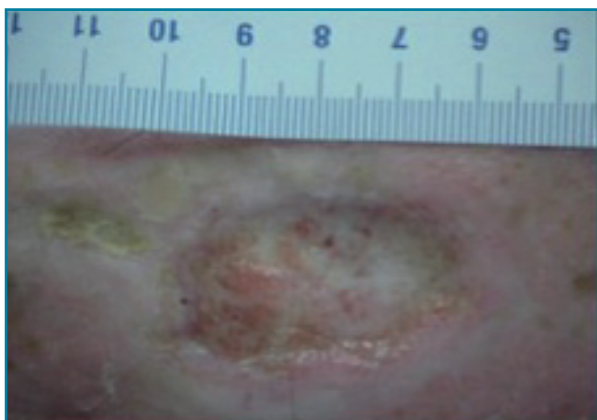


Figure 8.



Figure 9.

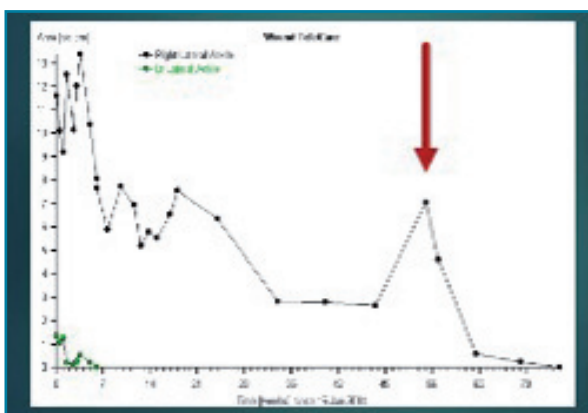


Figure 10.

Stage 3

Using the Leg Ulcer Telemedicine (LUTM) software, the vascular staff were able to track the healing or nonhealing of the ulcers. A photograph of the wound is taken alongside a measuring scale and uploaded to the software. The software user can then measure the ulcer, which is automatically converted into a graph. The use of graphs can be motivating for patients (Boyes and Harris, 2009) and immensely useful for health professionals as well as the latter can evaluate the outcome of the present treatment.

As can be seen in Append 8, the right leg ulcer was increasing in size. Therefore, at week 18, low-level laser

therapy was commenced using LTU-904 (by Haddenham Healthcare). Low-level laser therapy is the application of red and near-red light over injuries or lesions to improve wound and soft-tissue healing (Hopkins et al, 2004). It has also been shown to reduce thickened skin in patients with lymphoedema (Carati et al, 2003); however, the evidence for its use on wounds is not conclusive and that more research is needed. Mr K's wife was taught how to use it on a daily basis. This therapy continued and although some thickened tissue remained, the foot became softer and resulted in a decrease in the leg ulcer size.

Stage 4

The wound healing process continued for 14 weeks before becoming static, and the wound gradually increasing in size (append 9). There were no obvious signs of wound infection, so a repeat arterial duplex ultrasound was performed, and this indicated a deterioration of blood flow due to a total occlusion of the SFA. A hospital admission was arranged for Mr K with a further angioplasty and femoral popliteal bypass.

At the same time, the wound was surgically debrided, resulting in a good visual improvement (Figures) and a skin graft applied. The ulcer went on to heal (append 13) in a total time of 75 weeks. It is now over a year since the ulcers healed, and Mr K's ulcers remain healed, while his leg oedema is maintained with the regular use of FarrowWrap and skin care.

Discussion

A correct and early diagnosis is important to help a patient live with a chronic condition. An effective diagnosis also means that treatment can be initiated promptly. Regular reassessment is needed to demonstrate the effectiveness of the prescribed treatment.

User-friendly computer software, which will aid the patient, carer, and health professional, needs to become more readily available to health professionals. In this case study, the measurement of outcomes at regular intervals using software, allowed the health professionals to make treatment choices and they played an important part in the patient's successful outcomes.

At the lymphoedema/vascular unit at Salisbury District hospital, the result of using duplex scan reporting software means that patients are better informed about their condition. The duplex scans are easily understood by both patients and health professionals. In the case of patients with leg ulcers of arterial aetiology, it is possible to easily show why ulcer healing is not taking place (Boyes and Harris, 2009). This resulted in the performance of surgery, which improved the patient's arterial blood flow, which was vital to the wound healing.

One function of the LymCalc software is particularly for limb volume calculation and analysis. This allows the health professional to assess the effectiveness of the compression therapy. Both the LUTM software and LymCalc allow the patient and health professional to evaluate when treatment is effective and when it is not, and the treatment can be

changed accordingly. For example, when the patient's wound became static, the duplex scan was repeated, which demonstrated a decrease in blood flow to the leg. This allowed the nurses to adapt the treatment on the basis of any changes in the wound. In the case of an arterial ulcer, the use of the duplex scan can help health professionals to react promptly by referring the patient to a vascular unit if the patient's arterial status deteriorates.

Conclusion

The treatment of chronic oedema in the community can be costly and time consuming to the NHS. A large part of the treatment plan involves emphasis on self-care, reducing the need for community or practice nurse involvement, if possible. Treating the lymphoedema in Mr K who also had arterial disease and leg ulcers involved first treating his arterial disease with an angiogram and angioplasty, and then treating the lymphoedema once the blood supply was improved. His wound healing has continued with self-care and his wife's help in putting cleaning the wound and putting on the compression.

The MDT at the vascula department of Salisbury District Hospital worked closely on this case to ensure the most suitable treatment options were offered to Mr K. In addition to the financial benefits that effective treatment brings to the NHS, it is impossible to evaluate the life changes that optimising treatment brings to the patient.

BJCN

Declaration of interest: The author has no conflicts of interest to declare.

- Bell JW, Chen D, Bahls M, Newcomer SC (2011) Evidence for greater burden of peripheral arterial disease in lower extremity arteries of spinal cord-injured individuals. *Am J Physiol Heart Circ Physiol* **301**(3): H766–72. doi:10.1152/ajpheart.00507.2011
- Boyes R, Harris L (2009) Pictures and telemedicine to promote communication and improve concordance in leg ulcer care. *Wounds UK* **5**(3): 67–72
- Carati CJ, Anderson SN, Gannon BJ, Piller NB (2003) Treatment of postmastectomy lymphedema with low-level laser therapy: a double blind, placebo-controlled trial. *Cancer* **98**(6): 1114–22

KEY POINTS

- ◆ Treating lymphoedema in patients with critical arterial disease can be contraindicated
- ◆ The use of software in assessment of a patient's condition can help health professionals to make treatment choices
- ◆ In patients with chronic oedema and lymphoedema, regular reassessment is needed to demonstrate the effectiveness of the prescribed treatment
- ◆ Emphasis on self-care can reduce the need for community or practice nurses to regularly visit patients at home

- Guest JF, Ayoub A, McIlwraith T et al (2015) Health economic burden that wounds impose on the National Health Service in the UK. *BMJ Open* **5**(12): e009283. doi:10.1136/bmjopen-2015-009283
- Hobday A, Wigg J (2013) FarrowWrap: innovative and creative patient treatment for lymphoedema. *Br J Community Nurs* **18**(10 Suppl): S24–31
- Hopkins JT, McLoda TA, Seegmiller JG, David Baxter G (2004) Low-level laser therapy facilitates superficial wound healing in humans: a triple-blind, sham-controlled study. *J Athl Train* **39**(3): 223–29
- Földi E, Jünger M, Partsch H (2005) The science of lymphoedema bandaging. In: European Wound Management Association (EWMA). *Focus Document: Lymphoedema Bandaging In Practice*. MEP Ltd, London
- Ladwig A, Haase H, Bichel J, Schuren J, Jünger M (2014) Compression therapy of leg ulcers with PAOD. *Phlebology* **29**(1 Suppl): 7–12
- Lawrence G (2014) Juxta CURES: An innovative method of providing compression for leg ulcer management. *Wounds UK* **10**(1): 64–70
- Malas MB, Enwerem N2, Qazi U et al (2014) Comparison of surgical bypass with angioplasty and stenting of superficial femoral artery disease. *J Vasc Surg* **59**(1): 129–35. doi:10.1016/j.jvs.2013.05.100
- Morgan PA, Murray S, Moffatt CJ, Young H (2011) The experience of patients with lymphoedema undergoing a period of compression bandaging in the UK and Canada using the 3M™ Coban™ 2 compression system. *Int Wound J* **8**(6): 586–98. doi:10.1111/j.1742-481X.2011.00832.x
- Rankin J (2012) Transforming regional lymphoedema services: a managed clinical network. *Br J Community Nurs* **17**(10 Suppl): S18–25
- Scottish Intercollegiate Guidelines Network (2010) SIGN Guideline 120: Management of chronic venous leg ulcers. <http://bit.ly/1PpnCnC> (22 March 2016)
- Todd M (2014) Strategies to prevent the progression of venous and lymphovenous disease. *Br J Community Nurs* **19**(8 Suppl): S8–14
- Williams A (2003) An overview of non-cancer related chronic oedema - a UK perspective. *World Wide Wounds*. <http://bit.ly/1VAAGOD> (accessed 22 March 2016)