

CHAPTER 13

COMPRESSION THERAPY FOR VENOUS DISORDERS AND VENOUS ULCERATION

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Introduction:

The first treatment used for **chronic venous insufficiency** and **venous ulceration** is **compression**. The goals for **compression** therapy are: to encourage rapid **ulcer** healing and prevent a **recurrence**. In most cases, complete healing can be accomplished in under 3 months. Barriers to healing may include: older age, obesity, **venous reflux** or back flow in the **veins**, and underlying arterial disease (poor blood flow into the leg). In addition, long-standing or very large wounds, and patients with a history of previous **ulceration** take longer to heal. The ideal **compression** allows the patient to continue their normal activities – they are able to walk and remain active in their daily lives.

All **wound care** should begin with basic wound management. Making sure the wound is clean and free of infection, good nutrition to support healing, has good blood flow and is not subject to any injury or trauma which is critical for **wound healing**. Your doctor can pick the best wound management to make sure these needs are met. **Compression** therapy is applied in addition to the required dressing or bandage appropriate for the wound. Typical **compression** devices may include: **elastic compression stockings**, **paste gauze boots** (Unna's boot) and **multi-layered wraps**. Some patients even benefit from the use of **pneumatic compression pumps**.

Physiology

Based on experimental information, the ideal pressure for leg **compression** is likely 35-40 mmHg. Studies have demonstrated that in patients with severe **chronic venous insufficiency**, **inelastic compression** decreases **venous reflux** and decreases the **venous pressure** when walking. However, the exact mechanism through which **compression** improves the rate of **wound healing** is unknown.

Improvement in tissue blood flow may play a role. There is thought to be a beneficial effect on tissue pressure and swelling. The **compression** should promote a decrease in swelling by encouraging fluid to move into the lymphatic channels (third type of blood vessel that removes other debris than only blood from your soft tissues). In addition, the increased external pressure from the compression should stop further leaking of fluid into the skin and fat of the leg. As the swelling gets better, the lack of extra fluid should improve the skins' ability to receive needed oxygen and food required for **wound healing**.

Diagnosis

Many patients find it difficult to use **compression** therapy. This makes patient education critical to improve **compliance** (patient use) of the compression. Patients should be educated about the underlying changes in the **veins** (**reflux** with backward flow of **venous blood** down the leg)

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which may contribute to **ulcers** and poor healing. In addition, the need for **compliance** with therapy for both healing and to prevent **recurrent ulcers** should be stressed. Approximately 70% of leg **ulcers** or wounds around the ankle may be related to **venous disease**. Imaging of the **veins** with **ultrasound** (sound waves used to see the veins much as one sees a baby in the womb) or **venography** (injection of X-ray agents to help see the **veins**) will make sure that **venous disease** is the cause of the **ulcer**. The doctor should take a careful history to make sure there are no other reasons that might be causing the **ulcer** or making it harder to heal. Arterial insufficiency also called **peripheral arterial disease (PAD)** is decreased blood flow into the legs which would mean a poor delivery of oxygen and nutrients to your leg and must be excluded as a cause. When arterial disease and **venous disease** present together which can happen, there may be an even more noted delay in healing and the help given by **compression** may have to be changed for best results. If the arterial disease is severe enough, **compression** may be dangerous even cause gangrene or loss of the leg. Other medical problems that may affect **wound healing** include: diabetes, poor nutrition, or a decreased ability to fight infections. In some patients, **compression** may cause a lot of fluid to be pushed back to the heart and result in heart failure. Patients with these medical conditions should be followed closely.

Forms of compression

While **compression** garments are well studied in **wound healing**; they have also been shown to improve patient quality of life. Symptoms of pain, swelling, skin discoloration, cosmetic appearance of the leg, increased activity levels, improved sleep and decrease in depression symptoms have been documented with the use of **compression** therapy when used in the right cases. No studies have demonstrated one form of **compression** to be better than another with respect to **wound healing**. Successful compression is determined by the ability of the patient to use the therapy as directed by the doctor.

Gradient **elastic compression stockings** (more compression in the foot and less as one goes up the leg so that **venous blood** is pushed toward the heart and not pushed into the foot and lower leg) are the typical medical support hose that most people have come to know (**Figure 1a**). They are available from several companies in a variety of fabrics and materials, strengths, lengths, and designs. Some stockings are fitted with a zipper to help in stocking placement (**Figure 1b**). They can also be ordered “custom-made” for people with difficult to fit legs. **Compression stockings** are usually less bulky and likely more comfortable for most patients compared to other forms of **compression**. In addition, with the use of **compression stockings** the patient may continue to wear their own footwear. These types of stockings are often used before experiencing a venous **ulcer** to maintain health skin and combat the effects of abnormal **venous pressure** from **venous reflux** or **obstruction**. They are also the most common type of compressive device to prevent a **recurrent venous ulcer** after healing as occurred.

While the benefits related to **compression stocking** for **wound healing** are well known, there are a number of reasons or actions that will cause them to not do the job. If the patient can not put the stocking on, will not wear the stocking as shown to do so, or can not afford the stocking (insurance will not cover that cost); the results may not be as expected. **Compression stockings**

are “operator dependent” – meaning they only work when they are worn. Poor **compliance** (not used as directed) is a major reason many patients fail to heal their wounds.

Patients with significant pain related to the **ulcer** may not be able to use the higher **compression** levels because of pain. Such patients may be started with a lower grade (less pressure applied) of **compression** and increased as the pain they experience becomes less. Elderly patients who have difficulty putting the stocking on or patients known to be non-compliant do not do as well with this therapy. Obese patients and patients who have difficulty moving or bending following a joint replacement or with arthritis may be dependent on a family member or a other helper to assist with applying the stocking.

There are a number of devices available to help get the stocking on. Open toe stockings may be applied using a silk sleeve (**Figure 2a**). The sleeve is removed following placement of the stocking. Some patients may benefit from the use of a wire frame – or stocking “Butler” to assist with placement (**Figure 2b**). Other similar devices are available and may be helpful for some patients.

Unna’s boots or **gauze paste boots** are typically a 3 to 4 layer dressing which is applied by a trained medical professional. The gauze bandage which is loaded with zinc, calamine, or other moist substances is applied from the toes to the knee. Additional layers of gauze may be placed and then an outer **elastic compression** wrap is put over all this material. This must be changed weekly and sometimes 2-3 times a week if the wound has a lot of drainage. Once applied, it requires little care from the patient. Care must be taken not to get the **Unna’s boot** wet. Because it may be bulky, it can be uncomfortable for some patients. Some patients may have to use a larger shoe because of the added thickness of this form of **compression**.

There are other types of three and four-layer compression bandages which may have some added benefit in the care of a particular wound. Some doctors feel that the many layers of **compression** result in a more even **compression** up the leg. The added layers may also provide better absorption of the drainage from the wound. Your physician is responsible for determining what materials should be used for **multi-layered compression** devices. Depending on the materials and the elastic parts, the pressure on the leg may be quite variable from one application to the next.

The stiffer and more **inelastic compression** devices have been shown to have more benefit with respect to pushing the venous blood out of the leg (**venous return**). In some patients, padding is put directly over the wound to provide even more **compression** in that area. Padding may also be required for areas where there is rubbing or friction especially at the ankle crease.

Walking exercises are very important to get the best results from any form of **compression** therapy. Some patients experience a fairly significant decrease in swelling shortly after the device is applied. This is due to the increase in pressure and rapid decrease in **edema**. If this occurs, the **multi-layered bandage** or **Unna’s boot** should be reapplied to have the best pressure to continue seeing a decrease in swelling and better healing.

There is a specialized device consisting of multiple, rigid, Velcro-adjustable compression bands which are designed to go around the leg (**Figure 2c**). This provides inelastic, rigid adjustable **compression** which can be fit to the leg depending on the degree of swelling. This may serve as a useful alternative for patients who are unable or unwilling to wear a **compression stocking**.

Pneumatic compression devices have been used for the treatment of **lymphedema** and **venous ulceration**. While they are not widely used, these devices may be particularly helpful in people with severe **edema**, morbid obesity, or severely impaired movement in whom other options may be limited. These devices use several cuffs filled with air that can be placed on the leg from foot to thigh and that can be inflated and deflated to pump the venous blood and extra liquid out of the leg. For the best results, these should be used along with good standard **wound care**.

Conclusion

The abnormal backward flow of blood in the leg **veins** or blockages to the blood getting out of the leg can lead to problem including swelling, **skin changes** and even **ulcers**. There are studies which make sure that the **veins** are the problem and no other problem has a major role. Once the diagnosis is made, placing **compression** from the outside of the leg can correct many of the underlying problems such that the symptoms get better. **Compression** therapy comes in many forms and some devices are better for healing **ulcers** (open skin lesions) and other for maintaining a steady state within the leg. **Compression** is the first treatment generally used to correct problems seen with lower leg **venous disease**.

Commonly asked questions

Compression stockings are hard to get on. Do I have to wear them every day?

In order for **compression** therapy to give the best result the doctor wants, it needs be placed on everyday before you get out of bed. A hot shower or having your legs down even for a few hours may promote swelling and make the stockings harder to get on.

How can I make the compression stockings easier to put on?

Make sure to put the stockings on first thing in the morning before your legs begin to swell. Moisturize your legs at night rather than just before putting the stockings on since fresh moisturizer may make the skin sticky and more difficult to pull the stockings up. Wearing rubber gloves, like dish washing gloves, usually makes it easier to grip the stocking for the pull up the leg. Use of special aids may be helpful for some patients.

Which stocking is the best?

Stockings come in many different types and styles. For the most part; the material, the color, the style, and the brand of stocking are not as critical as is the proper measurement and fitting. Unless your physician has a particular recommendation regarding a brand or type of stocking – it is most important that the stocking you purchase is the appropriate grade of **compression**

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recommended by your physician and that it is measured and fit correctly for you by someone with training to do it properly. Specific characteristics such as a wide band at the top of the stocking or material components which may make donning easier may be recommended by your doctor.

Figure 1: This is an artist's impression of a compression stocking: **(a)** the compression stocking looks much like a normal stocking but is tighter and has more compression in the foot and less at it comes up the leg, **(b)** in some cases, the stocking is fitted with a zipper to make it easier for the patient to get it on.

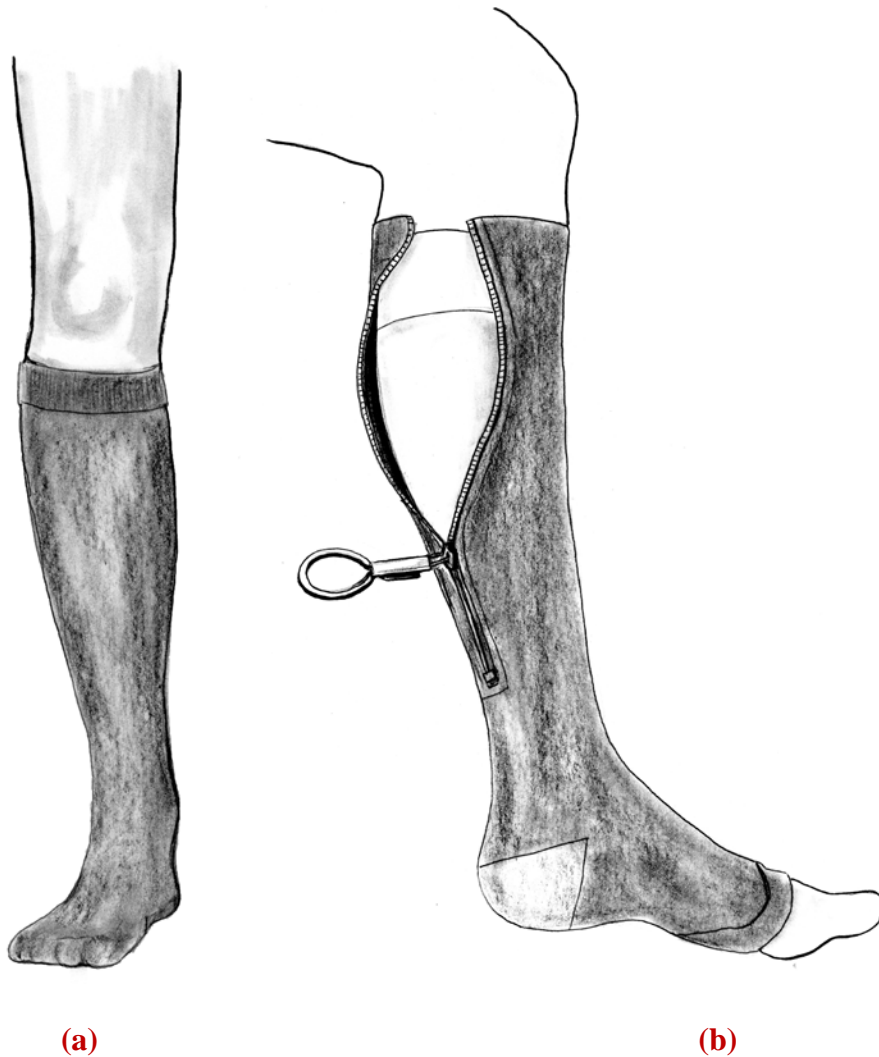
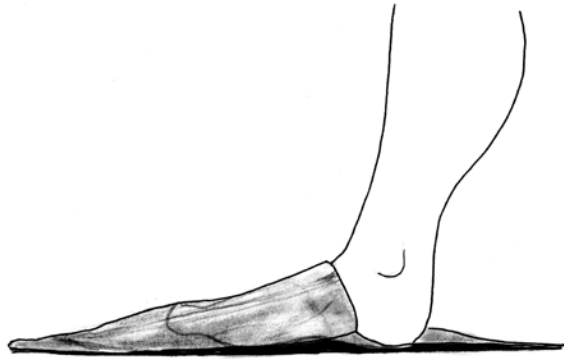


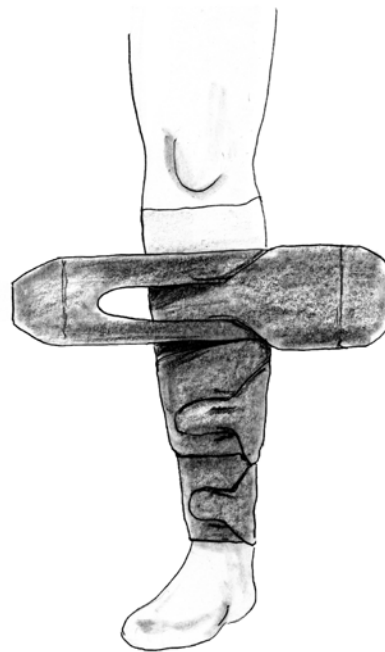
Figure 2: These pictures are an artist's impression of (a) a silk inner which may be fitted on the toes and allows for easier pulling up of the compression stocking and (b) the "butler" device which holds the stocking open so the patient can step into the stocking while pulling up the device to "don" it more easily. The Velcro device (c) is a series of non-elastic bands which are applied to the leg and adjusted to provide best compression. It can be replaced during the day to have the best compression possible with the least discomfort especially in people who have a tough time putting a stocking on.



(a)



(b)



(c)