How Do I Treat
Venous Leg Ulcers?

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The prevalence of active leg ulcers in western countries is estimated to be 1.1 to 3.0 per 1,000 adults. The incidence increases with age. By these estimates, the average family physician could expect to have two to 10 patients with a leg ulcer at any given time. In a recent survey, only 16% of family physicians felt comfortable providing care. Many factors were cited including, lack of knowledge of wound care products, lack of evidence-based protocols, and poor communications with home care agencies. Less than 50% of those surveyed were aware of the effectiveness of compression therapy in treating venous leg ulcers. A thorough discussion of the diagnosis and treatment of venous leg ulcers can be found on the Canadian Association Of Wound Care’s Web site.

What types of leg ulcers are there?

The three most common etiologies of lower extremity ulcers are:

- venous,
- arterial, and
- neuropathic (most commonly associated with diabetic peripheral neuropathy).

Neuropathic ulcers are distinguished from venous and arterial ulcers by location and the presence of associated comorbid conditions. Most neuropathic ulcers occur on the plantar surface of the foot or on the toes. Ten gram monofilament testing will demonstrate the loss of protective sensation in the foot. Venous and arterial ulcers differ in several ways (Table 1). Ulcer appearance is illustrated in Figure 1 and Figure 2. Other less common ulcers of the lower extremity include basal and squamous cell carcinomas and inflammatory ulcers, such as vasculitic, pyoderma gangrenosum, and necrobiosis lipoidica.

Mary’s ulcer

Mary, 68, has a non-healing ulcer over the left medial malleolus, which has been present now for 3 months. She thinks it started when she hit her ankle on the coffee table. She has been using a topical antibiotic ointment without success. She complains of a constant aching pain. The ulcer continues to drain large amounts of serous fluid. The leg has pitting edema to the knee. A course of oral antibiotics also has not helped. There is hemosideran staining to both legs. She is currently quite healthy otherwise, and her only medication is an antihypertensive. Past medical history includes three pregnancies, appendectomy, vein stripping, and a left total hip replacement. She states her mother had a similar problem, and she is really quite worried that she will lose the leg.

What do you do?

See page 99 for the answer.
**Venous Leg Ulcers**

**How do I assess the lower leg?**

Patients with lower extremity ulcers need a directed history and physical examination. There are several risk factors for venous leg ulcers (Table 2). Physical examination should concentrate on the distinguishing characteristics listed in Table 1. Prior to starting therapy, all patients with lower extremity ulcers should have a vascular assessment screening, using a Doppler to determine the adequacy of vascular flow. Few family physicians have appropriate Doppler equipment in their offices, but many enterostomal therapy nurses working for home care agencies do have hand-held Dopplers, and can measure ankle brachial pressure indexes (ABPIs). The ABPI is the ratio of ankle systolic pressure to the brachial systolic pressure (Table 3). Otherwise, referral to a vascular lab is suggested. Ulcers which do not appear to respond to appropriate therapy should be biopsied to rule out other etiologies.

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**Table 1**

**Comparison of venous and arterial ulcers**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Venous</th>
<th>Arterial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Gaiter area</td>
<td>Usually below the ankle</td>
</tr>
<tr>
<td>Size</td>
<td>Usually large</td>
<td>Usually small</td>
</tr>
<tr>
<td>Edges</td>
<td>Irregular</td>
<td>Round, punched out</td>
</tr>
<tr>
<td>Depth</td>
<td>Shallow</td>
<td>May be deep</td>
</tr>
<tr>
<td>Wound bed</td>
<td>Sloughy</td>
<td>Fibrinous</td>
</tr>
<tr>
<td>Exudate</td>
<td>Heavy</td>
<td>Often dry</td>
</tr>
<tr>
<td>Hemosiderin staining</td>
<td>Often present</td>
<td>Usually absent</td>
</tr>
<tr>
<td>Edema location</td>
<td>Generalized</td>
<td>Local</td>
</tr>
<tr>
<td>Varicosities</td>
<td>Often present</td>
<td>Usually absent</td>
</tr>
<tr>
<td>Pulses</td>
<td>Present, may be obscured by edema</td>
<td>Faint or absent</td>
</tr>
<tr>
<td>Capillary refill time</td>
<td>&lt; 5 seconds</td>
<td>&gt; 5 seconds</td>
</tr>
<tr>
<td>Pain</td>
<td>Dull aching pain in ulcers, no history of claudication or rest pain</td>
<td>Usually intense aching pain in ulcer +/- neuropathic type pain; may give history of claudication or rest pain</td>
</tr>
</tbody>
</table>

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**Table 2**

**Risk factors for venous stasis ulcers**

- Gender (female: male ratio = 1.6:1)
- Advanced age
- Multiple pregnancies
- Previous deep vein thrombosis
- Family history
- Previous hip replacement
- Immobility
- Reduced ankle mobility
- Obesity
- Trauma (most venous ulcers start with minor trauma)

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Treating the underlying cause:
The need for compression therapy

Venous leg ulcers are caused by a combination of venous reflux at the ankles, and failure of the calf muscle pump. Venous pressure at the ankle, when standing, is 80 mmHg in most people. Pressures are significantly higher in venous reflux patients, due to failure of the valves to prevent venous backflow. Normally, the calf muscles compress the deep venous system during walking, which pushes the blood back towards the heart. When valvular incompetence combines with calf muscle pump failure, fluid and macromolecules...
leak from the venous system into
the surrounding tissue creating
inflammation and hypoxia. Minor
trauma quickly leads to a signifi-
cant skin breakdown. A Cochrane6
review of 22 randomized controlled
trials demonstrated compression
therapy is key to treating venous leg
ulcers. The conclusions of the
review are summarized as follows:
• Compression is more effective
than no compression at all.
• Multi-layered compression systems
are more effective than single lay-
ered systems.
• In multi-layered compression sys-
tems, elastic systems are more
effective than inelastic systems.
• There are no statistically
significant differences among
multi-layered elastic systems.

How do I choose the best therapy?

It is important to remember the best
compression therapy is the one the
patient will wear. To make an informed
choice amongst the various compres-
sion therapies available, it is useful to
understand the factors that determine
sub-bandage pressure. Sub-bandage
pressure is determined by four factors
whose interrelationship is summarized
in the Modified Law of Laplace (Table 4).

The next step in choosing a bandage system is to
understand the differences between the various systems,
and to classify them according to type. One useful sys-
tem divides compression bandages into elastic and
inelastic systems, and furthermore, subdivides into high
and low compression (Table 5). In elastic systems, the
pressure is generated externally by elastic forces within
the bandage, while the expansion of the calf muscles
with activity against the relatively rigid inelastic system
generates the pressure internally in this type of bandage.
Examples of elastic compression systems are shown in
Table 6 and inelastic systems are detailed in Table 7.

While cohesive bandages do have some stretch, they
are best considered to be inelastic systems. Compression
stockings are classified as elastic systems. In general,
Compression stockings are best used for controlling edema once a venous leg ulcer has healed, rather than providing compression therapy aimed at healing ulcers. Class I stockings (20 mmHg to 30 mmHg) provide low compression and, in most jurisdictions, are available over the counter. Class II (30 mmHg to 40 mmHg) and Class III stockings (40 mmHg to 50 mmHg) are high compression systems and usually require a prescription.

### Mary’s treatment

The examination of Mary’s leg is consistent with venous stasis disease. Ankle brachial pressure indexes were 0.9. Mary was referred to home care, and a trial of a four-layer bandage system is started. Within two weeks the ulcer was 30% smaller. It healed in three months. Compression stockings were prescribed, and Mary remains ulcer-free a year later.

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>One layer</td>
<td>Tensors</td>
</tr>
<tr>
<td>High</td>
<td>Two layer</td>
<td>Surepress™</td>
</tr>
<tr>
<td>High</td>
<td>Four layer</td>
<td>Proguide™, Profore™, Fourpress™</td>
</tr>
</tbody>
</table>

### How do I apply therapy?

Before applying compression therapy, a complete lower limb assessment must take place to determine the appropriateness of this therapy. Select a compression therapy that is consistent with patient-centred concerns and with the leg ulcer. High pressure elastic compression therapy should only be used if ABPI is > 0.8 and < 1.2. Inelastic systems are often better tolerated if pain is an issue, while zinc oxide systems are useful if there is stasis dermatitis. The compression therapy should be changed as needs and tolerance change. High-compression systems are more effective, but many patients cannot tolerate

- Lipid levels should be monitored periodically and, if necessary, the dose of LIPITOR adjusted based on target lipid levels recommended by guidelines. Caution should be exercised in severely hypercholesterolemic patients who are also renally impaired, elderly, or are concomitantly being administered digoxin or CYP 3A4 inhibitors.
- Liver function tests should be performed before the initiation of treatment, and periodically thereafter. Special attention should be paid to patients who develop elevated serum transaminase levels, and in these patients, measurements should be repeated promptly and then performed more frequently.
- The effects of atorvastatin-induced changes in lipoprotein levels, including reduction of serum cholesterol on cardiovascular morbidity, mortality, or total mortality have not been established.

† A patient-year represents the total time of exposure to LIPITOR as defined by the sum of each patient time on LIPITOR.
1. I have a fetal heart rate Doppler in my office. Can I use it to do ankle branchial pressure indexes?
No. The frequency of the probe is designed to pick fetal heart blood flow and penetrates too deeply for the peripheral blood vessels. You can purchase a separate probe, but the probe accounts for the majority of the cost of the Doppler.

2. Can I use tensor bandages for compression therapy?
Tensor bandages have been shown consistently to be inferior to compression systems in healing venous leg ulcers. The problem is consistency of application and failure to keep them on 24 hours a day. Multi-layer systems consistently outperform other types of compression therapies in healing venous leg ulcers.

3. Why can we not use compression stockings to heal venous leg ulcers?
It is very difficult to get the stockings on over the absorptive bandages required. They also tend to be worn very inconsistently, leading to much lower healing rates. One study is quoted in the Cochrane review in which compression stockings plus a thrombo stocking were shown to be more effective than short stretch bandages.

4. How often should compression bandages be changed?
Initially they will have to be changed every 24 to 48 hours until the edema in the leg is controlled and exudate reduces. Wear times can then gradually be increased up to seven days.

5. Are there any prevention strategies besides compression stockings?
There are multiple strategies. Surgery aimed at subfascial ligation of leaking perforators has been shown to be successful in preventing reoccurrence of venous leg ulcers. Other forms of venous surgery have more questionable outcomes. Since one of the factors is failure of the calf muscle pump, physiotherapy aimed at improved ankle mobility and strengthening calf muscle pump function is helpful. Compression stockings, however, remain the cornerstone of prevention. New stockings must be purchased every 6 to 12 months, as they lose their elasticity with washing.

them initially. Often, it is best to start with a lower compression system and increase gradually. As edema reduces, bandages often fall off and initially the system will need to be changed every 48 hours. Most systems can be worn for up to seven days, as edema subsides and exudate decreases.
Venous Leg Ulcers

The treatment of venous leg ulcers can be accomplished by family physicians in partnership with home care nursing.

Prior to initiating compression therapy, a full lower leg assessment should be undertaken, including an assessment of arterial flow. Other etiologies need to be ruled out.

When arterial flow is adequate, it is safe to use high compression systems, which have been shown to be most effective in healing venous leg ulcers.

Table 7

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Cohesive+padding</td>
<td>Coban™+cast padding Rolflex™</td>
</tr>
<tr>
<td>Low</td>
<td>Zinc oxide bandage+</td>
<td>Unna’s Paste Boot</td>
</tr>
<tr>
<td>Moderate</td>
<td>Gauze zinc oxide bandage +/-</td>
<td>Modified Duke Boot</td>
</tr>
<tr>
<td>Moderate</td>
<td>Velcro system</td>
<td>Circaid™</td>
</tr>
<tr>
<td>Moderate to high</td>
<td>Short stretch system</td>
<td>Comprilan™</td>
</tr>
</tbody>
</table>

References