



Assessing leg ulcers

In this series, we present authoritative advice on the investigation of a common clinical problem, specially commissioned for family doctors by the Board of Continuing Medical Education of the Royal Australasian College of Physicians.

JEFF ROWLAND

MB BS, FRACP

DAVID VESELIC

MB BS

Dr Rowland is the Director of Aged Care, Liverpool Hospital, Sydney, NSW. Dr Veselic is GP Registrar, Port Macquarie, NSW.

Series Editor

CHRISTOPHER S. POKORNY

MB BS, FRACP

Dr Pokorny is a member of the Board of Continuing Education, Royal Australasian College of Physicians, and a Gastroenterologist in private practice, Sydney, NSW.

Leg ulcers are a common source of morbidity in the community and are particularly prevalent in the elderly.¹ Typically, leg ulceration is a chronic condition, and some ulcer types have a propensity to recur. These features create a difficult management challenge for a variety of healthcare professionals. This article focuses mainly on the more common types of leg ulcer encountered in clinical practice and their assessment.

What is the prevalence of leg ulcers?

There are limited Australia-wide data on the prevalence of leg ulcers. One Australian study published in 1994 cited a prevalence for chronic ulceration of 1.1 per 1000 population.¹ In this study, prevalence was similar in men and women, and increased with age. Another Australian survey conducted around central Sydney in the same year found that the ulcers in 100 patients persisted for a mean of 12.6 years. It also estimated that the nursing costs associated with ulcer treatment for these 100 patients would be \$250,000 per annum (Hyde, Bagia and McMullin, personal communication). Overall, 92% of these patients had venous ulceration, one-third had a degree of arterial insufficiency, and 6% had diabetes. Only eight of the patients with venous insufficiency had received adequate compression therapy. Although all patients had seen a GP and most had consulted a specialist at some time, the community nursing

service had received no diagnosis or management plan for any of the patients.

What are the causes of leg ulcers?

There are numerous causes of leg ulceration, but most (70%) occur as a result of venous disease. Mixed venous and arterial disease is responsible for about 20% of all ulcers, whereas peripheral arterial disease alone is the cause of about 5% of ulcers.² Ulcers caused by peripheral neuropathy (often due to diabetes) and pressure ulcers are also relatively common.

Malignancy (such as squamous cell and basal cell carcinoma) and inflammatory conditions (such as vasculitis due to rheumatoid arthritis, and pyoderma gangrenosum) account for a relatively small number of leg ulcers. However, their presence must be considered as they can coexist with the common ulcer types.

The importance of identifying the underlying cause of a patient's leg ulcer cannot be stressed enough, as it is this that directs further management decisions (as opposed to deciding which dressing to apply).

What are the common types of ulcers?**Venous ulcers**

Venous insufficiency or incompetence with chronic ambulatory hypertension is the underlying cause of venous ulcers. The calf muscle pump usually

IN SUMMARY

- Treatment of a leg ulcer depends on the underlying aetiology.
- Most chronic leg ulcers are due to venous and/or arterial disease.
- Malignancy can mimic or coexist with the common causes of leg ulceration.
- If an ulcer fails to heal, review the diagnosis and consider a tissue biopsy.
- In leg ulcer management, failure to heal is the most common reason for specialist referral of patients.

Table. Typical features of venous and arterial ulcers³

| Feature | Venous ulcers | Arterial ulcers |
|------------|--|--|
| History | Patients often have history of DVT, varicose veins, trauma of leg fractures | Patients often have other diseases associated with ateriopathy – e.g. diabetes, myocardial infarction, cerebrovascular disease |
| Pain | Patients may have no pain, or they may have a nagging ache | Patients may have intermittent claudication and often marked pain on resting that is relieved by leg dependency |
| Location | Often located in the gaiter area over the medial malleolus | Often located over the pressure points of the toes and ankles |
| Appearance | Usually shallow with moderate amounts of exudate, may occupy the entire circumference of the leg, may be hyperpigmented; skin may be indurated, often associated with eczema and peripheral oedema | Usually have characteristic ‘punched out’ appearance and are well demarcated; surrounding skin may be cool, dry and hairless with diminished peripheral pulses |

works during walking to reduce venous pressure; however, in patients with valvular incompetence of the venous system, pressure becomes high on exertion. Arthritis, obesity and a sedentary lifestyle (increasingly common in our ageing population) can all contribute to failure or disuse of the calf muscle pump. However, the means by which elevated venous pressure leads to skin ulceration is not clear and various theories exist.

Venous ulcers are usually shallow with moderate amounts of exudate. Typically, they are located in the gaiter area of the leg over the medial malleolus (Figure 1). They can exist as a single entity or in multiples and can occupy the entire circumference of the leg. Although these ulcers are often said to be painless, patients do complain of a nagging ache, especially when the legs are swollen.

The surrounding skin often provides useful clues to assist in making a diagnosis of venous ulceration. Hyperpigmentation and induration of the skin are indicative of longstanding venous disease. Eczema and peripheral oedema are also common findings (Table).

Arterial ulcers

Arterial ulcers (Figure 2) occur as a result of arterial circulation occlusion due to atherosclerosis or emboli. Symptomatically, the classic presentation includes intermittent claudication, but often quite marked pain on resting intervenes. The ulcers have a characteristic ‘punched out’, well demarcated appearance and are often located over the pressure



Figure 1. Venous ulcers are usually shallow with moderate amounts of exudate. Typically, they are located in the gaiter area of the leg over the medial malleolus.

points of the toes and ankle. The surrounding skin may be cool, dry and hairless with diminished peripheral pulses (Table).

Neuropathic ulcers

Neuropathic ulcers result from trauma to areas of diminished sensation (which can be quite minimal) and are often not detected by the patient. They are common, particularly in patients with diabetes, and concomitant arterial disease must always be excluded in affected patients. Neuropathic ulcers are painless and deep with a thick surrounding callus (Figure 3). Osteomyelitis is more likely to occur in patients with neuropathic ulcers than in those with other ulcer types.

Other causes of leg ulcers

Malignant ulcers can present with the typical features of melanoma, squamous or basal cell carcinoma (Figure 4). However, malignancy should be suspected if an ulcer enlarges rapidly or

continued



Figure 2. Arterial or ischaemic ulcers have a characteristic 'punched out', well demarcated appearance and are often located over the pressure points of the toes and ankle.



Figure 3. Neuropathic ulcers, which are common in patients with diabetes, are deep with a thick surrounding callus.

has failed to heal despite treatment.

Patients with rheumatoid arthritis can have ulcers that are multifactorial in origin, and skin biopsy is often needed to distinguish the cause of the ulceration. As mentioned previously, impaired mobility can lead to failure of the calf muscle pump, thus predisposing patients to venous ulceration, and vasculitis can also be a cause of ulceration in patients with rheumatoid arthritis.

Pyoderma gangrenosum, which can occur in association with a number of inflammatory conditions, is another rare cause of leg ulceration. Such ulcers have characteristically 'undermined' and ragged ulcer edges. Biopsy is not always diagnostic for this type of ulcer but should be considered when an ulcer develops rapidly.

Skin tears occur in patients with frail thin skin. Most often this is in the elderly and those people who have been taking corticosteroids in the long term.

Pressure areas tend to manifest over bony prominences and mostly in patients with restricted mobility. They develop after a skin area becomes necrotic following prolonged ischaemia due to compression of blood flow against another object (usually the bed or the floor). Any cause of reduced skin oxygenation, whether it be anaemia, hypoxia or peripheral

vascular disease, will lower the threshold required to develop ulceration (Figure 5).

How should patients be assessed initially?

The best treatment for a leg ulcer depends on an accurate diagnosis being obtained and the underlying aetiology determined. A comprehensive history and examination will provide this in most cases. In addition, an understanding of the pathophysiology and clinical aspects of the different types of ulcers is useful (see above and Table).

History

Taking the patient's history is the first step in the assessment. Ask questions relating to the following.

- The ulcer itself – for example:
 - How long have they had the ulcer?
 - Has it changed in size over time?
 - Did something trigger it, such as trauma or prolonged bed rest?
 - Are there associated symptoms such as pain? (This may indicate infection, especially if the nature of the pain has changed.)
 - What is the history of the ulcer, and if it has recurred how was it managed previously? (Venous ulcers tend to recur.)
- Medications they are taking – in

particular, the use of corticosteroids and other immunosuppressants.

- Comorbidities – for example:
 - Is there a history of diabetes, autoimmune disease, deep venous thrombosis, orthopaedic surgery, peripheral neuropathy or mobility issues?
 - What about other vascular risk factors (such as smoking, dyslipidaemia, hypertension)?
- Their occupation – for example, the prolonged standing necessary in some occupations can complicate the management of venous insufficiency.

Examination

Examination should begin with the ulcer itself. It is important to document regularly the size, shape, margins, depth and location of the ulcer. Photographic records are ideal as a means of providing a comparison at follow up; alternatively, a tracing may be helpful.

The patient's legs should be examined for varicosities and signs of peripheral oedema, and the skin surrounding the ulcer should be checked for pigmentation changes.

Neurovascular assessment of the lower limbs, including peripheral pulses, capillary refill and sensory examination (light touch, pin prick, vibration, deep tendon

reflex) can provide useful additional information on the underlying aetiology of the ulcer. Musculoskeletal examination may reveal conditions such as rheumatoid arthritis or an immobile ankle (which reduces use of the calf muscle pump).

Useful investigations

Although the history and examination are the cornerstones of leg ulcer management, there are situations in which additional investigations may help to confirm or add certainty to a diagnosis. This is especially relevant when the ulcer is atypical or has 'mixed' characteristics.

- **Ankle brachial pressure index (ABPI):** this is a very useful bedside test to help rule out peripheral arterial disease, which coexists in up to 25% of patients with presumed venous ulcers. The presence of mixed arterial and venous disease is important to note, particularly when considering that the standard therapy for venous ulceration (compression bandaging) can make arterial ulcers worse and generally precludes its use. An ABPI value of 1.0 is normal, whereas a reading of less than 0.8 suggests arterial disease and warrants referral of the patient to a vascular surgeon. It is important to remember that falsely elevated results can occur when the arteries are noncompressible, which is often the case in patients with diabetes. In such cases, the waveform will be monophasic rather than triphasic (the normal waveform).
- **Colour duplex ultrasonography:** this is considered by many to be the gold standard for evaluating vascular disease as it provides information on both anatomy and function. However, it is not a routine investigation in our practice, particularly for patients with clinically straightforward venous ulceration, as it is expensive and can be difficult to organise. Ultrasound can identify a subset of patients who have normal deep veins with only superficial venous incompetence.



Figure 4. A malignant ulcer (melanoma). Suspect a melanoma if an ulcer enlarges rapidly or has failed to heal despite treatment.

- **Blood glucose measurements:** such measurements will confirm or exclude diabetes.
- **Radiography and bone nuclear scanning:** these investigations should be considered in patients who have 'deep' ulceration to exclude underlying osteomyelitis (osteomyelitis is unlikely in cases of venous ulceration).

When is it appropriate to take a swab for microbiology?

Although there are some proponents of performing a wound swab at the initial assessment, this is not our practice. We believe that bacterial swabbing should be performed only if there are signs of clinical infection – for example, cellulitis or sepsis. Chronic leg ulcers are subject to colonisation by bacteria, and so a swab in the absence of a clinical infection could result in the inappropriate use of antibiotics.

When is it appropriate to perform a biopsy?

It is reasonable to perform a tissue biopsy through the edge of the ulcer when no obvious cause for the ulcer can be



Figure 5. Pressure ulcers develop after a skin area becomes necrotic after prolonged ischaemia during compression of blood flow against another object.

determined clinically or when a more rare cause is thought to be complicating or mimicking one of the common causes. A skin biopsy is also reasonable in patients with ulcers that have not shown signs of improvement despite a suitable duration of appropriate therapy (two to three months).

When should patients be referred?

Referral of patients to a wound clinic, dermatologist and/or vascular surgeon depends on the clinical circumstances. The most common reason for specialist referral in leg ulcer management is failure to heal. Other reasons include situations of diagnostic uncertainty, especially when a more rare cause of ulceration, a malignancy, or an inflammatory condition is suspected. Pain, contact dermatitis and persistent oedema despite compression and elevation are often difficult conditions to manage. Patients who have ABPI abnormalities also warrant referral.

Why do some ulcers not heal?

Risk factors associated with nonhealing ulcers include a large wound area (greater than 5 cm²) and wounds of long duration. These are important factors to consider when starting treatment, particularly since almost 50% of venous ulcers will not have healed after six months' therapy.

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Being elderly, malnourished, and deficient in vitamins and trace metals are all perpetuating factors that can delay healing. These dietary factors are especially relevant in frail elderly patients. Regular reviews, which should include documentation of

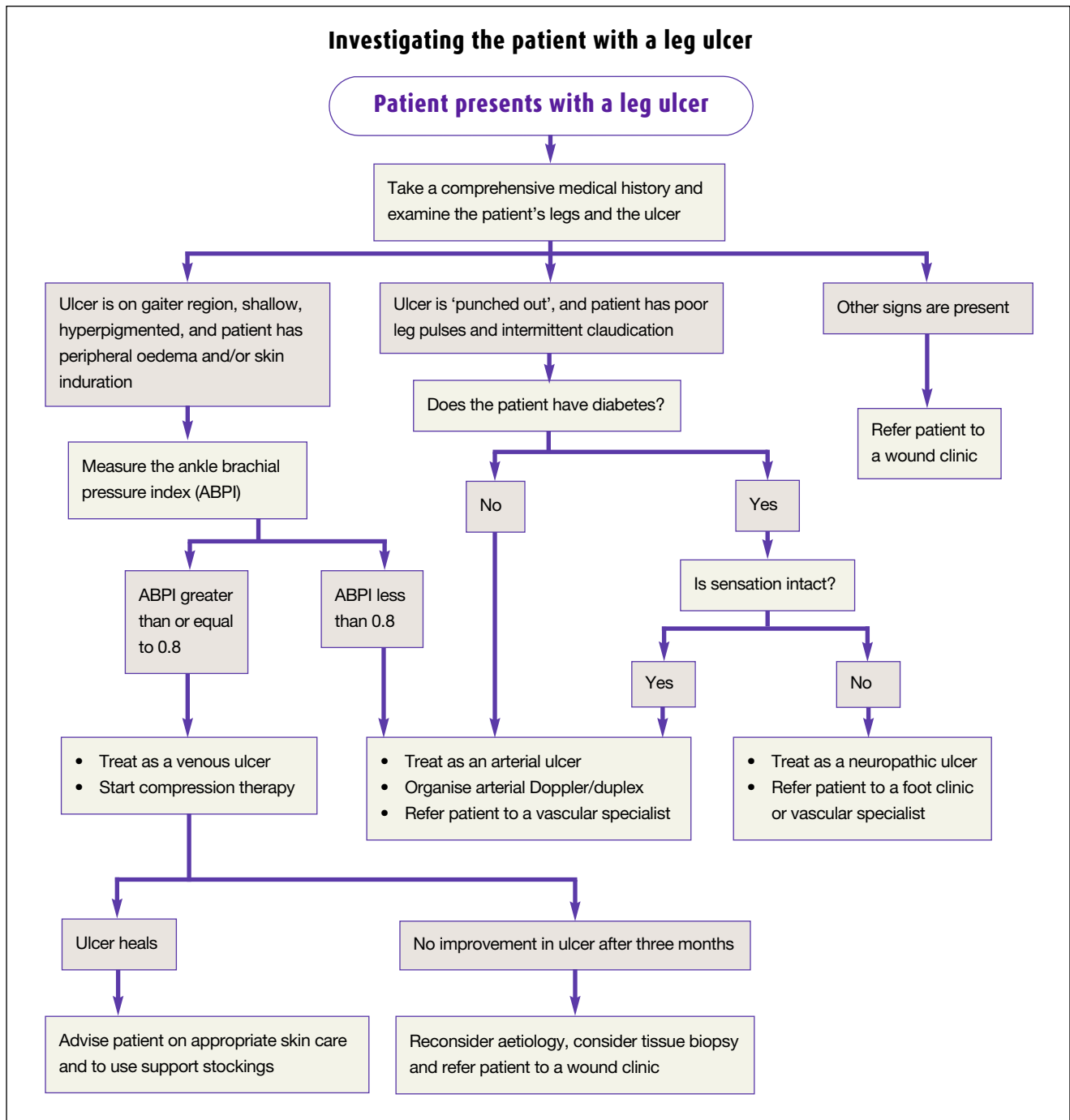
ulcer size, are vital to ensure that the ulcer is healing appropriately.

Starting treatment

Treatment depends on the aetiology of the ulcer; here we limit our brief discussion to

the management of common venous and arterial ulcers.

The mainstays of treatment for venous ulcers are leg elevation and compression therapy. Compression bandaging enhances ulcer healing rates and prevents



recurrence, and it is recommended that this treatment be continued long after the ulcer has healed. Compression bandaging techniques vary, but the technique chosen must be sufficient to minimise oedema.

Educating the patient about compression is a crucial aspect of treatment, as well as a means of encouraging compliance. The correct technique for application of an elastic bandage is extremely important. The bandage needs to extend from the toe to the knee and overlap by 50% on each turn with a constant tension. This leads to a change in pressure that is inverse to the radius of the leg, creating a graduated compression that provides a higher pressure at the ankle than at the calf.

Walking is beneficial because it promotes the action of the calf muscle pump. Prolonged standing or sitting with feet on the floor is best avoided. When elevated, the ankle should be above the level of the heart if possible. When patients are in bed, this is best achieved when the foot of the bed is elevated.

In patients who are identified as having superficial venous incompetence and a normal deep venous system, surgery may prevent further ulceration.

Revascularisation should be considered for patients who have arterial ulcers. Options such as bypass grafting and angioplasty are best reviewed by a vascular surgeon. Pain control and management of vascular risk factors (such as cessation of smoking, use of aspirin, reduction of beta-blockade) are all important aspects of treatment.

For both ulcer types, skin grafting is an option for patients whose ulcer fails to heal despite therapy; however, it is preferable that the ulcer has reached the granulating phase before grafting is attempted.

The choice of dressing used will be dictated by the nature of the wound and, particularly, by the presence of exudate or slough.

Summary

Although most leg ulcers are a result of venous disease, other causes must be considered. The history and examination provide the most valuable diagnostic information. Judicious use of simple investigations can assist in diagnosis and help guide further management. The flowchart on page 54 summarises the diagnostic pathway for patients presenting with leg ulcers, and shows how diagnosis can affect management decisions.

It is treatment of the underlying disease

rather than the choice of dressing that leads to ulcer healing. **MT**

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